Wisconsin Farmers' Institutes : a hand-book of agriculture. A report of the nineteenth annual closing Farmers' Institute, held at Eau Claire, Wisconsin, March 7, 8, 9, 1905. Bulletin No. 19 1905

Wisconsin Farmers' Institutes
Milwaukee, Wisconsin: Evening Wisconsin Co., 1905

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"Probably the Farmers' Institute Movement has done more to help the farmers of the United States and Canada during the past ten years than any other one agency."—G. C. CREELMAN, President Ontario Agricultural College.

"He who maketh two ears of corn, or two blades of grass to grow upon a spot of ground, where only one grew before, deserves better of mankind, and does more essential service to his country than the whole race of politicians put together."—DEAN SWIFT.

Chas. L. Hill, Rosendale, Wis. President Wisconsin Dairyman's Association.

WISCONSIN

Farmers' Institutes

A HAND-BOOK OF AGRICULTURE.

BULLETIN No. 19
1905

A Report of the Nineteenth Annual Closing Farmers' Institute, Held at Eau Claire, Wisconsin, March 7, 8, 9, 1905.

"The test of national welfare is the intelligence and prosperity of the farmer."
George William Curtis.

EDITED BY
GEO. McKERROW,
SUPERINTENDENT.

SIXTY THOUSAND COPIES ISSUED.

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Eau Claire, Wis.

STENOGRAPHIC REPORT BY
MRS. A. L. KELLY,
CHICAGO, ILL.

Printed by
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Milwaukee, Wis.

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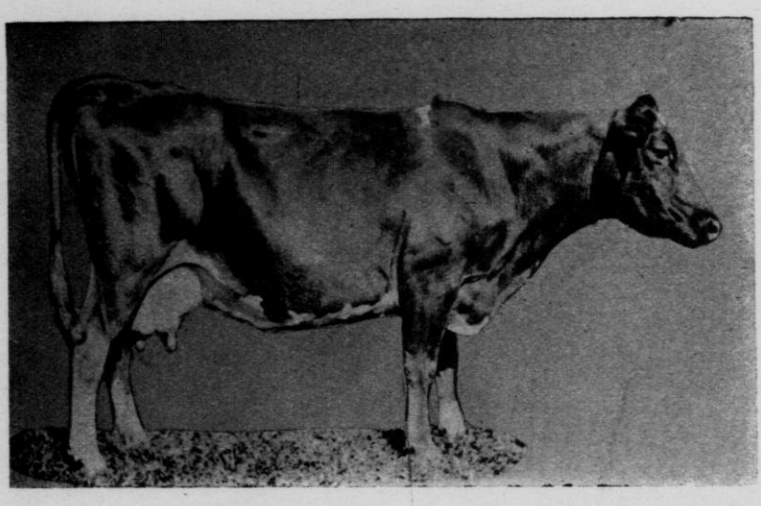


Yeksa Sunbeam, No. 15439; Owner, Fred Rietbrock, Milwaukee, Wis.; Breeder, W. D. Richardson, Garden City, Minn.; Dropped, April 2, 1895; Dam and Grand-dam Both Bred in Wisconsin; Freshened, September 11, 1904; Test, October 1, 1904, A. M., to September 30, 1905, P. M.; Requirements for Admission— Milk, 10,000 lbs.; Fat, 360 lbs.

RECORD.

Month.	Milk Lbs.	Per Cent. Butter Fat.	Butter Fat Lbs.
October, 1904	1428.2	5.69	81.26
November, 1904	1322.5	5.62	74.32
December, 1904	1294.4	6.08	78.70
January, 1905	1217.0	6.04	73.51
February, 1905	1060.8	5.75	61.00
March, 1905	1185.1	6.05	71.70
April, 1905	1089.6	5.79	63.09
May, 1905	1127.5	5.75	64.83
June, 1905	1158.4	5.25	60.82
July, 1905	1266.0	5.88	74.44
August, 1905	1463.8	5.42	79.34
September, 1905	1307.5	5.67	74.14
Totals	14920.8	Av. 5.75	857.15

Pounds of butter 1000.01. This is the world's official record for a Guernsey cow, the next highest, 912 pounds, being made by Lilly Ella, a Wisconsin cow.

LETTER OF TRANSMITTAL.

HON. M. C. MEAD,

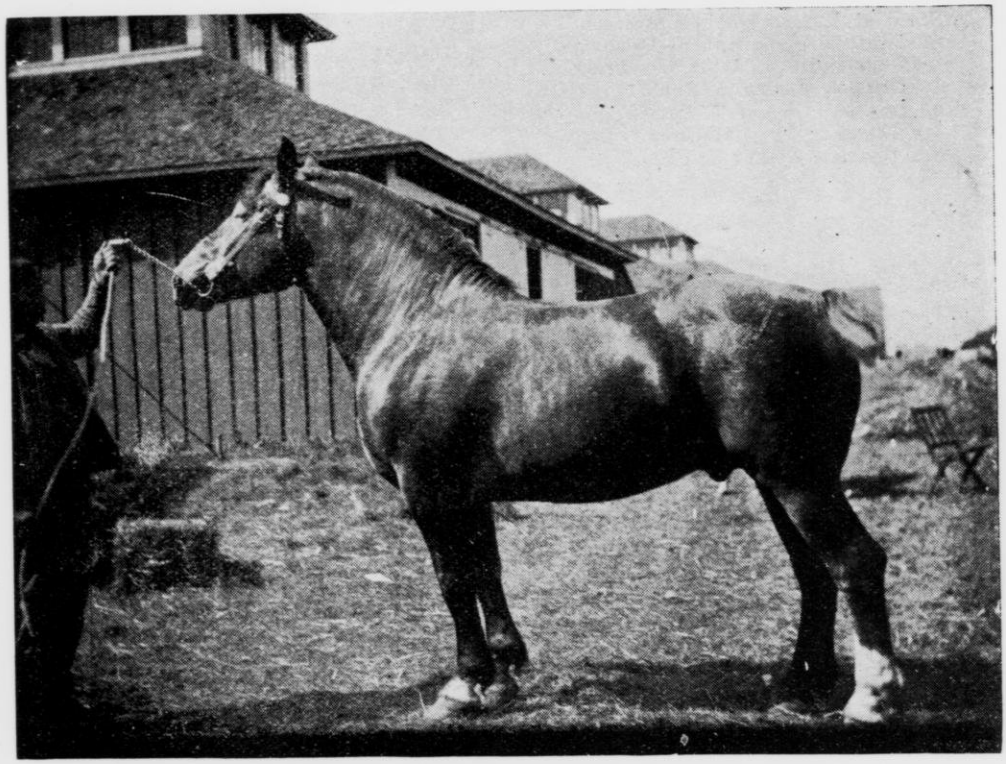
President of the Board of Regents, University of Wisconsin:

SIR:—I have the honor of herewith presenting to you Bulletin No. 19, of Wisconsin Farmers' Institutes.

Most respectfully yours,

GEORGE McKERROW, *Superintendent.*

Madison, Wis., Nov. 22, 1905.



Honorable, Champion Percheron Stallion, Wisconsin State Fair, 1905. Owned by W. L. Houser, Madison, Wis.

UNIVERSITY OF WISCONSIN.

Board of Regents.

The President of the University, *ex-officio.*

The State Superintendent of Public Instruction, *ex-officio.*

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State at Large, Almah J. Frisby.
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3d District, Dwight T. Parker.
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8th District, Edward E. Browne.
9th District, Orlando E. Clark.
10th District, George F. Merrill.
11th District, August J. Myrland.

E. F. Riley, Secretary.

Organization.

The University embraces—
- The College of Letters and Science.
- The College of Mechanics and Engineering.
- The College of Law.
- The College of Agriculture.
- The Graduate School.

The College of Letters and Science embraces—
- General Courses in Liberal Acts.
- Special Courses, which include:
  - Commerce.
  - Pre-Medical Studies.
  - Pharmacy.
  - Education.
  - Music.
  - Home Economics.

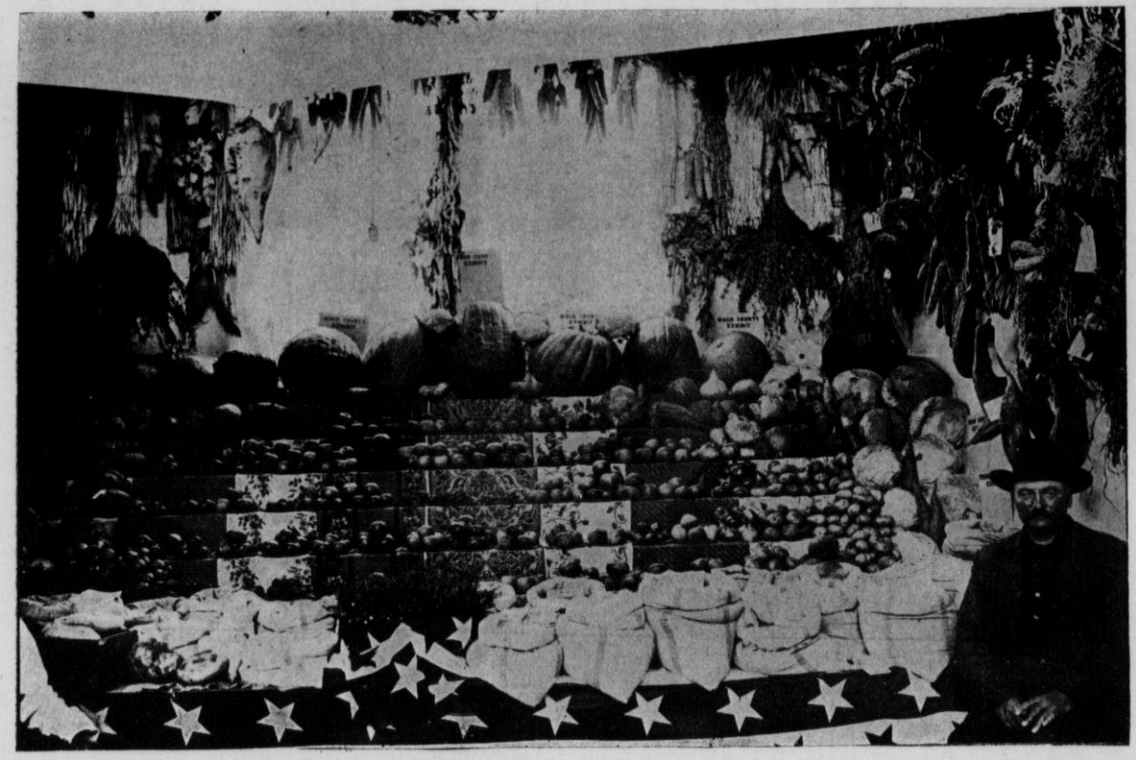
The College of Mechanics and Engineering embraces—
- The Civil Engineering Course.
- The Sanitary Engineering Course.
- The Mechanical Engineering Course.
- The Electrical Engineering Course.
- The Applied Electrochemistry Course.
- The General Engineering Course.
- The Mining Engineering Group of Electives.

The College of Agriculture embraces—
- The Experiment Station.
- The Long Agricultural Course.
- The Short Agricultural Course.
- The Dairy Course.
- The Farmers' Institutes.

The College of Law embraces—
- A Three Years' Course.

Branches of Study.

The University presents a wide range of study, embracing more than three hundred subjects. Something of the extent and variety of these may be indicated by the following synopsis: Eleven languages are taught, viz.: Greek, Latin, Sanscrit, Hebrew, German, Norse, French, Italian, Spanish, Anglo-Saxon and English. In Mathematics there are twenty-seven special courses. Under the Sciences there are a large number of courses in each of the following: Astronomy, Physics, Chemistry, Geology, Mineralogy, Zoology, Botany, Anatomy, Bacteriology, Pharmacy. In History there are thirty-five courses; in Political Economy, fifty-eight; in Political Science, twenty-nine; in Mental Sciences there are twenty-nine, embracing Psychology, Ethics, Aesthetics, Logic and Education. There are twelve courses in Pedagogics, and eight courses in Music, and two courses each in Military Drill, and Gymnastics.



Wood County Exhibit at Wisconsin State Fair, 1905; Awarded First Prize.

Physical Culture:—The Armory and Gymnasium is one of the largest buildings for its purposes connected with any institution of learning in the country. It is provided with rooms for lectures on Physiology and Hygiene, and for class and individual exercise in all the forms of gymnastic practice. There are also the most abundant and approved facilities for shower, sponge, and swimming baths.

Adequate accommodations are provided for the woman's gymnastics by the construction of an addition to Chadbourne Hall, which has been fully equipped. This furnishes ample facilities for systematic courses for young women, and is under the immediate direction of a trained instructor.

In Mechanics and Engineering:—Elementary Mechanics, Mechanics of Material, Mechanics of Machinery, Theory of Construction, Thermodynamics, Elementary Surveying, Railroad and Topographic Surveying, Geodesy, Sanitary, Hydraulic, Railroad, Electrical, Steam Engineering, Hydraulic Motors, Hoisting Machinery, Theory and Construction of Locomotives, Railway Locomotives, Railway Location, Railway Equipment, Construction and Maintenance of Way, Railroad Field Work.

In Electricity:—Electrical Testing, Electrical Plants, Electrical Construction, Electrochemistry, and various forms of drawing are given; also shop work in wood, iron, brass, both hand work and machine work, machine designing, construction and testing machines.

In Agriculture:—Various courses are given in agriculture. Animal Husbandry, Farm Management, Dairying, Agricultural Chemistry, Veterinary Science, Agricultural Physics, Horticulture and Economic Entomology, etc.

In Law:—Courses in Equity, Jurisprudence, Real Property, Constitutional Law, Wills, Contracts, Torts, Practice and Pleading, Law of Evidence, Corporations, Domestic Relations, Admiralty, Insurance, Estoppel, Partnership, Taxation, Criminal Laws, Common Carriers, Medical Jurisprudence, Probate Law, Code Practice, Agency, etc.

In Pharmacy:—Courses in Practical Pharmacy, Pharmaceutical Chemistry, Materia Medica, Pharmaceutical Botany, and Practical Laboratory Work.

General Facilities:—The Faculty embraces upward of two hundred and fifty-seven instructors. The laboratories are new, extensive and well equipped; embracing the Chemical, Physical, Metallurgical, Mineralogical, Geological, Zoological, Botanical, Bacteriological, Civil, Electrical and Mechanical Engineering, Agricultural and Pharmaceutical Laboratories. **Seminaries** are held for advanced study in History, Language, Literature, Mathematics, and other branches.

The libraries accessible to students embrace that of the University, 96,000 volumes; of the State Historical Society, 259,000 volumes, including pamphlets; of the State Law Department, 40,000 volumes; of the city, 15,000 volumes, besides special professional and technical libraries, making in all more than 405,000 volumes, including pamphlets, thus affording very exceptional opportunities for reading and special research.

Any person who desires information in regard to any of the colleges or schools, should apply to

W. D. HIESTAND,
Registrar.

Wisconsin Farmers' Institute Workers in Attendance at the Round-up at Eau Claire

UNIVERSITY OF WISCONSIN.

COLLEGE OF AGRICULTURE.

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H. L. RUSSELL.....*Professor of Bacteriology.*
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IDA HERFURTH.....*Executive Clerk.*
SOPHIE M. BRIGGS.....*Librarian.*

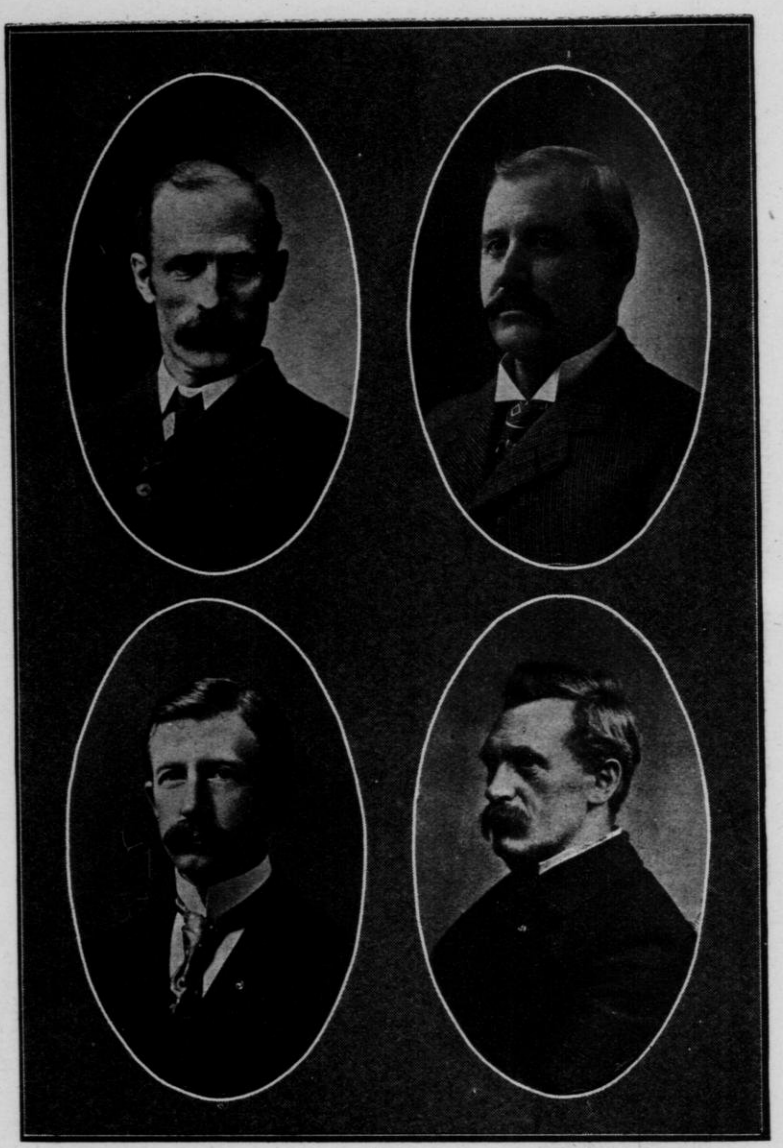
Farmers' Institutes.

GEORGE MCKERROW, Superintendent.
NELLIE E. GRIFFITHS, Clerk and Stenographer.

1. The Agricultural Experiment Station is devoted to a study of problems incident to the agricultural development of our commonwealth. It is supported jointly by the general government and the State of Wisconsin. An annual report and frequent bulletins are issued and distributed gratuitously among the farmers of the State. Any Wisconsin farmer wishing to receive these reports and bulletins regularly should send his request on a postal card addressed to **Agricultural Experiment Station, Madison, Wis.**

II. Agricultural Instruction at the University. The College of Agriculture offers instruction in agriculture to college graduates, a four years' course leading to the degree of Bachelor of Science, special instruction to students of mature years, instruction in the Short Course in Agriculture requiring two winter terms of fourteen weeks each, a course in Dairying lasting one term of twelve weeks, and a two-weeks course for busy farmers. For information concerning these courses address **W. A. Henry, Dean, College of Agriculture, Madison, Wis.**

III. The Farmers' Institute. Each year this practical school for the farmer holds more than a hundred two-day meetings in the farming districts of our commonwealth. These meetings are for practical instruction and conference on all matters pertaining to the farm and farm life, and at them 60,000 copies of the Farmers' Institute Bulletin are distributed annually. Any community can secure an institute upon early application to the Superintendent. For further particulars concerning this school for the farmer, write **George McKerrow, Supt., Madison, Wis.**



Dwight T. Parker.
Edw. E. Browne.

H. C. Taylor.
Orlando E. Clark.

Four of the Five Members of the Farm Committee of the Board of Regents.

Wisconsin Farmers' Institutes for 1905-1906.
Arranged by Counties.

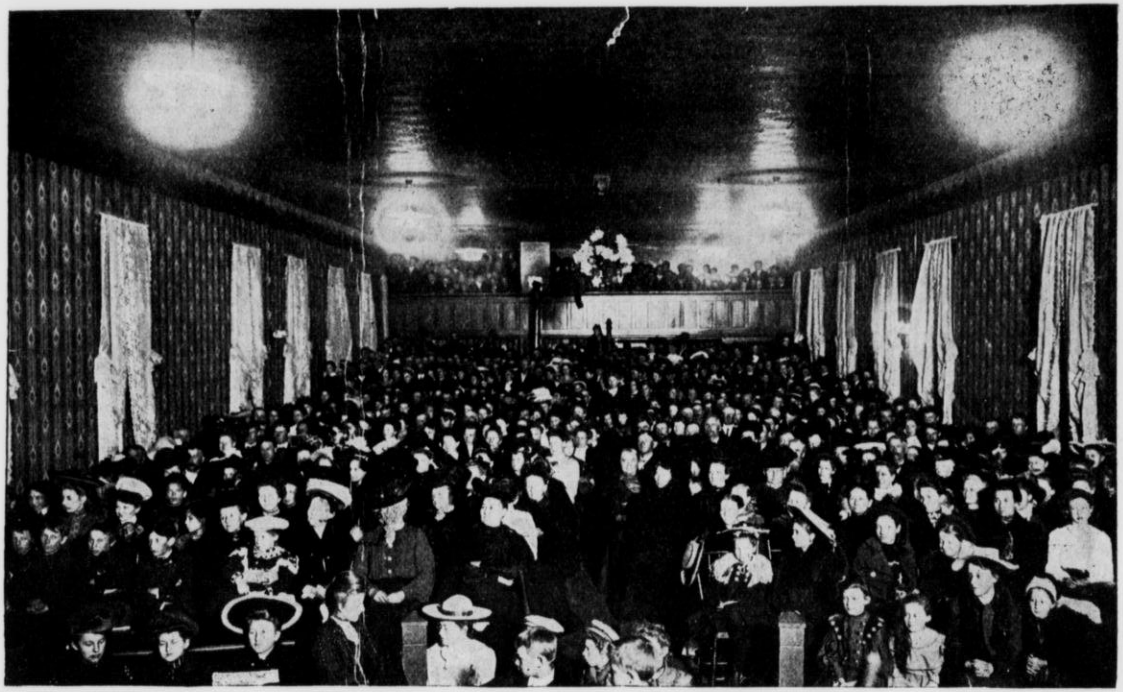
County.		County.	
Adams	White Creek.	Marathon	Stratford.
Ashland	Glidden.	Marinette	Pound.
Barron	Dobie.	Marquette	Briggsville.
Brown	Greenleaf, New Franken.	Monroe	Cashton, Clifton.
Buffalo	Gilmanton, Misha Mokwa.	Oconto	Abrams.
Calumet	Darboy.	Outagamie	Greenville.
Chippewa	Cadott.	Ozaukee	Saukville.
Clark	Humbird, Lynn.	Pepin	Porcupine.
Columbia	Columbus.	Pierce	Prescott.
Crawford	Mt. Sterling, Wauzeka.	Polk	Frederic, Osceola.
Dane	Dane, Deerfield.	Portage	Buena Vista.
Dodge	Horicon, Theresa.	Racine	North Cape.
Door	Brussels, Sturgeon Bay.	Richland	Boaz, Loyd.
Dunn	Elk Mound, Ridgeland.	Rock	Beloit, Milton Junction.
Eau Claire	Shaw.	Rusk	Bruce.
Fond du Lac	Rosendale, St. Cloud, Waupun.	St. Croix	Hudson, Star Prairie.
Grant	Fennimore, Hazel Green, Muscoda.	Sauk	Loganville, Plain.
Green	New Glarus.	Sawyer	Hayward.
Green Lake	Princeton.	Shawano	Pulcifer.
Jackson	Taylor.	Sheboygan	Plymouth (Closing Institute).
Jefferson	Palmyra.	Trempealeau	Ettrick.
Juneau	Wonewoc.	Vernon	Retreat.
Kenosha	Salem.	Walworth	Delavan.
Kewaunee	Kewaunee.	Washington	Schleisingerville.
La Crosse	West Salem.	Waukesha	Brookfield, North Prairie, Stone Bank.
LaFayette	Blanchardville, South Wayne.	Waupaca	Embarrass, Manawa.
Langlade	Polar.	Waushara	Coloma Station, Red Granite.
Lincoln	Merrill.	Wood	Aburndale, Nekoosa.
Manitowoc	Branch.		

Institutes, with Dates and Conductors.

Date.	W. C. Bradley, Conductor.	L. E. Scott, Conductor.	Date.	F. H. Scribner, Conductor.	Delbert Utter, Conductor.
December.			January.		
12	Frederic	Hayward	23	White Creek	Clifton
13	Osceola	Dobie	24	Columbus	Wonewoc
14	Star Prairie	Bruce	25	Briggsville	Loganville
15	Hudson	Glidden	26	Coloma Station	Dane
19	Cadott	Humbird	30	Muscoda	Deerfield
20	Shaw	Gilmanton	31	Wauzeka	Plain
21	Elk Mound	Misha Mokwa	February.		
22	Ridgeland	Porcupine	1	Mt. Sterling	Boaz
January.			2	Retreat	Loyd
2	Prescott	Taylor	20	Hazel Green	New Glarus
3	Ettrick	Lynn	21	South Wayne	Milton Jct.
4	West Salem	Stratford	22	Blanchardville	Beloit
5	Cashton	Merrill	23	Fennimore	Delavan
9	Manawa	Polar	27	Palmyra	Theresa
10	Buena Vista	Embarrass	28	North Prairie	Schleisingerville
11	Auburndale	Pulcifer	March.		
12	Nekoosa	Greenville	1	Salem	Brookfield
16	New Franken	Branch	2	North Cape	Stone Bank
17	Kewaunee	Greenleaf	6	St. Cloud	Darboy
18	Sturgeon Bay	Abrams	7	Rosendale	Saukville
19	Brussels	Pound	8	Princeton	Horicon
			9	Red Granite	Waupun

Twentieth Annual Closing Institute and Cooking School, Plymouth, March 13, 14, 15, 1906. All inquiries relative to Institutes will be promptly answered.

GEO. McKERROW, Supt.,
Madison, Wis.



An Evening Audience at a Wisconsin Farmers' Institute, Mayville, March 1, 1905.

PROCEEDINGS

OF THE

NINETEENTH ANNUAL

CLOSING FARMERS' INSTITUTE

HELD AT

EAU CLAIRE, WIS., MARCH 7, 8, 9,

1905

The meeting was called to order by Superintendent McKerrow. Mr. Thos. Convey, of Ridgeway, was called to the Chair.

Invocation by Rev. Mr. Hatch of Eau Claire.

Judge Blum.

ADDRESS OF WELCOME,

Judge Geo. L. Blum, Eau Claire, Wis.

On this beautiful winter day, a pleasant and agreeable duty has been assigned to me, a duty which I embrace personally with enthusiasm, to extend, in behalf of the farmers of Eau Claire county and the citizens of Eau Claire, to our fellow citizens of Wisconsin, and our neighboring states, a sincere and hearty welcome to our city and an invitation to participate in the proceedings of this Institute. Let me assure all of our visitors that the farmers of Eau Claire county and the citizens of the city of Eau Caire appreciate the honor which is signified in your presence here. I believe that I voice the sentiment of all the people of this county in saying that you are thrice welcome, and may your visit be one of profit and pleasure, and it is our wish that you would carry away with you, when you depart, a kindly remembrance

of your visit here, and we hope and trust that you will come again.

The objects and purposes of your gathering here and the results which you hope to accomplish, are both worthy and deserving of the highest commendation. As education is the acknowledged safeguard of our great republic, so it is one of the essential elements in the upbuilding of the state. Therein lies the strength of these United States, and of the individual states and communities, and in it lies the hope of the perpetuity of our government and its institutions. Intelligent application of its principles in the development of agriculture with all its allied interests are as essential to success as educational development in the arts and sciences, and the professions. In all lines of human endeavor there is a constant yearning for more knowledge, and for greater perfection, which not only results in individual wealth, but contributes to the general good. It has taken centuries of advancing civilization to bring about these conditions. The years have been patiently pushing the door of progress open with strong and unwearied arms.

Wisconsin, one of the greatest in our sisterhood of states, has a place in the van-guard of the army of progress and development. Her place as one of the greatest states in the union is secure. Her wealth of undeveloped resources needs but the touch of the wand of intelligent development to attract within her borders a substantial citizenship. We want good farmers, laboring men, mechanics and capitalists. The opportunities in our great state are multiplied as we seek them out. No other state in the union has more water-power than Wisconsin; with the Wisconsin river, the Chippewa, the St. Croix, the Rock, the Fox, the Brules, the Menomonie and their tributaries, and innumerable other streams, it is not too much to say that Wisconsin has almost a million horse-power. She has millions of acres of good agricultural land awaiting the brawn and muscle of the pioneer to convert them into profitable grain, fruit and stock farms. She has immense wealth in her mines, in her manufacturing, industrial and horticultural interests; her present dairy interests and the opportunity for their development are of the greatest importance. The development of the dairy and stock raising interests will place Wisconsin in the front rank. There are over a million cows in Wisconsin and so plentiful has become the harvest that the cheese factory and creamery established out of necessity has contributed $50,000,000 annually to the wealth of Wisconsin.

Wisconsin has one of the greatest universities in the world, and as a part thereof a great agricultural college and experiment station, and it has been asserted that one of the reasons her university has a world wide reputation is the fact of Dr. Babcock's invention of the milk test, the advanced position it has taken, and the work it has done for agricultural education.

In the year 1866 was the establishment in the university of a Department of Agriculture. Year after year this department has grown in importance and successive legislatures have encouraged its development and usefulness by appropriations for its maintenance and extension, and gradually the fact has been forced upon the people that the interests represented by the farmers are second in importance to none other, and that to stimulate these interests to more comprehensive and intelligent effort will add inestimable wealth to our state. The Farmers' Institute came naturally in this development of the agricultural college, and the efficiency of the Institute is attested by the fact that successive legislatures have provided for their extension until now they have become recognized as one of the most essential departments of our state government as an adjunct to our educational system, and the people of Wisconsin should congratulate themselves upon the fact that in this department there is a corps of educators whose ability and enthusiasm in their field of activity has given us the prominence which should excite the pride of the citizens of this great commonwealth.

The work of the Farmers' Institutes is of the greatest importance. It should be taken advantage of by all who have a desire for intelligent and scientific farming. The knowledge gained in the Institute should result in curtailing losses incident to less intelligent effort.

It is a school of experience, and experience is the best teacher. By taking advantage of this knowledge and experience developed in the Institute the farmer lightens his burden, and he begins to see a profit. Poor and unintelligent farming increases the burden and leads to the mortgage, which is, as expressed by a Western editor, "a self-supporting institution." Perhaps inviting the criticism that what the editor says lacks in optimistic sentiment, still I take the liberty of quoting him further. The mortgage "calls for just as many dollars when grain is cheap as when grain is dear. It is not drowned out by the heavy rains. It never winter kills. Late springs and early frosts never trouble it. It grows nights, Sundays, rainy days and even holidays. Potato bugs do not disturb it. Moth and rust do not destroy it. It brings a sure crop every year, and sometimes twice a year. It produces cash every time. It does not have to wait for the market to advance. It is not subject to speculations of the bulls and bears on the Board of Trade. It is a load that galls and frets and chafes. It is a burden that the farmer cannot shake off. It is with him morning, noon and night. It eats with him at the table. It rides upon his shoulders during the day. It consumes his grain crop. It devours his cattle. It selects the finest horses and the fattest steers. It lives upon the first fruit of the season. It stalks into the dairy where the busy housewife toils day after day, and month after month, and takes the nicest cheese and the choicest butter. It shares the children's bread and robs them of their clothes. It stoops the toiler's back with its remorseless burden of care. It hardens his hands, benumbs his intellect, prematurely whitens his locks and oftentimes sends him and his aged wife over the hills to the poorhouse. It is the inexorable and exacting task master. Its whip is as merciless and cruel as the lash of the slave driver."

Fight your burden with intelligence received through the Farmers' Institute, lift the mortgage, if one owns you, by educating yourself in the Farmers' Institute.

Again extending you a hearty and sincere welcome, I wish you Godspeed in your work.

RESPONSE TO ADDRESS OF WELCOME.

Supt. Geo. McKerrow, Madison, Wis.

On behalf of the Wisconsin Farmers' Institute force and the farmers of Wisconsin from outside of Eau Claire county, I rise to give a word of response to this eloquent and practical address of welcome.

We accept your cordial invitation to make ourselves happy while we are here, and we want to say that if from any cause Eau Claire city and Eau Claire county have any mortgage on us, we will try to pay it before we get through.

We have been pleased to note the sentiment that has run through your eloquent address in regard to the matter of agricultural education, a sentiment, I am pleased to say, that seems to be moving the whole civilized world. It has been acknowledged long that the farmer is the mainstay, the mudsill, if you please, of society in all civilized countries. He feeds the world, he clothes the world, and in that sense he makes the happiness of the world, and on this account we thank you for these remarks.

Farmers' Institutes under a state or governmental system were first introduced in the state of Wisconsin in 1885. At that time our legislature saw fit to make an annual appropriation of $5,000.00 for the purpose of a state-wide organized system of Farmers' Institutes. This fund was enlarged two years later, after a trial, to $12,000.00, and from that time to this we have been expending annually $12,000.00 in holding an average of about one hundred of these Farmers' Institutes, covering the state as perfectly as it has been possible to do, and publishing from 40,000 to 60,000 copies of the Wisconsin Farmers' Institute Annual Bulletin, which has gone into the homes of the farmers of the state, and they have even gone beyond the state lines. I believe I can safely

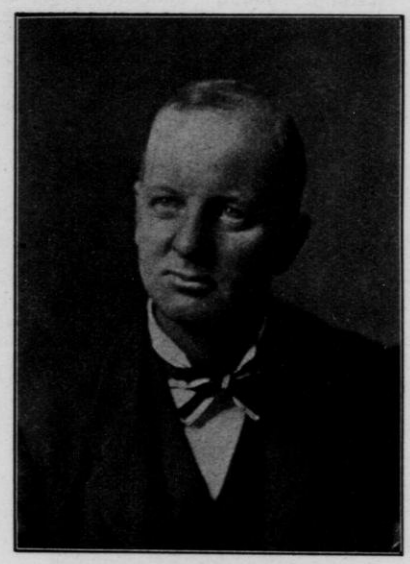
say that all the English speaking countries of the globe have had these Farmers' Institute Bulletins; they have sent for them, paid the expense of their transportation to these different countries and have read them, and even Japan has been having the Wisconsin Farmers' Institute Bulletin, and I think that is the principal reason why Japan is winning out in the fight with Russia.

This Nineteenth Annual Closing Institute has come, upon your request, to the city of Eau Claire. I have only heard of but one man up here in this section that has been discovered who objected to the Farmers' Institutes, but since I have heard of this gentleman I can see the reason why your citizens were so strenuous in their efforts to secure this Nineteenth Closing Institute. Evidently you did not like to live in such company and want to have this fellow converted. We will do our best in the way of conversion. He may be a little like an old Scotch friend of mine who lives in the town where I do—we have several people of that kind down there—who, after a little argument one day and a remark from me that I did not believe he was open to conviction, immediately took me to task by saying, "Open to conviction! Sure, I am open to conviction, but I'd like to see the man that can convict me." Your friend and neighbor may be of that character. If he is, we won't promise to raise his mortgage, but we will do our best.

Again, Mr. Speaker, thanking you for your cordial welcome, we will try to behave while we are in Eau Claire.

SOIL PHYSICS.

L. E. Scott, Stanley, Wis.



Mr. Scott.

While there are other essential elements that enter into the growth of the plant, the three that are the most talked of, not because they are more necessary than some others, but rather on account of their being more frequently lacking in their available form in our soils than any of the others, are nitrogen, phosphoric acid, and potash. Of these, recent analyses show that the average soil, to the depth of eight inches, contains nitrogen enough to last 90 years, phosphoric acid enough for 500 years, and potash sufficient for 1,000 years. Unfortunately these analyses show only the potential fertility of these soils, but do not tell us what proportion of the above named elements are in a form available for the use of the plant. Warring says "The analysis of any tolerably fertile wheat soil will show that it contains within a foot of its surface an amount of phosphoric acid sufficient for the needs of probably a hundred times as many bushels of wheat as could be grown upon it in a hundred years without the use of manure", but of this a very large proportion is locked up in the interior of pebbles and coarse particles.

To make as much of this plant food available as possible, is the object of the most unselfish farmer, and he who succeeds best is commended for his efforts and his motive is never questioned. While the supply of nitrogen is the least and while it is the most expensive when bought in the form of a commercial fertilizer, and while it is gaseous in nature and therefore the one element that is the most easily lost to the soil, it is the one which is the most easily supplied to our Wisconsin soils by the use of leguminous plants, of which the clovers, as yet, stand at the head.

The phosphoric acid and the potash are mineral elements contained in an inert form in the rocks of which our soils were originally made. These rocks have been broken and ground and weathered and acted upon by many and varied forces of nature, until, intermixed with vegetable matter or humus in various stages of decomposition, it is now called soil and is submitted to us for our use and to our care. Nor are the processes of disintegration all complete. Upon the contrary they are silently and almost unobservedly going on each year. You have seen the hard surface of flint glass ground to powder by a few days use in a chicken's gizzard in masticating its food, so the earth worm while living upon the vegetable matter with which we supply the soil is continually grinding the coarser particles and reducing them. It has been estimated in England that ten tons of earth within an acre of fertile soil pass annually through the bodies of angle worms. Countless millions of bacteria are working upon the organic matter in the soil and rendering it available for plant food. Various chemical compounds are reducing mineral matter to a like form. Let us supply these forces by keeping the soil full of vegetable matter and aid their activity by proper tillage and management.

Once supplied with food, these unseen

forces do their best at a temperature of 60 to 80 degrees F., with sufficient moisture to form a film around each soil particle and with an aeration to supply the necessary oxygen. To these ends the farmer must give due attention to drainage, tillage, and proper application of manures.

Drainage.

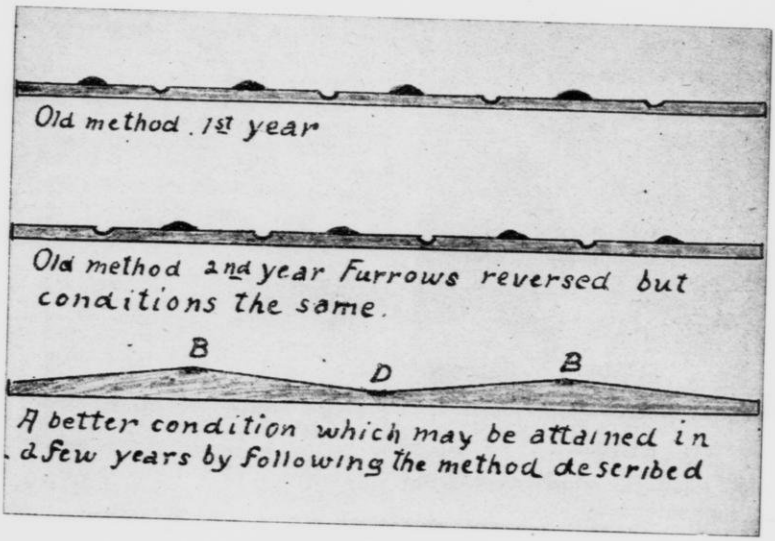
We drain land, first, that water may not occupy the spaces between the soil particles to the exculsion of oxygen, without which not only the plant but the bacteria as well would drown and the soil itself becomes lifeless.

We drain, secondly, to warm the soil that bacterial action may be stimulated. It is said that it takes five and one-half times as much heat to evaporate a given amount of water as it does to raise the same from a freezing to a boiling temperature. Again, the same amount of heat that raises a pound of iron ten degrees will raise a pound of water but one degree. It will be seen, therefore, that water is a very expensive material to warm, and a wet soil must, of necessity, be a cold soil.

Thirdly, we drain that we may get our crops in early in the spring. "The early bird gets the worm", and proper season counts for much with most farm crops.

Methods of Draining.

Without doubt, underdraining is much better than surface draining where practicable. It insures a more perfect aeration of the soil and the bother of the open ditch is avoided, but there is a class of soils of so fine and close a texture as to defy all attempts at underdraining. There is a large belt of this class running nearly if not quite across the state from west to east a little north of the center. These soils are classed as "clayey loam" and are indicated upon the soil map by figure 4. These soils are rich and productive and owing to their extremely fine texture they are capable of absorbing a vast amount of moisture by capillary action and holding it for the use of the crop. But in case of excessive rains, capillarity is too slow and unless some means of surface drainage be provided crops may be seriously injured. Much of this section is undulating and when the little pockets and depressions of the newer lands are filled, as they will be by a few



Methods of Draining.

years of cultivation, the surface drainage will be much improved and possibly sufficient, but something more will have to be done with the flatter lands. Most of these have a little slope and may be drained by a proper method of plowing. A common way is to plow in narrow lands and reverse each year, putting the back furrow in the old dead furrow. This drains nothing, as the stagnant water will stand in the dead furrow and oftentimes the back furrow is the only dry part of the field.

A much more effective way would be to plow in wider lands, say eight rods wide, putting the back furrow upon the old back furrow and the dead furrow in the old dead furrow and with a light scraper or slick, set at an angle with the pole, after the pattern of the old-fashioned rut scraper before the days of the modern road grader, pull down a little dirt from a too high back furrow or back from the edges of a too precipitous dead furrow, till the surface of each land presents a gentle but even incline from center to outside.

True, there would be a little bare clay at D that would be wasted, but better this than to lose a whole crop. To rid some soils of surplus moisture is of as much importance as to conserve needed moisture in others.

Tillage.

The objects of tillage are to prepare a seed bed to conserve moisture, to kill weeds, to aerate the soil, to hasten the decay of vegetable matter in the soil, thereby breaking down mineral matter rendering inert elements of fertility available.

Soils and conditions vary so much that no iron-clad rule can be made as regards depth of plowing. Heavy clay soils may be temporarily if not permanently injured by too deep plowing.

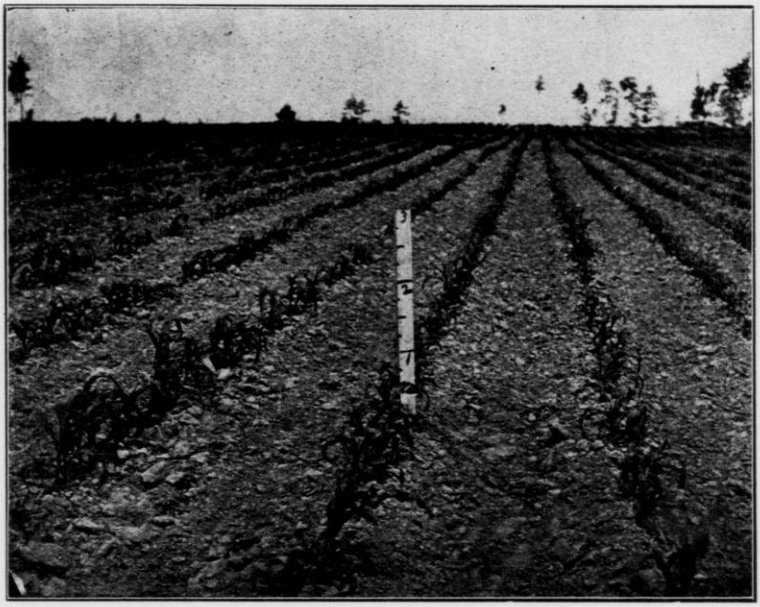
A. Sod ground manured and plowed 4 inches deep just previous to planting.

The clover plant grown in short rotation is the cheapest and I believe the best subsoiler and when so grown I do not believe there is need or benefit, for the common field crops, of plowing as deeply as many do. I had rather have the upper six inches of the soil well filled with humus than to have 12 inches only half as rich in this material. I do not want a manured soil turned more than four inches deep for corn. I am quite sure this is right for the clays in this northern latitude, and Roberts speaks of the lighter soils in parts of New Jersey where he says

"Excellent crops are raised and where the plowing is seldom more than four inches deep and where it is quite uniform in depth from season to season.".

Seed beds should always be thoroughly and finely prepared. Inter-cultivation of growing crops should nearly always be shallow, tending to a better growth and an earlier maturity.

Pictures A and B show adjoining fields of corn. A was sod ground manured and plowed four inches deep. B was stubble ground unmanured and plowed seven or more inches deep. Both fields were well tended. Pictures of soil tests, C shows that the soil in A possessed all the elements the plant needs in right proportions, while D plainly indicates that available phosphoric acid is lacking in field B. Probably the cold clay brought up by the deeper plowing is rich in potential phosphoric acid that may be made available by the introduction of vegetable matter and a period of weathering, but I would feel inclined to leave it down in its original depth till science has fully demonstrated that it would be better to bring it up.



B. Field adjoining A. Fall plowed stubble ground 7 or more inches deep. No manure.

Manures.

The Wisconsin dairyman knows only the manures manufactured in his stable and the only question with him is their application. Some of our best authorities advise the hauling of manures direct from the stable and spreading at once, a practice which is quite general in Wisconsin, but there are other equally good authorities who are not quite satisfied with this practice.

Brooks says: "There appears to be much need of further light on the general question of spreading fresh manure on the fields in winter. Many good farmers follow this practice, but there are also many who believe it to be a mistake."

In my own practice, to economize in time, I am hauling this winter and putting in piles to be spread just previous to plowing for corn, where form-

erly upon more level ground I spread as hauled, but if I could handle it just to suit me, I would house in a compact form until spring and then haul and plow under at once. But the rush of spring work and the soft condition of fields will not always admit of this, and of two evils we should choose the least.

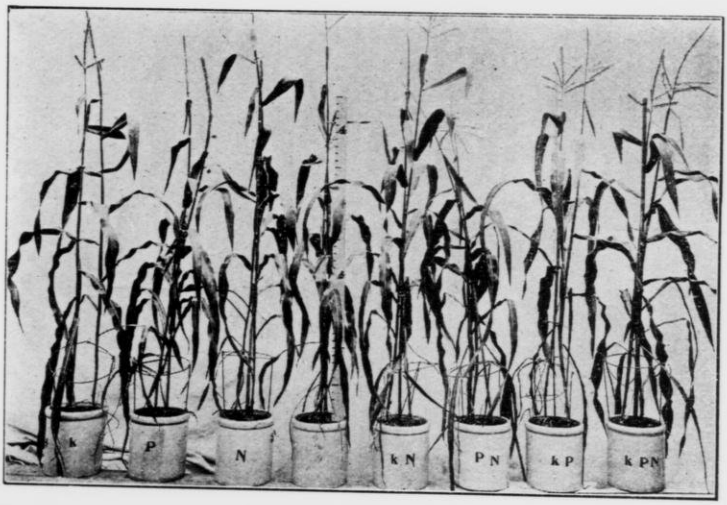
I would rather that manure be plowed under shallow than to leave it upon the surface. The benefits of incorporating the humus as well as the liquid in the soil cannot be over-estimated.

Storer says: "It is advantageous, as a means of preserving manure, to mix with moist loam, but where mixed with an excess of dry loam and then exposed to the free action of the air, there is danger that a good portion of the nitrogen may be lost." The practice of discing manure in the surface of a plowed field would therefore seem to be fraught with danger of loss of nitrogen.

If, as Warring says, "Phosphoric acid is the one element needed nine times out of ten", why should we leave the solids which contain the phosphoric acid on top of the ground and allow only the liquids, which contain practically none of it, to percolate into the soil?

Johnson says: "Disintegration of the mineral matters of soils is aided by the presence of organic substances in a decaying state." We believe that when we have manures incorporated in the first few inches of a retentive soil that they are there to stay till the plant takes them, and the effect of one such application has been manifest for 20 years.

Let us carefully till our soil and feed it and exclaim with our own Prof. King that "Soil is not a grave where death and quiet reign, but a birth-place where the cycles of life begin anew to run their courses over and over again."



C. Soil from Field A. with and without fertilizers. N. stands for Nitrogen, P. for Phosphoric Acid and K. for Potash. Seems to have all the plant needs.

DISCUSSION.

Mr. Smith—The speaker says he would rather have four inches of soil well filled with humus and well tilled than 12 inches poorly filled and tilled.

Mr. Scott—Six inches.

Mr. Smith—Is not six inches well filled a good deal better than four well filled?

Mr. Scott—Oh, yes, but there is a limit to the supply of manure upon most farms.

Mr. Smith—But a man may have it, and if he has, he may put it on.

Mr. Scott—It depends on the size of the manure pile.

Mr. Hill—You would prefer to have four inches with all the fertility saved possible?

Supt. McKerrow—Wouldn't you prefer to have six acres with the first four inches well filled, than four acres with six inches well filled?

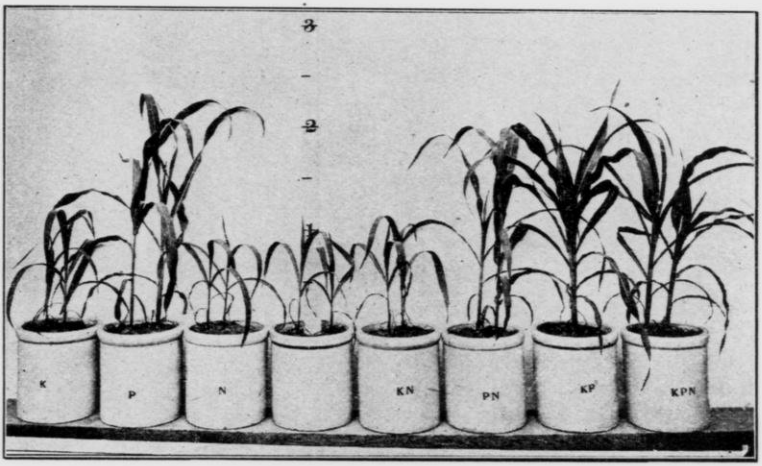
Mr. Scott—Yes, that is what I mean.

Capt. Arnold—Then you have six acres to go over instead of four.

Mr. Scott—And I have six acres to harvest instead of four. I believe that upon this ground have something to do with determining whether you will fill simply four inches with humus or put in six?

Mr. Scott—Yes, it would. My line of thought was more specially upon the common farm crops. It would not apply to gardening, to the growth of sugar beets or vegetables, but the corn and the small grain crop and the grasses, with the exception of clover and alfalfa. We should keep this bacterial action for such crops near the surface.

Mr. Galbraith—What would be the depth of the roots in timothy?



D. Soil from Field B. Seems to be lacking in available phosphoric acid. N. stands for Nitrogen, P. for Phosphoric Acid and K. for Potash.

upon our heavy soils four inches is sufficiently deep to plow the first season after it is manured. I am not averse to plowing a little deeper the second time. That will throw it back and you will get the manure nearer the surface again, but we must remember that decomposition goes on at a much more rapid pace nearer the surface than at a depth of six inches. It has been stated in my paper that the bacteria work at their best at a temperature of 60 to 80 degrees. Some will work as low as 35, but they do their best and most rapid work at 60 to 80.

Supt. McKerrow—Would not the kind of crop you are going to grow

Mr. Scott—A few roots strike down to considerable depth, but most of them are shallow.

Mr. Hill—I have brought in, and show you here, a specimen of the root of the great American drainage plant, not one of Salzer's, but made before he was, fully four feet long. It is a root of medium red clover, and it measured 52 inches before it was dried. That shows how it grows and where it reaches to. That was grown in Clark county.

Supt. McKerrow—Clay soil. How deep would you like the soil, Mr. Smith, for a crop of sugar beets?

Mr. Smith—I will answer that

this afternoon. Do we understand that you will plow only as deep as you can thoroughly pulverize the soil, that is, have the soil well filled with bacteria?

Mr. Scott—That is my idea for common farm crops.

Mr. Smith—In other words, if you have enough manure to make four inches, you would plow four inches, but if you can make six inches, you would plow six inches?

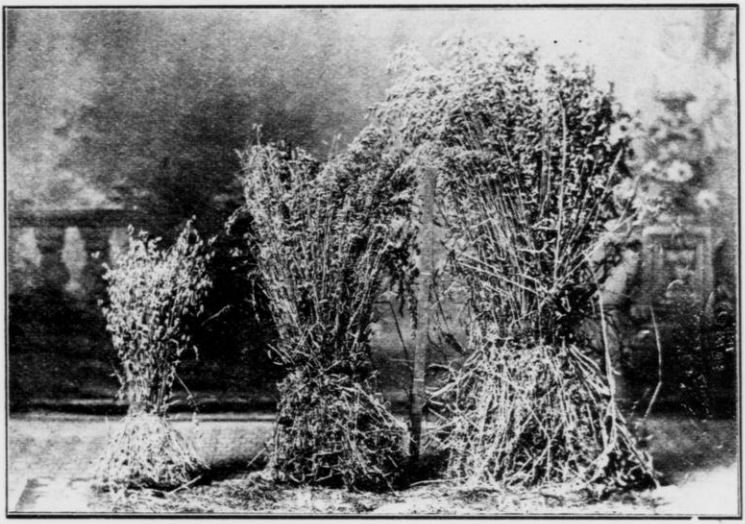
Mr. Foster—Would it not be a great deal better to have that simply mixed with the soil?

Mr. Scott—Yes, if it were practicable.

Mr. Utter—Tell us briefly what you plow for.

Mr. Scott—The objects of plowing are to prepare the soil for a seed bed, to aerate the soil.

Capt. Arnold—Are there any exper-



Each of the above sheaves was grown upon ¼ sq. rd. (640 per acre). No. 3 was grown upon subsoil with top soil removed. Total weight, 1¼ lbs., 800 lbs. per acre. Threshed grain, 7 oz., 8¾ bu. per acre. No clover was sown with this.

No. 2 was grown near where a stone was sunk four years previous and where the clay subsoil was intermixed with top soil in the process. Weight of entire product, including young clover as cured for stacking, 5½ lbs., 3,520 lbs. per acre. Threshed grain, 1 lb. 6 oz., 27 13/16 bu. per acre.

No. 1 was grown upon adjacent top soil. Weight of entire product, 9½ lbs., 6,080 lbs. per acre. Threshed grain, 3 lbs., 60 bu. per acre.

Fertility, like cream, is found at the top.

Mr. Scott—But I would not plow six inches for the first season after the land is manured.

Supt. McKerrow—Why is this plant exhibited here called the American drainage plant?

Mr. Scott—It does the work of a subsoiler.

Mr. Foster—Do you think it is the best practice to always put the manure at the bottom of the furrow?

Mr. Scott—I do not think four inches would be too deep to turn the manure on a majority of our soils.

iments at the different stations that indicate that the clover plant, or any other plant, will grow any deeper in the soil by deep cultivation than by shallow cultivation?

Mr. Scott—I do not know that, but I am quite confident that no farmer ever plowed as deeply as that root seems to have grown.

Capt. Arnold—Then the fact is, all plants take care of themselves, provided they get a proper start in the world.

Mr. Matteson—I understand that

that clover root grew down by the side of a stump.

Mr. Hill—Yes, but it did not depend upon the stump to get that depth, because I have seen clover roots grown in clay soil, frequently as long as that, where there was not a tree in sight.

Mr. Utter—Another thing I believe we plow for and cultivate, is to conserve moisture, especially in the southern part of Wisconsin, and the deeper we have our seed bed, the more moisture we can conserve. I think that is one object of plowing and cultivating deeply.

Mr. Scott—Will not this clover plant do that work, the conservation of moisture? Doesn't it prepare the lower strata of soil so it will hold more water?

Mr. Utter—We have not been able to use it in preparing our land in the southern part of Wisconsin, and we have had to do some hard work.

Mr. Scott—Probably because you do not grow clover.

Supt. McKerrow—You had better try alfalfa.

Mr. Culbertson—Is this plan of yours more practicable on newer or older land?

Mr. Scott—Both. It certainly works on our new land in northern Wisconsin, and, according to Prof. Roberts of Cornell, it is equally practicable upon the old lands of New Jersey.

Mr. Culbertson—We understand that in some of the eastern states they have lacked proper tillage to maintain the fertility of the land.

Mr. Scott—As I understand, the troubles in the east have accrued largely from the use of too great an amount of commercial fertilizers, or rather, too small an amount of stable manures and humus.

Mr. Hill—We hear the statement made quite often that clover sod, or soil that is full of clover roots, is the best place to plant corn, because it is a warmer soil from the decaying of those roots. How is that?

Mr. Scott—I could not answer that.

Supt. McKerrow—Is the soil that is lacking in warmth deficient in humus?

Mr. Scott—If clover is really a drainage plant, if these roots strike a lower stratum, making it porous, so the water can go down, then it must follow that the soil would be warmer, because a well-drained soil is certainly warmer than wet soil.

Mr. Culbertson—What are the best crops to furnish a great abundance of humus?

Mr. Scott—We think we get a larger bulk by a mixture of clover and timothy.

Supt. McKerrow—His question was right on the point of humus.

Mr. Scott—Then I would confine it to clover, on account of its root system in connection with the top, without the timothy.

Mr. Culbertson—Do you have as thorough a sod on your land as you would have by a mixture?

Mr. Scott—No, I do not think so. It is my judgment that you get a larger amount of material in the root of the clover than with the clover and timothy, and better material also.

Mr. Foster—But isn't a great share of that material down out of reach when you come to the accumulation of humus in the soil; and would not red top and timothy and some other kinds furnish the surface soil with more humus to be turned over than tame clover?

Mr. Scott—Possibly you might get a larger proportion in the upper layers of the soil with other grasses which are surface rooted, but you must bear in mind that if there is any available fertility there you must have a root growing down to the depth where it is, pumping it up into the upper part of the plant, and consequently to the upper layers of the soil.

Supt. McKerrow—Then, again, the clover root will grow much larger when it does not have to fight the other plants mentioned.

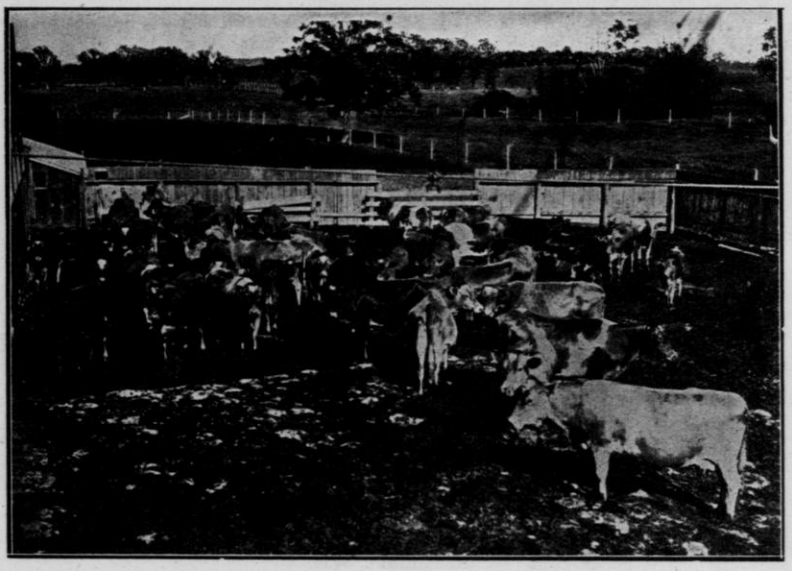
Mr. Foster—I claim that there are several feeding grounds in that soil. The clover root goes way down and below the others. We can pasture different kinds of stock on soil, and none of them interfere with the others. So we feed plants of different character in different layers, so that they do not need to fight. That is my idea.

Mr. Scott—I have never been able to occupy the same soil with different kinds of stock or plants and have them get along as harmoniously as Friend Foster seems to, but I believe in many cases it pays to mix grasses.

PROFITABLE CROPPING.

Geo. C. Hill, Rosendale, Wis.

It is the same old, old story, profitable cropping for the Wisconsin farmer is only another name for animal husbandry, for two reasons: First, that we may keep our lands in productive condition. The best system of farming is that which gives the largest returns for the labor and capital invested, and still leaves the soil in condition to produce maximum crops. There is little profit in the average crop. As a rule, maximum crops are the profitable crops, though there are exceptions to even this rule. The producer cannot control the price, but should aim to produce cheaper. Feeding animals is the best system, because the largest portion of the fertilizing elements of the feeds is retained on the farm. At many places where we have been this winter, the farmers were selling hay and straw. The price for timothy hay delivered at the railroad is at least $7.00 per ton. Suppose clover is grown instead of the timothy and fed to beef cattle or sheep. It is estimated that, with favorable conditions, 14 tons of hay, or its equivalent in other feeds, will produce a ton of beef or mutton worth $115. The 14 tons of hay if sold at $7.00 would bring $98. If sold to the stock, the same price would be received and $17 for the labor of feeding, besides $70 worth of fertility deposited in the farmer's bank. In this case the hay is sold for $13.50 per ton. I believe $5 per ton is small enough estimate for the fertility left from feeding the clover hay.



Guernsey Cows: Important Factor in Profitable Cropping, on farm of Geo. C. Hill & Son, Rosendale, Wis.

It is estimated that the average amount of feed required to produce a ton of butter worth $500, is equivalent to 40 tons of hay, worth in the market $280. Adding the fertility value of the hay left after producing the butter, to the value of the ton of butter, equals $700, or a return of $17.50 per ton for

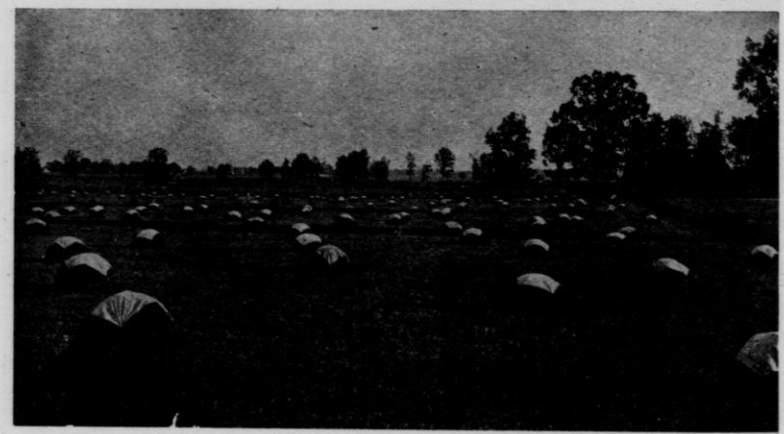
the hay when sold to the cow, while that fed to produce beef or mutton returned only $13.50. Of course, the difference in favor of feeding the cow goes to pay for the excess of labor required in dairying. This view of the matter might help in the choice of the kind of animals to feed. With broad acres and little available help, it might be best to feed beef or sheep. On smaller farms and more help, feed the cow and hog. The degree of profit in either case depends much on the skill of the feeder and on the selection of the animal. A friend of mine, whose farm is near Fond du Lac, told me that he received from his 25 cows last year an average of $92 per cow for milk and cream. Some of my neighbors are satisfied to get $45 per cow.

In addition to feeding stock largely of the crops grown on the farm, it may be profitable, both for the stock and the farm, to feed commercial feeds that are rich in feeding and manurial elements.

The Commercial Side of the Question.

Another reason why animal husbandry is profitable cropping, is the saving in transportation when concentrated products are marketed. The cost of marketing a ton of butter is about one-half of one per cent on a value of $500, while on a load of potatoes it would amount to 30 per cent, and even 50 per cent, at the present time; besides, the grower would have to haul 50 or 60 loads of potatoes from the farm to a shipping point to draw as much money as one load of butter or two loads of cheese would bring. He would have to haul over 70 loads of hay, or 25 loads of oats.

Some years ago an Institute was held in a county where potatoes was the principal crop grown. It was 24 miles to the shipping point, taking two days to get one load of potatoes to market. It was learned that, though the soil was sandy, it produced good crops of corn and clover. It seemed to be the business of the Institute to advise the farmers to change their methods and get cows and build a creamery. The potato grower whose farm is near a good market can save the costly transportation and grow the crop at a profit. So it seems that location may be a factor in profitable cropping.



Alfalfa Field: Third Cutting, Sept. 30, on farm of Geo. C. Hill & Son, Rosendale, Wis.

The Importance of Rotation.

Rotation is another factor. Nature revels in variety. We shall do well to follow her plan in crop production. Whatever the rotation, it should include clover and corn, or other cultivated crops. A farm was found in southern

Illinois where corn had been grown for 27 successive years. The crop in 1903 was 27.63 bushels. On adjoining land, where corn and oats alternated for the same term of years, the yield was 40 bushels. On other nearby lands, where the rotation was corn, oats and clover, the yield for the same year was 74 bushels. This crop was nearly equal to three yearly crops on the first mentioned farm, and in the meantime a crop of oats and a crop of clover was secured.

The Barns and Grain Stacks at the Hill Farm.

Some Other Essentials for Profitable Cropping.

Profitable cropping includes good, clean seed and good varieties. At the Ontario station the yield of oats per acre for seven years, when large, plump seed was used, was 62 bushels; seed which had not been carefully cleaned brought 54 bushels, while small, imperfect seed produced only 46 1-2 bushels per acre.

It means clean culture. There is no profit in weeds. It takes fertility to grow weeds. Weeds choke the good crop and lessen the product.

Some of the Results Achieved.

It means improved live stock. We are subject to low prices and need the best stock to work with. The St. Louis dairy test shows that some animals are greatly superior to others in capacity for producing cheaply.

It means comfort for our animals. It means a portion of our lands reserved in forest. Quality in farm products is an important factor. Market quotations give a difference of 8 to 10 cents on the price of butter, and two to four cents on live stock. Wheat is quoted at 92 cents to $1.15; much the same on many products. Doubtless the cost of production is about the same. It takes as much feed and perhaps more labor to produce 18 cent butter as the 26 cent product. The cheaper product has more ingredients worked into it.

Big stories are told of the profits on so-called special crops, and farmers are tempted to grow a few acres. There was the hop craze; then it was ginseng; now it is tobacco or cabbage, sugar beets or cucumbers. There are small farms with a surplus of available labor

whereon some of these crops can be grown with profit. The objection to the general farmer doing so is that these crops need large quantities of fertility and labor, and the other farm crops are likely to be neglected.

Something might be said of the farm itself increasing in value from year to year, as labor and capital is put into it, until we have seen it increase in value from $10 to $15 per acre to $100 and over.

More than all else, profitable cropping means comfortable, pleasant, well furnished homes for the family, the most profitable crop of all. We take pleasure in well cultivated fields and crops, fine live stock, good farm buildings, surrounded with orchard and garden and lawn, but the greatest satisfaction is had in the crop of boys and girls that grow up on the farm, sturdy in all that makes ideal manhood and womanhood.

DISCUSSION.

Prof. Knapp—I would like to ask about the manurial value of clover. It is said to be $5.45. Does that imply that you get all that phosphoric acid and potash where you can use it?

Mr. Hill—As I understand it, that is what the chemist finds in what is left. We can waste that before we get it onto the soil, or we can carefully save most of it.

Prof. Knapp—How do you save potash

Mr. Hill—I am not prepared to answer that question.

Mr. Convey—You can't very well lose it, can you?

Mr. Hill—No, that is safe enough, probably.

Mr. Scott—Is not the highest rating of the clover plant due largely to the amount of nitrogen it contains?

Mr. Hill—That is a fact, and we do not need to state here also that in comparing the growing clover hay and timothy hay, that valuable feeding qualities, as well as manurial elements of the clover, are obtained from the air, the nitrogen and the protein.

Mr. Goodrich—I think the only way we can lose the potash out of that soil is what is taken down by water as it goes down into the ground. Then we send the clover plants down to pull it back again towards the surface.

Capt. Arnold—We consider clover a great fertilizer. It is constantly making nitrogen, but it is evident that it has taken a great deal of potash out of the soil. Now, if it does that, why should it be such a great fertilizer? It is necessary to have the potash in the soil and the clover plant doesn't put it back, does it?

Supt. McKerrow—Forty-four pounds to the ton.

Mr. Goodrich—And there is just as much in the root.

Mr. Foster—And it goes down low for a large share of that potash, down where we have not been able to get at it before. It is like the policeman, it goes after the runaway and brings him back where we can use him. So we haven't lost anything.

A Member—Mr. Scott said that in 15 inches of soil there was enough potash to last 1,500 years.

Mr. Scott—A thousand—don't make it too deep.

Supt. McKerrow—Another thing, you will notice on this long clover root the fine feeding roots are at the bottom. They are drawing their potash supplies from a great depth where other plants cannot go after them.

Mr. Hill—It is a question whether those small alfalfa roots are not after water. We are told that the alfalfa plant goes down 50 feet for water.

Mr. Convey—But we understand they eat as well as drink.

Mr. Linse—How much nourishment is there in a glass of pure water?

Supt. McKerrow—This plant drinks from the soil where the water has its nourishment in it.

Mr. Goodrich—Four hundred pounds of water take up one pound of nourishment to the plant.

Mr. Utter—There is no pure water within a few feet of the surface of the soil, not in the soil water.

Mr. Linse—When the root goes down 15 or 20 feet, it does not strike pure water.

Mr. Scott—Isn't it true that while the clover plant does take its potash from the soil, the greater part is returned to the soil?

Mr. Hill—We believe the larger portion, and still it is a matter of opinion

that with all our care and growing the best crops, it takes fertility to grow crops, and there will be a gradual deterioration of the soil. Now, if in feeding our stock we can make it profitable to use some of the feeds that are rich in feeding and manurial elements and return still more to the soil, I believe that is the only way to keep the soil up to its original fertility, and perhaps we may add to it in that way.

Capt. Arnold—What is the occasion of what we call "clover sick" soil?

Mr. Hill—Well, I cannot say positively. It is my opinion that there may be two reasons. One is the soil has lost its humus, and the other is that it needs clover bacteria added to the soil. I think the great trouble, however, is lack of humus.

Mr. Foster—What are the symptoms of "clover sick" soil?

Mr. Hill—It makes a sickly growth.

Capt. Arnold—Then I should call it "clover dead" soil.

Mr. Hill—We found whole counties in the southern part of the state this winter where they couldn't grow clover.

Mr. Meyer—That has been the case in Switzerland and at the same time they grow pretty good crops of grain.

Mr. Convey—Mr. McKerrow and I live in the southern part of the state, and I can grow clover.

Mr. Linse—Mr. Meyer, haven't you this clover-sickness right up here in Buffalo county?

Mr. Meyer—Not that I know of.

Mr. Linse—A neighbor of my brother-in-law states that clover will not grow on his farm any more. Now, with alfalfa, if we find the soil lacking this bacteria, alfalfa will not grow, but by inoculating the soil with soil in which bacteria has been developed, it will grow and it will keep increasing. There must be something else besides the bacteria.

Mr. Meyer—I haven't grown alfalfa yet in Buffalo county, but I guess I will try it. We used to grow three or four crops in Switzerland.

Mr. Convey—I think the trouble in southwestern Wisconsin is due very largely to the poor condition of the soil, an abundance of weeds and lack of moisture. Those three conditions will kill out clover anywhere. Where there is lack of humus we always have a poor physical condition of the soil. Mr. Hill, you have spoken of the values of the products of the farm as fertilizers. Has the matter been taken into consideration as to the value of those feeds acting in improving the mechanical condition of the soil?

Supt. McKerrow—You will notice that three-quarters of the analyzed value is charged back.

Mr. Convey—I consider that a very important feature, that the elements of plant food are put in such form that they are available as they are not in a majority of cases, and we find that we get better results in that respect from the use of stable manures than with the commercial fertilizers.

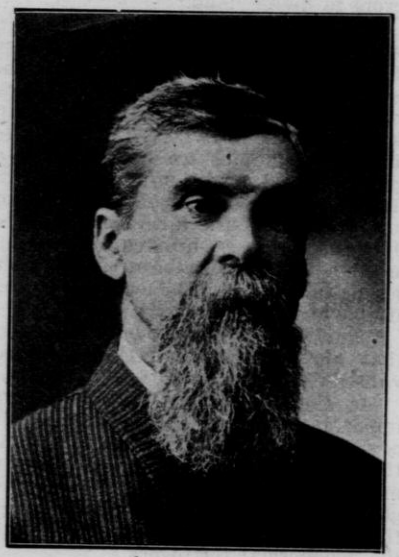
Mr. Roberts—I think you will find, on the whole that there is more land sick from want of clover on it than clover sick.

Mr. Convey—Still we must recognize that people are making an effort to grow clover and cannot grow it, and they do not know why.

Mr. Scott—I have here a little cut from a school text book that illustrates the point brought out by Mr. Convey. Here is the clay subsoil with the commercial fertilizer, and here is the same with the humus incorporated in the soil. That will show the difference in the effects.

MARKET GARDENING.

Delbert Utter, Caldwell, Wis.



Mr. Utter.

It is often said that any fertile soil will produce good garden crops. This may be true to the extent of growing vegetables for family use, but to succeed in market gardening a soil must be selected that is adapted to the crops grown.

For early vegetables and for tomatoes and melons, a rich, sandy loam, with a porous subsoil, and that underlaid with a bed of clay at a depth of five or six feet, is an ideal soil. An abundance of manure must be supplied to provide humus as well as the necessary elements of fertility; such a soil, when handled with intelligence, will be in the best condition to make use of the food, moisture, heat and air that work together to produce a good crop.

For the late crops and for cabbage, cauliflower and celery, a dark colored loam soil should be selected.

Much of the reclaimed swamp land makes the very best place to grow the crops mentioned. When we say a place to grow vegetables, we particularly mean that the physical conditions are good, as when well drained such soil is capable of conserving the proper amount of moisture, and when well cultivated will admit the needed amount of heat, and will grow vegetables that are of good form and quality.

It is simply a place, for the reason that the soil was formed from the coarsest kinds of vegetation that contained very little nitrogen and less of the mineral elements of fertility. All of the elements of fertility must be supplied in sufficient quantity to produce maximum crops.

All soils with a retentive subsoil should be tile drained, and work should be most perfectly planned and executed. Should water stand a few hours on the land, a season's crop may be lost. Soil that is well drained will allow the heat and air to penetrate to a greater depth and will withstand drought better than one that is not.

Preparation of the Soil.

The ground should be thoroughly cultivated before planting. By discing before plowing, thereby mixing manure with the soil, then plowing as deep as nature of soil will admit, following with leveler, disc, roller and smoothing harrow, until soil is in the finest tilth and so firm that a horse will sink to half the depth of his hoofs, the ground should be in the best possible condition.

While we may apply the most liberal amount of fertility in the form of manure, yet, early in the season, before there is enough heat to unlock and make available the elements of fertility that are in the soil, the plants make little growth, and an application of some kind of soluble nitrogen may be needed to give the plant a good start. Nitrate of soda used at this period at the rate of 100 to 200 pounds to the acre, will prove to be very beneficial. Then again potash can very often be used profitably for crops that take a large amount of that element of fertility.

The only successful market gardener is the one who keeps his soil supplied with an abundance of plant food.

Careful Selection of Seed Important.

The very best seed should be secured, growing the varieties that mature perfectly on our own grounds and purchasing from dealers and growers that have a reputation for reliability. It is best to know where the best seeds are grown and buy of the grower, if possible. No gardener should risk his crop without testing his seed, unless he has implicit confidence in the source from which it came. Seeds of all vine crops are better if not used until the second or third season after saving, and such seed can be tried for quality by purchasing enough for two seasons and planting a part of the crop from new seed and noting results.

The price of the seed is of the least importance, yet a high-priced seed does not signify good quality. A single pound of seed sometimes produces a thousand dollars' worth of produce, consequently it means everything to have the best seeds.

A List of Successful Varieties.

Varieties should be chosen according to the demand of the markets in which we sell our products, at the same time considering their adaptability to our soil and yielding capacity. It is better to cater to the tastes of our customers than to try to educate their tastes to the kinds we think are best.

While no list of varieties can be recommended for all markets and all localities, there are standard varieties that yield well and are popular in most markets. A partial list is given here that have proven to be good in my own gardens, or in the gardens of growers with whom I am acquainted.

Asparagus: Palmetto and Early Argentuil.

Delbert Utter on Load of Garden Truck on way to Milwaukee Market.

Bush beans: Golden Wax, Curries' Rust-proof Wax, Stringless Green Pod, Refugee.

Limas: Siebert's Early, for pole; Thorburn's Bush Lima.

Cabbage: Early Jersey Wakefield, Premium Flat Dutch, Mammoth Rock Red, Danish Ball Head.

Beets: Egyptian, Early Blood Turnip, Eclipse.

Cauliflower: Extra Early Erfurt, Early Snowball.

Carrots: Half Short Oxheart, Half Long Danvers.

Celery: Improved White Plume, Golden Self-Blanching, Giant Golden Heart.

Sweet Corn: Mammoth White Cory, Premo, Country Gentleman, Chicago Market, Crosby, Early Evergreen, Stowell's Evergreen.

Cucumber: White Spine, Improved Long Green.

Egg Plant: New York, Early Dwarf Purple.

Lettuce: Improved Hanson, Grand Rapids, Deacon, New York.

Muskmelon: Emerald Gem, Rocky Ford, Osage, Tip Top.

Watermelon: Phiney's Early, Kolb's Gem, Early Jumbo.

Radish: Early Scarlet Globe, Early Scarlet Olive Shaped, Improved Chartier.

The Wisconsin grower has no northern market to ship to and has the southern stuff to compete with during the whole season, but late in the season the southern market draws on the northern grower for potatoes, onions, cabbage, celery and cauliflower. There are many localities where there is land well adapted for these crops, and if good shipping facilities can be obtained for shipment of produce and a sup-

Utter's Melons.

Onion: White, Early Barletta, Yellow, Globe Danvers, Red, Large Weathersfield, Large Globe.

Peas: Extra Early Alaska, Gradus, Nott's Excelsior, Telephone, Juno, Market Master.

Potatoes: Early Ohio, Rural New Yorker, Carman.

Squash: Giant Golden Summer, Crookneck, Hubbard.

Turnip: Early Milan Purple-Crown, Red Top Globe-Shaped, Purple Top White Globe.

Tomatoes: Beauty, Dwarf Stone, Dwarf Champion.

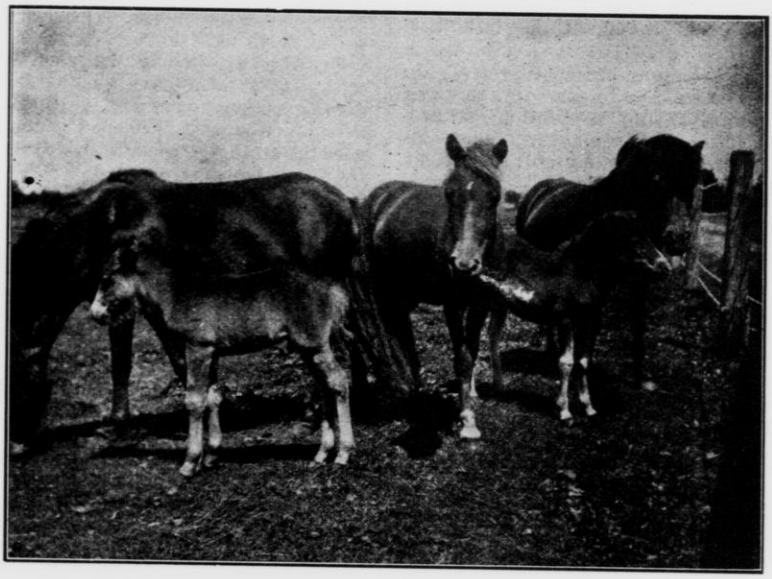
ply of manure at a fair rate, success is assured to the man with good business ability and a practical knowledge of growing the crops.

Three varieties of crops, choosing these with separated periods of planting and harvesting, makes a combination that will prove profitable. Early potatoes, onions and cabbage are being grown in combination in the southeastern part of the state very profitably.

Manure is procured from the Chicago stock yards and Chicago stables, many hundreds of cars being used, and

in addition to this many cars of chemical fertilizers are used.

Celery and cauliflower are usually grown by men who have learned how to handle these crops as specialists. They require close attention to details, both as to culture and preparing for market. A deep, moist, black loam soil is needed for these crops; it must be well drained and a liberal amount of manure supplied and well mixed with the soil. Frequent and thorough cultivation is most necessary, particularly after each rain, to conserve the moisture and encourage rapid growth.



Shetland Ponies on Farm of Delbert Utter, Caldwell, Wis.

Early Markets Most Profitable.

The early stuff in our home market is what makes the most profit, and every effort should be made to forward the crop. This is accomplished by preparing the soil in the best possible manner, using good seed and cultivating the crop thoroughly at every stage of its growth. Many crops can be forwarded by starting plants in greenhouse or hot bed; these plants should be transplanted several times and well hardened before planting in the open ground.

Cantaloupe and all vine crops can be forwarded two or three weeks by starting them in sods or plant boxes. I have been successful in using sods placed on a fresh made hot bed the first of May and removing to the field in five or six weeks. A blue grass sod that is of a sandy or loamy texture and well enriched by top dressing with manure the year previous is best.

The texture of the sod pieces has much to do with the success of this method, as roots will not penetrate through a clay sod. The hot bed is made from stable refuse with a large proportion of litter, this mixed thoroughly and moistened, so that it can be tramped firmly and evenly in a bed six feet wide and of any desired length. When finished the bed is about a foot deep. The sods are cut three inches thick, 10 inches wide and 17 inches long, to fit the bed, and when placed should be perfectly level. The sods are then cut to about five by six inches and five or six seeds are planted in the

center of each piece, using a knife to make a hole for the seed.

As soon as the seeds are planted glass is put on and the bed is allowed to heat up to 100 degrees during the day, and should not drop below 60 degrees at night. When plants are up, which will be in about four days, sash are raised during the hottest part of the day. If half cloth sash are used, there is less danger of injury from too much heat. The cloth should be treated with a coating made of boiled linseed oil and eggs, using two eggs to each pint of oil, and mix thoroughly.

When the plants are well grown, thin to four plants; after the fourth week the plants should be gradually hardened off and when weather conditions will warrant, transplanted to the field. The pieces of sod should be saturated with water before transplanting, thus enabling them to withstand a period of drought.

The ground should be plowed early in the spring and disced and harrowed several times at intervals of a week or ten days, with this preparation the soil should be in the finest tilth. Make the rows six feet each way and place sod pieces so they will be covered an inch deeper than the thickness of sod.

Some Good Garden Tools.

There has been as great improvement in tools for the gardener as for the farmer, with the exception that the gardener usually walks. The first requisite in a tool is that with it perfect work can be performed, not that it has a comfortable seat and canopy top.

The seeders and planters are easily adjusted to use the required amount of seed, dropping it at an even depth and firming the soil so that rapid germination may be expected. The plow should throw the soil and mix it, in place of turning over completely. The disc harrow is the most important tool for the preparation of the soil for a crop. It is a pulverizer and a mixer, working the soil into the proper condition for good germination and by mixing the manure thoroughly, the plant food is prepared for the use of the young plants.

The leveler, roller and smoothing harrow are used as finishers and the harrow and horse weeder are used to kill the weeds and form a dust mulch, on crops that will stand the treatment after planting and until the plants have made considerable growth. As to how much and how long the weeder may be used depends on condition of soil and plants. We follow the cultivator with the weeder, this levels the ground and breaks up the space left by the cultivator. Success in using this tool depends on using it before weeds have made their appearance above ground.

A steel frame horse cultivator with seven teeth one and a fourth inches wide, to be used when plants are small, with adjustment for gauging depth, does excellent work. There are hoe attachments and sweeps which are used later in the season; shallow and thorough work is assured if tool is in hands of competent man. The proper adjustment of these tools has much to do with their efficiency.

The smaller tools, consisting of wheel hoe, spade, rake and hand hoe, with horse and hand markers, make up about all the tools required, except special tools for special crops. Less work is performed with the hand hoe than formerly, yet it has its place and it should be kept bright and sharp.

Harvesting and Marketing the Crop.

The most important part of the work is harvesting and marketing the crop. Many of the crops are perishable and must be prepared for market and sold just as soon as they are fit; enough help must be secured to keep up with the work, so that no over-ripe stock will be left on our hands.

In delivering to a nearby market return crates may be used, but much of our produce is sold in gift packages and it is best to use such style of crates as are most popular in the market to which we ship. Our name on crates should be a trademark that means good quality, just as good at the bottom as at the top. Some growers place a card in the package in such position as to be easily seen, and it reads, "U see one, U see all." It would be well if always true. It costs time and money to acquire a reputation for fair dealing and after once acquired it pays to live up to it.

Some of the Discouragements of Market Gardening.

Blight and insect pests keep the gardener on the edge of despair, for after the expense of growing a crop until nearly ready for market and then see it destroyed is, to say the least, just a little discouraging. Each year we get an addition to our long list of troubles, and without having learned to overcome the old ones. With all the experiments with sprays and insecticides, with scores of bulletins written upon these subjects, the gardener has not gained much during the last decade that is new to aid him. The orchardist has fared better, as spraying is his salvation.

For the insects and worms that eat, we can feed them paris green, and I know of nothing better. The suckers, and we find as many of them in the garden as the real estate and mining stock agents do when they cultivate the acquaintance of the "easy marks," can only be scared off, you cannot kill them; make them uncomfortable by tangling their legs with land plaster, road dust or coal ashes. Something like sulphur, tobacco or kerosene, that has a disagreeable odor, will also hinder their ravages. Carbon bisulphid is being used to exterminate the worms and insects that work underground.

The remedies recommended for blight and fungus diseases contain copper sulphate in combination with quicklime, ammonia, or caustic soda, and are used to protect the plant from the attack of the various diseases. It must be applied as a preventive, and foliage must be kept covered continually. This means eternal vigilance and the time may be near when it will be as necessary for the gardener to spray as thoroughly as does the successful orchardist at the present time.

It may be best to experiment in a small way so as to become familiar with the methods of mixing and applying these fungicides and watch results. From my own experience, and from what I have learned from the experience of others, I believe much may be accomplished to prevent the ravages of these pests by practicing a regular rotation of crops, using all the fertility possible, using only the best seed and strongest plants, and giving the very best culture. The weakest plants, as well as the weakest and badly nourished members of the animal kingdom, are usually the first to succumb to the ravages of disease.

The Gardener the Most Important Factor.

After all has been said about the prerequisites of right kind of soil, favorable location, good seed and best methods of culture, success depends largely upon the man. He must be a business man, for he must be alive to take advantage of every opportunity possible to increase his sales; by correspondence, use of the telephone and personal inquiry, he is able to place his products where he will receive the best price.

He must be able to handle men, for he must employ many of them, and the proper management of labor is very essential. He needs to be a hustler, for his crops must be marketed at the right time and at the right place, and to customers who will expect prompt delivery and in good condition. Regular customers can only be held by fair dealing, regular delivery of the best that can be grown, put up in an attractive manner and so good that their customers will think there is no other grower that can furnish products of quite as good quality.

DISCUSSION.

Mr. Smith—I want to take exception to the remark in the paper that the Wisconsin gardener has no northern market. The southern Wisconsin gardener has none, because the northern Wisconsin gardener took your market away. That is where your market went to.

Mr. Foster—It is not lost, we have got it.

Mr. Meyer—What particular kind of garden pea would you recommend?

Mr. Utter—If I was going to recommend one only, I would recommend the Gradus for the farmer. It is not a large yielder, and for that reason the seed is expensive. It grows two and a half or three feet, and the pods are four times the size of the ordinary early pea and most excellent quality.

Mr. Smith—We are putting in the Gradus, planting early, as it is very hardy, and also have made some experiments with the Thomas Laxton, which is very nearly the same size and much more prolific.

Mr. Scott—The Gradus has not yielded very well with me in northern Wisconsin, because I put it in too early.

Mr. Meyer—Would you recommend fall plowing?

Mr. Utter—I would recommend fall plowing on heavy soils, plowing under to get as much humus as possible, and then plow again in the spring. Disc harrow before plowing.

Prof. Knapp—Will the use of commercial fertilizers hasten the maturity of the crop?

Mr. Utter—It will. A small amount of nitrogen of soda used early in the spring will give it a start before there is enough heat to form nitrates from the elements in the soil. I will say commercial fertilizers have been used for that purpose up in the northeastern part of the state. The manager of the Menomonee Beet Sugar Company procured a car load of nitrate of soda, it was distributed among the patrons of that locality, and it was used with great success to give the plants a good start.

Mr. Smith—You spoke about plowing as deep as the nature of the soil will permit. How are we going to know what that means?

Mr. Utter—Every tiller of the soil must use his own judgment in regard to that. If you have a hard subsoil, I would not throw much of that hard subsoil up each year, but gradually work a little deeper. We must have a deeply worked soil.

Mr. Scott—What is your late treatment of asparagus?

Mr. Utter—We cut the asparagus as soon as the tops turn yellow, before the seeds have fallen, and then burn them, being careful that the seeds do not drop upon the ground. We let them go to seed, because they need to mature good growth of roots for next season's crop.

Mr. Matteson—And what do you do first with the asparagus in the spring?

Mr. Utter—I have mine planted so deeply that I can plow it up in the spring; plant at least six inches deep.

Mr. Scott—Don't you think that would be pretty deep for us in the north?

Mr. Utter—It must be deep, but you have got to work your soil deep, plow under an immense amount of manure.

Mr. Smith—What kind of soil is the best?

Mr. Utter—I think black, sandy loam soil is best, while reclaimed marsh, where there is water within six or eight feet, is an ideal soil. The soil should be very highly fertilized, using manure that will aid in keeping soil in fine tilth, for the reason that if there is a coarse lump as the shoots come out of the ground they will turn at the end and that injures them.

A Member—How about cut worms?

Mr. Utter—They say you can poison cut worms by the use of about 100 pounds of bran and a pound of paris green, using molasses enough to cause the green to stick to the bran.

Mr. Dahl—I think in this country the best soil for asparagus would be a light, sandy loam, well manured. If you put them as deep in rich soil, you can't get your asparagus until everybody else has eaten theirs. It will grow in your sandy loam three times as fast as your heavy soil.

Mr. Utter—The asparagus has a long season if you will cut all of the sprouts. If you let here and there a sprout grow, it will exhaust itself early.

Mr. Linse—What do you think about liquid manure to aid your asparagus?

Mr. Utter—I have never used it, but it is my opinion it would be better if some absorbent was used with the liquid manure and then applied. It seems to me the liquid manure would have a tendency to harden the soil.

Mr. Meyer—How do you apply this cut worm remedy? ?

Mr. Utter—Simply sow it broadcast, or distribute it along the rows.

Mr. Hill—What effect would it have on your neighbor's chickens?

Mr. Utter—Chickens and gardens do not grow well together.

Mr. Todd—How do you plant your asparagus?

Mr. Utter—Rows five feet apart and from 18 inches to two feet in the row.

Mr. Todd—And how long do you continue your bed?

Mr. Utter—For 20 years or more. I had a bed about 15 years when the rust destroyed it.

Question—Would you plant your asparagus bed from two-year old roots, and when is it at its best?

Mr. Utter—Five or six years from planting. You should not cut it until the third year from setting, and set some two-year old roots. I would really prefer one-year old roots.

Mr. Scott—If you set two-year old roots in 1905, when would you cut it?

Mr. Utter—Nineteen hundred and seven.

Mr. Smith—We used to have the idea that asparagus needed a heavy, rich soil, until both my father and myself noticed some asparagus that the wind had blown the seeds so that it was self-sown by the side of a fence in pure white sand, and the stalks were about the size of my thumb. We set out some asparagus on some of our white, sandy soil and found it did much better than anywhere else.

Mr. Hill—Have you been troubled with rust?

Mr. Utter—I was with Colossal; my Palmetto escaped it.

Mr. Scott—How deep did you set it?

Mr. Smith—Only deep enough to get out of the way of the surface; I think they were covered about three inches.

A Member—What was the subsoil in this sandy soil?

Mr. Smith—More sand, till you got down five or six or seven feet deep; then you would strike clay or water.

Mr. Hill—What do you do with the asparagus bed in winter, and how do you prepare for cultivation?

Mr. Utter—The ideal way is to mulch it with coarse manure right in the summer after the growth has commenced, after you stop cutting. Fill right in between the rows with as much manure as you can spare.

Mr. Todd—Do you cut asparagus below the surface of the soil?

Mr. Utter—Yes, so as to be out of the way of the knife.

Mr. Todd—If you cut under the soil a little that stops the growth of the stem, but if you cut above, it will grow again.

Mr. Utter—I do not think it will make any further growth, after it is broken off.

Mr. Todd—I beg to differ with you. A lady came and I told her to cut all she wanted. She snapped it off a little above the soil and it all came up again.

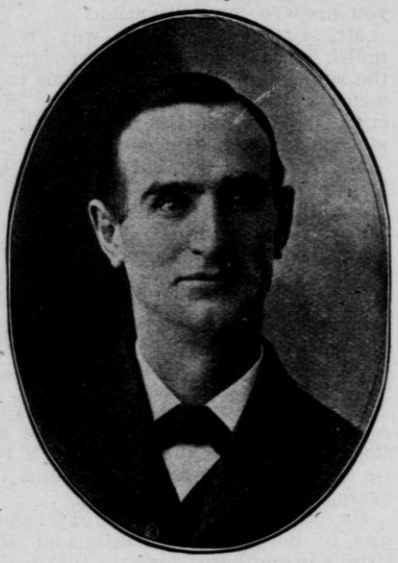
Mr. Scott—Mr. Todd's experience was in northern Wisconsin and Mr. Utter's in southern; perhaps that made a difference.

Mr. Roberts—If I snap mine off from the top, it never comes up.

Mr. Utter—The sprout that is cut off above or below the surface will not grow again in southern or northern Wisconsin; new growth starts from the root crowns.

CORN IMPROVEMENT.

D. B. Foster, Fairchild, Wis.



Mr. Foster.

Ten minutes is allowed to the subject of corn improvement! Ten minutes in which to deal with the improvement of the most important, the most valuable farm crop raised in all America! Too short a time to do full justice to such a crop, but the season is always so short in this state that we must hustle and we must use every bit of time available in order to raise a proper corn crop.

There was raised in the United States in 1904 over a billion dollars worth of corn. Billion dollar congresses and billion dollar corn crops have come in style about the same time. How much corn, however, do we raise to the acre? There's a test. The northern states, such as New York, Michigan, Wisconsin, Minnesota, and the Dakotas, have averaged during the past ten years 27 6-10 bushels per acre; the so-called corn states, Ohio, Indiana, Illinois, Iowa and Nebraska, averaged 27 8-10 bushels per acre; while the southern states, South Carolina, Alabama, Georgia, Mississippi, Louisiana and Texas, where nobody ever heard of a late frost in the spring, or an early frost in the fall, where they are never troubled with short seasons, there they have only averaged during the past ten years 13 6-10 bushels per acre. These figures are from the United States Year Book of Agriculture, 1902. But we have to do with Wisconsin, and every farmer knows that an average of only 27 6-10 bushels of corn to the acre is no credit to any man. Illinois and Iowa have awakened to this state of affairs, and they are spending many thousands of dollars for investigation and education on corn, and we may now take advantage of their discoveries and apply them to our circumstances with great profit to ourselves.

One Baleful Influence Exposed.

Well, what is the matter with our corn crop, and what baleful influence sends our average crop down to less than 28 bushels per acre? One of our influences is the seed we use, and to this influence I shall confine myself in this paper.

Our seed corn does not grow as it should, and what does grow does not produce as it should. Forty-six samples of selected seed corn were sent by farmers (and presumably not the worst farmers, either) to the experiment station in Iowa in 1903 to be tested. Only 10 per cent of some of them germinated at all, and some of them produced at the rate of less than 10 bushels per acre. Much of our planted seed does not grow and we get only air where there should be stalks and leaves and ears.

Care of Seed Corn.

Seed corn should be thoroughly ripened on the stalk, if it is not, there will be a loss of vital force to the seed. It must be well dried before severe freezing, it will not do to spread it on the floor in a warm room while fresh from the field, or it may mold or even sprout; and it must not be stored in bags, boxes or barrels, at any time, for it is apt to gather moisture enough to

spoil the germ. If seed corn is damp when husked, it should be thinly spread in a cool, airy place, and when well air dried, and before severe freezing it should be hung up or piled on racks in a well ventilated room that is warmed with fire heat; the ordinary attic is a good place if well ventilated and light, and seed should always be tested before planting; if not more than 80 kernels out of 100 of it grow in a fairly severe test it should be rejected.

How to Test the Seed.

The testing may be done in a warm place in the house between folded layers of wet cloth or blotting paper, laid between a couple of dinner plates turned together, but I much prefer a severer test. We may have bad weather after the corn is planted, we had it in 1904, two weeks of cold, wet weather, and it took good, strong seed to survive. I want to test seed corn under nearly natural conditions.

Go into the garden and scrape away about an inch and a half of earth, then spread 100 average kernels out so they are not too crowded, cover them with a square of cheese cloth, replace the soil and wet down thoroughly. In about four days of ordinary weather you may lift off the cloth and ascertain by actual count how many kernels in a hundred are available growers. This test should be made a couple of weeks before corn planting time.

But the seed that grows does not always produce as it should. What is the matter? Why so many barren stalks and nubbins? Well, suppose we have here a hill of corn containing three stalks, three good, thrifty stalks, one of which produced a good, big ear, the second a small ear, and the third one a miserable nubbin, what makes the difference? Not the season, nor the soil, nor the cultivation, because all three stalks have had the same opportunity; the difference must have been in the seed, and if we could go through the field and pick out the brothers and sisters of these stalks we should probably find that as a usual thing all the kernels from the ear that produced each of these stalks have each a strong family characteristic toward producing either good, big ears, or small ears, or nubbins, and this is freely shown in the experiment carried on at the station in Iowa, where 100 good, perfect looking ears, of the same kind and appearance were selected, the kernels (tips and butts rejected) from each ear were planted in separate rows, and each row harvested separately in the fall, and then compared one with another in regard to different characteristics; the result, briefly stated, being as follows:

Result of Test.

Yield—Ear No. 75 yielded 90.56 bushels per acre; ear No. 93 yielded 36.06 bushels per acre.

Vitality of Seed—Ear No. 77 gave 96.5 per cent of a stand; ear No. 73 gave 43 per cent of a stand.

Constitutional Weakness—Ear No. 54 gave 258 broken stalks or 64 per cent; ear No. 85 gave 41 broken stalks, or 8 per cent.

Barren Stalks—Ear No. 19 gave 79 barren stalks, or 21.5 per cent; ear No. 83 gave 6 barren stalks, or 1.5 per cent.

Suckers—Ear No. 37 gave 106 suckers, or 21 per cent; ear No. 75 gave no suckers.

In the face of such evidence as this, we must admit that heavy yielding stalks transmit to a large degree the tendency to heavy yields, while stalks defective in any way, likewise transmit the tendency to reproduce their own defects.

How to Improve the Seed.

The problem therefore is, how may we improve these weak, and defective, and unproductive strains from our seed corn? I believe that this can only be done by breeding these defects out of our seed corn and increasing its fruitfulness, in the same way that we have improved every kind of live stock on the farm, and that is by eliminating the unproductive and imperfect individuals, and I know of but one way to do this in the case of corn, and that is to raise our own seed in a seed plat special to that purpose.

Now this seed plat would be best if located at least a quarter of a mile from any other piece of corn, but the ordinary farmer will not go to the extra trouble and expense of providing such a plat, so I shall have to give you an easier plan, though not so effective, so

I say locate your seed plat on the south or the west side of your regular corn field and well away from your neighbor's field, especially if he raises popcorn, or some other small variety that you want to keep clear of. We put our seed plat to the south or the west of our regular field, so that the prevailing winds through the summer will blow the pollen from our regular field away from our seed plat instead of toward it.

This spring select from the seed which you have saved a number of your very best ears for your seed plat and plant each ear in a separate row. There is not much extra work in doing that, is there? Now cultivate your seed plat just the best you know how, just as you do your other corn, and watch it grow. But just as the silks first appear, and just before any of the tassels show any of that yellow dust that they bear at this time, go through your seed patch and break the tassel from every stalk that does not show signs of producing a good, big ear. In this way you begin the finish of the unproductive tendencies. Watch your seed plat through the summer and compare the rows one with another, and the difference between them will surprise you. Let your seed patch thoroughly ripen before cutting, harvest each row separately, compare the product one row with another, and select the very best ears from the very best row, to plant your seed patch with next year, using the best ears from the rest of the patch for your regular crop, or to sell. The fault with the common plan of selecting the best ears from the regular crop for seed is that the good, big ear, while having in its parent stalk a good mother, has in it also the tendencies of the unproductive stalks, because its silks were fertilized more or less by the pollen from the tassels of these unproductive, loafing fathers. Now, do not get the idea that you ought to send off and get some supposedly superior corn to start with, and if you do this for your main crop you are taking grave chances. Every farmer should raise his own seed corn, but if you have to buy seed corn, go to the best corn raiser in your neighborhood and buy of him the best he has, but never, never buy seed corn after it has been shelled. If you buy shelled corn, how do you know what kind of ears it grew on? And there is altogether too much temptation and tendency among salesmen to select seed corn by the "scoop shovel" method, when seed corn sells for upwards of $2 per bushel, and common corn may be bought for 30 to 50 cents per bushel. No, demand your seed corn on the ear, and be willing to pay the extra price necessary to get it in that shape.

The reason that every farmer should raise his own seed corn is that corn adapts itself to its local surroundings, to the climate, to the length of season in that particular locality, and to the soil. Why, it even adapts itself to the farmer who grows it. You know you can judge a farmer fairly by the looks of his corn field.

Potato men tell us that their crop is improved by changing seed, but such is not the case with the corn plant, and after it has adapted itself to our soil and to our season why should it not do better by us, year after year, unless we run it out by getting extreme earliness at the expense of size and vigor, or by producing runts and cripples by improper culture and breeding them into our crop instead of away from it.

Now, the objection may be raised that it will not pay to do so much "monkey work" just to get a little seed corn, but let us see. It has been proven that the yield of corn may be easily increased to the extent of 15 bushels per acre by the proper selection of seed. Now, our bushel of seed corn will usually plant seven acres of ground, and seven acres at 15 bushels additional per acre would make more than 100 bushels extra, and 100 bushels of corn at 30 cents per bushel makes $30. The extra work of raising a bushel of corn according to this plan could hardly take more than a day. Then we have this comparison. Here are two bushels of seed corn, one will raise a certain amount of corn and the other will raise $30 worth more. Now, if you have got that extra $30 for your day's work, as you may, it is as good wages as you ought to expect on the farm, or any other place, and you get the fun of the thing for nothing.

DISCUSSION.

Mr. Goodrich—I want to say a few words to reinforce what Mr. Foster

has said about the importance of the corn crop. It is the greatest crop raised in the United States; there is more corn raised in the United States, four times over, than there is in all the rest of the world. The crop of 1904 is estimated by the agricultural department at 2,453,000,000 bushels, worth $1,054,790,000. If it was loaded on a wagon 40 bushels to the load and started on the road, each load taking up 25 feet as close together as it could be driven, it would reach 292,000 miles, or eleven and three-fifths times around the world. If moved at the rate of four miles an hour, a good walking gait for a team, night and day, an observer standing by the side of the road would have to stand there eight years before it would all pass by him. After he had stood there one year, night and day, the next crop would be started out, and there would be two trains moving, and in one year more there would be three trains moving, and so on till there was a column of 18 abreast, and it would move on for all time, if the United States kept on raising as much corn. I could easily make a long speech, but I won't.

Mr. Todd—How will you exterminate suckers, with which we are all bothered?

Mr. Foster—You can't be in the real estate business, or you wouldn't complain of being bothered with suckers. Now, in choosing the best ears from the best row in your seed plat—mind you, I left the choice of that best row to the individual farmer, you might want the row that grew the most corn, I might want the row that grew more leaves; you might want the row that raised suckers. If you do not want suckers, do not take the suckers. Take your seed from the stalk that does not raise suckers, unless you want suckers.

Mr. Todd—Will suckering corn help it any?

Mr. Foster—I do not think so.

Capt. Arnold—Do experiments show that a barren stalk has any utility in the corn field?

Mr. Foster—Oh, it may be of some utility. I have seen some men that it was a question with a whole lot of other people whether they were any good at all, but I guess likely they were some good to somebody.

Capt. Arnold—Among all plants there are male and female; isn't it possible that that barren plant is a masculine plant?

Mr. Foster—It has been estimated that there are about five million particles of pollen on each tassel. It takes a good ear of corn to contain a thousand kernels, and most of our ears do not contain half that, but say we have an ear that contains a thousand. There is enough pollen on that one tassel to fertilize 5,000 such ears. You can break off the tassels from half of those and you still have plenty of pollen left. So let these worthless—comparatively worthless—stalks be put into the silo, the cows eat them just the same, but if you are raising corn do not let them grow. There are men who object to butt end seed corn, because they complain that there won't be any end to the ear of corn if you don't have kernels there. Very early in my philosophy or arithmetic I found there was only one thing that did not have an end, and that was a circle. So let us grow our seed corn without end, if we can.

Mr. Christianson—Can't you go into a field of corn and pick out corn that is just as good as if you have a field particularly for the seed corn?

Mr. Foster—No, because it will be all around, mixed through with the regular corn yield. There will be stalks that did not bear good ears; say here is one having only two-thirds of the kernels on that cob and that has thrown out pollen, which has fertilized other corn. You would not take a calf from my dairy that came from a cow that never gave any milk. You want to get productive sires, that is what you want.

Mr. Christianson—I have raised my own seed for the last few years, I never raised less than 40 to 45 bushels to the acre, and I picked out my seed in the fall as soon as the corn was fairly ripe; I just picked out the best.

Mr. Foster—That is the right way to do. We know, all of us, that farmers can improve their corn simply by going through the field and selecting the best ears, but it is too slow, and that is the only objection. We want more improvement in a short time; we shall not live forever.

Mr. Todd—How about keeping the seed corn in the cellar?

Mr. Foster—If you keep it in the cellar, it may not get quite so dry, and it certainly will not freeze. It will keep all right, if it does not mold and your cellar is well aired. You must keep it from freezing and you must keep it dry. I do not keep mine there.

Mr. Wilmer—I put mine in the cellar one year, but I will never do it again. I had to buy my seed corn. What are you going to do with the barren or unproductive stalks?

Mr. Foster—Break off the tassel.

Mr. Wilmer—How do you know you are breaking off the right one?

Mr. Foster—If there is any doubt about it, break it off; do not break it off until those silks begin to appear, but before the ear is formed.

Mr. Wilmer—But how do you know you are getting the right one?

Mr. Foster—You don't know, but you do not take any chances on it.

Mr. Wilmer—How will you keep from having your corn fertilized by the pollen from your neighbor's corn?

Mr. Foster—By keeping at least a quarter of a mile away, or your neighbor's pollen will blow over to your field.

Mr. Wilmer—Will it go a mile and a half?

Mr. Foster—Oh, some of it might, but then you are doing the best you can. I am not talking about a perfect way of raising corn, but I want you to do a little better than you are doing. I do not want Eau Claire county to come into the statistics with 27 bushels of corn to the acre.

A Member—You represent that 80 per cent was the best you had in testing seed.

Mr. Foster—No, I said if it was below 80 I would reject it. It ought to be 95 anyway. I wouldn't stand anything that goes below 80 per cent germination. I wouldn't plant it.

Mr. Wilmer—This last year seed was very scarce and you had to plant what you could get.

Mr. Foster—Necessity knows no law.

Capt. Arnold—I always thought those defective plants were occasioned by having poor seed, not sufficient vitality.

Mr. Foster—That is right, poor in one respect or another, and it is for you to settle with yourselves why it was poor.

Mr. Imrie—Would you recommend the Dent corns for this locality?

Mr. Foster—I would recommend raising just whatever you can raise and get the most corn to the acre. The best corn is the corn that grows the most to the acre, and so is the best farmer the farmer that raises the most corn to the acre and gets it right.

Mr. Martiny—Did you ever notice any relation between the leaf growth and the production of corn?

Mr. Foster—No, I never noticed. There may be some relation, because it has been shown that suckers will cut down the product of the corn to some extent, but I do not know how it is with leaves, they are different, they are the lungs. A man with big shoulders and big lungs does not always do more work than the fellow that is a little bit narrow. It is something besides lungs that produces labor.

Mr. Weber—Isn't there a corn that will not produce suckers?

Mr. Foster—As a rule, Dent corn does not produce suckers.

Mr. Weber—There are not but two or three varieties that produce suckers.

Mr. Foster—I do not know. I raise Dent corn, because I do not want to dig up suckers. I got tired of that in New York state.

Mr. Weber—What variety of Dent do you prefer?

Mr. Foster—The biggest one that will get ripe. The one that will raise the most corn when I raise it for corn for the silo or for fodder. The one that will raise the most feed to the acre, but they must both get ripe.

Mr. Weber—You would not recommend the Mastodon for this country?

Mr. Foster—Not if it won't get ripe. I want a dead sure thing.

Mr. Weber—Won't it get ripe as fast as Pride of the North?

Mr. Foster—I never raised Mastodon, but I have raised Pride of the North.

Mr. Weber—I have raised both side by side.

Mr. Foster—If the Mastodon will raise larger crops and ripen, it is the better corn.

Mr. Roberts—The Flint varieties grow more suckers.

A SMALL FARM.

C. E. Matteson, Pewaukee, Wis.

I wonder how many people in this audience ever realized that they were "land poor;" that they have too much land, more than they can use to good advantage; so much so that it is skimmed over, half worked and less than half fertilized; it costs more for labor, machinery, etc., than the crops will sell for in the open market. Many a large farmer is hard up, always in debt, overworked and disgusted with the best profession known to man. A small farm, well worked and cared for, can be made to bring as great a profit and a great deal more comfort and satisfaction. I receive many letters of inquiry as to my management of a small farm, and how I have made a good home and a living for my family on ten acres of land. It is not a long story, neither does it contain anything remarkable, nor anything beyond the reach of any ambitious man who is willing to work and economize, and, beyond all, who is willing to study and read so as to post himself thoroughly along the line of work he is following on his farm. Many men get frightened at the word science; perhaps it may be their own ignorance that scares them. Science means to know why a thing is done thus and so, to know the truth; it means to study and reason out, to have a clear understanding of one's own business; not to be thus fortified means ignorance of the underlying principles of the business and inability to apply the mind and hand to the best advantage. The man who farms 200 to 600 acres of land will not find much to interest him in my small farm, and he will be loath to believe that a family can be supported and educated from a ten acre plot, but that it can be done my own experience is ample testimony, and besides that I am able to put a little aside each year for the rainy day when I shall be incapacitated for work.

What One Man Has Done.

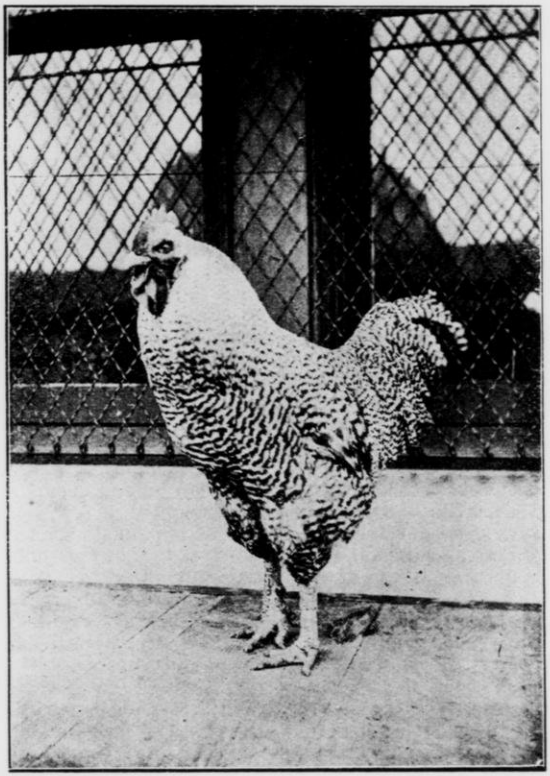
My farm is but nine and one-half acres by actual measurement, and I find it a pretty big farm at times, too, so much so that during the last few years of the scarcity of labor I have had to work a little harder than I really wanted to. Do not think to escape work on a small farm, simply because the work must be better done in all its details, and thus our profits are increased accordingly.

There are probably many people in this great state situated just as I was and cannot afford to buy and equip a large farm, for indeed it takes a small fortune today to buy, stock and equip a large farm, but they could start a nice, little, comfortable home for themselves and family with what capital they have at hand, and not be obliged to carry a mortgage all their lives. I know of many who went so heavily in debt at the outset that they are only able to keep up the interest year by year. This I call slavery. All such, if really they must have a large farm, would do much better on the fertile, cut over lands of northern Wisconsin, that can be had cheap, and from which they could in a few years own a home free from incumbrances. All people have not the aptitude to follow intense farming, for, as I said before, it requires some degree of science and skill to manage even a small farm, but by beginning small and growing up with your business as I did, and by study, work and careful attention to details as one progresses, there is no need of failure.

Many city people long to operate a small farm, to raise poultry, fruit, etc. Many such make the venture, only to find that they know nothing about the business of intense agriculture and thus they fail utterly. It takes time, years of time, to become prosperous in any business.

Several years ago my whole possessions were about $1,300. I had farmed for others all my life, supported a family and saved the above amount, and came to the conclusion that I would own some land, that henceforth I would be my own boss, so I began to look for a location. I realized that location had a great deal to do with the kind of

farming I would be obliged to follow. Land at that time was worth close to $100 per acre in this vicinity, so my hearers can easily see that my capital would not go far towards starting even a ten acre farm, but I purchased nine and one-half acres at $100 per acre, leaving me but $350 to build dwelling house, poultry buildings, buy fruit stock, berry plants, etc. I could see but one course to follow, and that was to mortgage my prospective home, which I did for $800. This, with what I had left from the original capital, enabled me to build a dwelling, poultry buildings, etc., but right here another problem confronted me. What was I to live on while waiting for my little farm to produce? I had given up working for others, my investment needed all my time, and to neglect it meant loss. I was obliged to give a second mortgage of $500, making my total indebtedness $1,300, but I was not discouraged. Located as I was, near one of the best markets in the west, I knew that a few good crops would clear all indebtedness, and they did. In just five years I was out of debt. I could have cleared it up sooner had it not happened that I started in business just as the panic of '93 was sweeping the country and prices were not what they have been since for poultry and fruit products.



Jumbo, Jr. Score, 93½ Points. Bred and Owned by C. E. Matteson, Pewaukee, Wis.

Location of the Small Farm Important.

Location must be considered. Because a good deal of shipping must be done to and from such a plant, it is the part of wisdom to locate as near

a shipping station as possible. If poultry is to be made the backbone of the enterprise, as it is with me, the land should slope to the south, or, still better, southeast, so as to catch the early morning rays of "Old Sol." Poultry and fruit certainly make a splendid combination, running the fruit as an adjunct to poultry, managing the poultry so that the major portion of our crop is placed on the market in winter and early spring. In fact, I never recommend poultry from any other standpoint. Have a small brood house, so that a nice lot of winter broilers can be put upon the market in early spring. The same brood house can be used to get out our spring stock from which to select our next winter's layers, and yearlings to be sold in June while prices are high and to get them out of the way of growing pullets, as well as to lighten up on the labor problem.

Location of Poultry and Fruit.

The growing pullets should be so colonized that they have the run of the land, thereby getting three crops from the same land each year, and a very efficient way of ridding the fruit plants of insects, curculio, etc., distributing the fertility as they go from the detached colony houses, the manure is taken directly to the tree and cane plants, and spread where it at once becomes available, and is one of the best fertilizers known for fruit.

Advantage of Live Stock on Fruit Farm.

A stable should be built to accommodate not less than three cows and a horse or two. I hear some say, why keep so many cows on such a small farm? I do not do it because there is any considerable amount of money derived directly from dairying, but to get a large amount of good manure to grow fruit, and the milk comes in so nicely for the poultry. In fact, my way of managing poultry demands milk, so if I can pretty near sell butter enough to pay for the keeping of the cows, I get the manure and milk for my labor. But if one can locate near a city where they can get plenty of manure and can also get plenty of milk for the

Berry Pickers at Lunch at the Poultry and Fruit Farm of C. E. Matteson, Pewaukee, Wis.

poultry, it would not be advisable to keep too many cows. At present I am buying food for six head of stock, and consider my money well invested.

I consider one of the secrets of my success in growing small fruits attributable to the liberal use of stable manure. By this method of running a small farm a revenue is coming in at all seasons of the year, it is much safer to follow mixed farming, even in a small way, for we have seasons that are unfavorable to certain kinds of crops and it is well to have something else upon which to rely for an income. I find poultry the surest and safest of all my undertakings. No matter what the season, a full crop can be relied upon. It requires experience, however, to succeed with fowls, especially the winter egg business. No one should jump into the business and expect to make money from the outset.

A ten acre farm rightly managed will bring a good living, including the comforts and some of the luxuries of life. This I have fully demonstrated, and what I have done others can do.

DISCUSSION.

Mr. Weber—Does not putting on a liberal amount of manure make some berry plants grow to stalks?

Mr. Matteson—It might, especially with strawberry plants, where there is considerable nitrogen in the manure. I do not believe there would be much danger with tame fruits. It would be so with a plum orchard, they would be liable to grow largely to wood.

Supt. McKerrow—What kind of fruits do you find most profitable on that little farm?

Mr. Matteson—The kind of fruit that works best in connection with my poultry farm is the black raspberry and native plums. Strawberries are not the nicest crop to grow with poultry.

Supt. McKerrow—We understand you grow two crops at a time, the poultry down near the soil and the raspberries and plums higher up?

Mr. Matteson—Yes, and sometimes I am growing three crops. Right in the plum orchard I set out raspberries and we have a crop of plums, a crop of raspberries, and a fine crop of pullets on the same soil.

Mr. Convey—Have you kept a record of your revenue?

Mr. Matteson—Yes, I have a statement.

Mr. Convey—Can you give a rough estimate of the amount of money received on this nine and a half acres of land?

Mr. Matteson—I haven't it itemized last year, but I sold somewhere about $1,600 worth.

A Member—And how much money did you put on that farm?

Mr. Matteson—That is a good question, but I would rather you didn't ask me that—between $700 and $800 last year. We got a good share of our living and considerable more that we never gave our farm credit for.

Supt. McKerrow—Is your living included in those figures?

Mr. Matteson—No, sir, that is not included.

Supt. McKerrow—That is over and above the living of your family?

Mr. Matteson—Yes.

Supt. McKerrow—And your family is not a small one, either?

Mr. Matteson—We have quite a family.

Mr. Smith—Where is your market?

Mr. Matteson—For poultry we depend on Milwaukee and Chicago. I live 19 miles from Milwaukee. For the fruit, we aim to sell mostly in the home markets; I ship but little.

A Member—What kind of poultry do you keep?

Mr. Matteson—Barred Plymouth Rock at present.

The Member—Do you sell any for breeding purposes, or just for pullets or eggs?

Mr. Matteson—I do sell some breeding stock. That was the last thing I thought of when I launched into the business, but you cannot help yourself when you get into it, your reputation will gradually grow, people will want your stock and then in a short time you are a breeder.

Mr. Donaldson—You would advise a young man then to buy a small farm?

Mr. Matteson—Well, I would, if he did not have the money to buy a large farm, rather than go without a farm.

Mr. Donaldson—Suppose the young man had capital enough to buy, say, 80 acres of land, but he would have to

go in debt to stock it and make all the improvements on it, and that same capital would buy him, say, 20 acres of land, improve it, stock it in the very best way?

Mr. Matteson—I think the latter would be by all means the most independent course. The large farmer really is a little more independent. He does not have to hunt a market for his crops, but, of course, with fruit you have to hunt a market.

Mr. Utter—Don't you think there are more men capable of handling 80 acres than 10?

Mr. Matteson—Yes, I guess that is right, though not necessarily so; that is, if they inform themselves as they can. All people have not the aptitude to take up a small, intense farming project, and in that case they will do better with an 80 acre farm. But 80 acres is really considered a small farm. As I said, the location has a great deal to do with it. You must locate yourself where you are going to be sure of getting the price for your product. Of course, that is not so much so now as it was when I went into it. There is rapid transportation now, you can get your fruit to market in the large cities promptly.

Capt. Arnold—Haven't you pretty nearly got to be your own hired man when you have a farm of ten acres?

Mr. Matteson—You have to with a large farm.

Mr. Foster—And isn't the hired man the most independent creature on the place?

Mr. Convey—Have you ambitions for a larger farm?

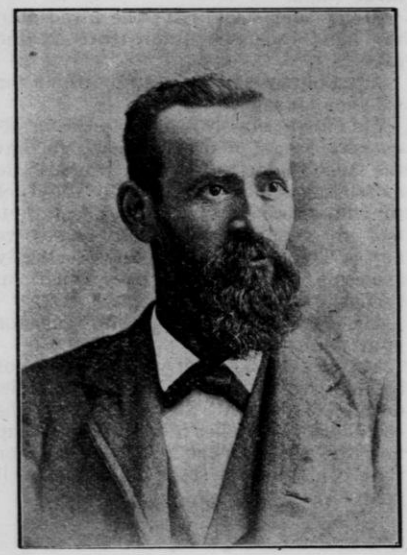
Mr. Matteson—Not in my present situation. I said just a moment ago that the large farmer, of course, was a little more independent, owing to the fact that his products always had a market, but all people haven't the money to buy a large farm, and they certainly are very independent if they can farm themselves on small farms.

Mr. Smith—What do you get for your poultry?

Mr. Matteson—Last year the price of broilers was from $5.50 to $7.00 per dozen. This year the market will be considerably higher; broilers are up now in the market and that means that cold storage stock is pretty well gone.

THE LARGE FARM.

David Imrie, Roberts, Wis.



Mr. Imrie.

My subject, as you have heard, is The Large Farm. Now, this is rather an unknown quantity, as a large farm in one locality may be considered a small farm in another. In eastern Wisconsin, a farm of 320 acres would be called perhaps a large farm, while with us in St. Croix county it is not a very large one. Taking all the farms in Wisconsin, the average is 117 acres, so we will call the 320 acre farm the large one, and will discuss it in this paper.

Some Advantages of the Large Farm.

For the last 25 or 30 years, good farm lands in Wisconsin have been advancing in price, and I think will continue to advance for some time to come. This is especially true in central and western Wisconsin, where farms equally as good as those of eastern Wisconsin were selling (five or six years ago) for from one-third to one-half as much, and are still a good deal lower; therefore the larger the farm the greater the amount made by the advance in price.

On all farms we must have farm buildings; the house must be large enough to accommodate the family, whether the farm be small or large. We must have barns and outbuildings, also. Of course, on the large farm we will have to have larger buildings, but the larger the barn the less it costs for the area enclosed, as you all know it requires only twice as much fencing to enclose a square 40 acre field as it does a 10 acre field. And it requires the same amount of money to clothe and feed the family, no matter what size the farm may be. This is shown plainly with a farmer who has but three cows and is selling milk. It may take the milk from two cows to supply the family with butter and milk, so that he only has the milk from one cow to sell, but double the number of cows and he has four times as much milk to sell. So the small farmer has the most expensive plant, in comparison to his receipts.

Every farmer on a small farm of 40 or 80 acres will need about the same machinery to work his farm properly as he would on the large farm, as a binder, mower, hay rake, grain drill, harrow, plows, etc. The large farm will require larger machines, but the larger sizes cost but little more.

On the large farm each man can work four horses most of the time, as the fields are long and the machinery large, therefore, it costs less to produce a crop, and to reduce the cost of production is about all we can do, as the other fellow fixes the price.

Difference in Management of a Large Farm.

The management of a large farm must of necessity be different from that of the small one. On the large farm the work will be done mostly by hired help, whereas the small farmer will be obliged to do most of his work himself, as his income being small he

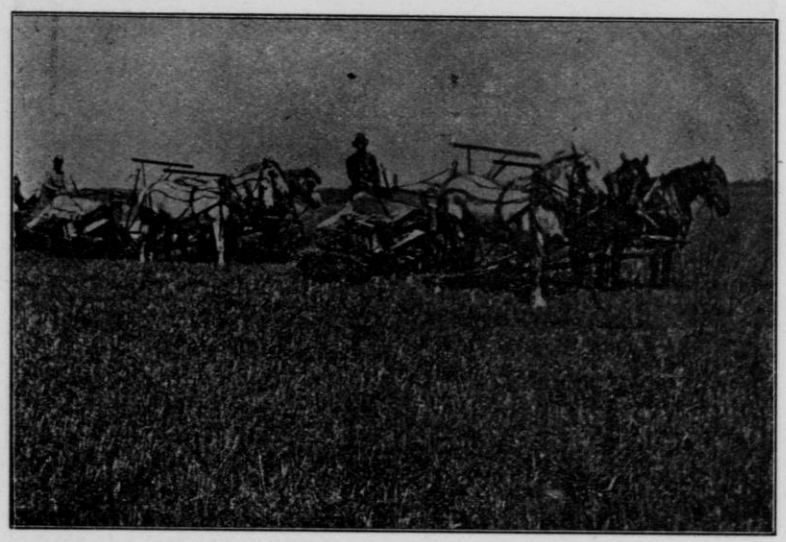
cannot afford to hire much, so the large farmer does not work as hard as he on the small farm. Again, if a man is alone on a farm he often works at a great disadvantage, as there are lots of jobs at which two men can accomplish a great deal more than twice as much as one man.

In buying feed or selling stock the large farmer has the advantage, as he can buy and sell by the car load and thereby save the profit made by the middleman. He on the small farm must be a dairyman, poultryman, fruit grower, or a specialist of some kind, can make more money and do it easier with the large one.

DISCUSSION.

Mr. Meyer—Do you follow the same methods in handling a medium-sized farm and a large one?

Mr. Imrie—No, we do not. On the small farm we were dairying almost wholly. We raised some hogs and a few colts, but kept no young stock whatever. On the large farm we keep as many cows perhaps, but we raise more colts and young stock, and also more grain.



Harvesting on The Large Farm, from 30 to 40 Acres a Day.

putting all his eggs in one basket, as it were, while on the large farm we have a variety of crops and stock, so that if the price of one class of stock is low, we make a profit on some other that is high, and the same with the crops where a variety is grown.

We can allow the young stock to mature and fit them for market, buying and feeding extra stock at times when we have an abundance of feed, for all crops raised should be fed on the farm.

I have owned and operated a small farm, so have had experience with both, but I prefer the large farm, as I

Mr. Scribner—Do you feed all of this grain out on the farm?

Mr. Imrie—Yes, practically all is fed on the farm.

Mr. Bradley—Isn't there more fun on a small farm?

Mr. Imrie—I don't know. On a small farm, you are obliged to work hard yourself, because your receipts are so small.

Mr. Goodrich—Do you have any difficulty in getting good hired help on your large farms?

Mr. Imrie—Yes, we do at times. For two or three years hired help has been

very scarce and hard to get of the right kind.

Mr. Goodrich—And if you have a good many hired men, you have to make a boarding house of your place, don't you?

Mr. Imrie—Yes, somewhat.

Mr. Foster—What does your wife think about it?

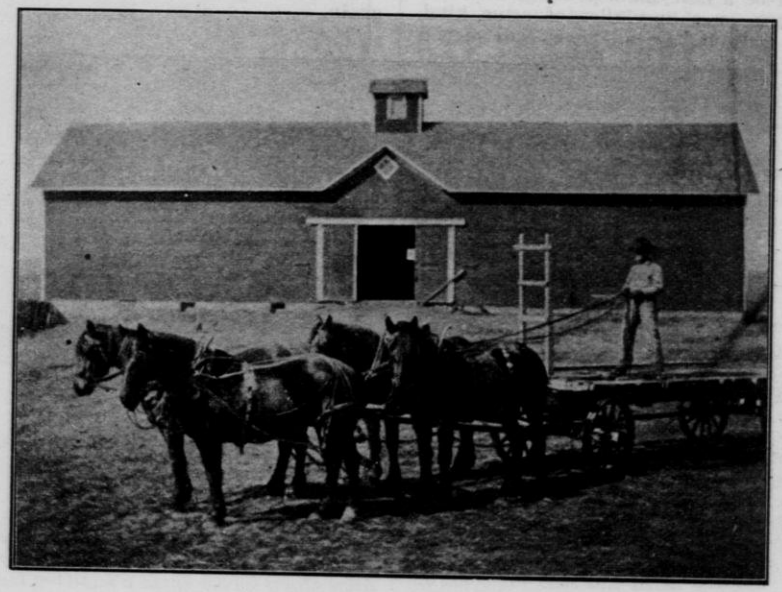
Mr. Imrie—She isn't here to say.

Mr. Scribner—She has gone upstairs to learn how to cook, so as to be able to learn how to take care of you.

man in Grant county who has 80 acres of fine land and he desires to sell that land and come up north. What do you think of that proposition?

Mr. Imrie—I never have had any experience in clearing a farm. Our farm was all under the plow when I bought it, and the old farm I helped father clear and bought it of him some eight or ten years ago, so I can hardly say.

Mr. Convey—I would like to hear what Mr. Scribner has to say about that, I mean would he prefer to re-



Going for a Big Load of Manure; a Long Haul.

Mr. Scott—She keeps so busy, you don't see enough of her to find out how she feels.

Mr. Imrie—I thought I would answer that question, but I don't believe I will.

Mr. Foster—Will the court notice that the witness refuses to answer?

Mr. Convey—I know quite a number of farmers in the south part of the state who have small or medium-sized farms that think they can get a large price for their land and think they had better come up north and start up a new farm here. I know one gentle-

main on a medium-sized farm, or to go up in the northern part of the state and clear up a farm there?

Supt. McKerrow—I think Mr. Convey is the best man to answer that question. He has a family of 12 children, and he certainly ought to look for bigger acreage.

Mr. Convey—I don't wish to answer it. I know from observation throughout the state that it is a good deal better to keep the small or medium-sized farm and do better farming upon it. Mr. Scribner runs a small farm and carries upon it a cow for each acre

under cultivation, nearly. I have a very much larger farm than he has, but I doubt if my receipts are much larger than his are. I wish Mr. Scribner would tell us how many acres of land he has and how much revenue he gets off that land.

Mr. Scribner—I believe it is a good thing to strike the happy medium between the small and the larger farm. We have an 80 acre farm and can carry about 60 head of cattle. Of course, we are in the dairy business. I believe it is possible to realize as much from an 80 acre farm, well cared for, in the dairy line, as from a larger farm. Our receipts for the last few years have been between $3,500 and $4,500 each year, and our expense, hired help, has been $600. We keep two hired men through the year.

Supt. McKerrow—I do not want Mr. Convey, or anybody else in this audience, to get the idea that these topics, the small farm and the large farm, are put on this program to get up any antagonism between them, but simply to show what may be done with a very small farm and the large farm. I will admit that the man who made the program made one mistake, and that was in not putting on a representative of the medium-sized farm, such as Mr. Scribner's or Mr. Convey's, so that there is one link missing, and that Mr. Convey wants to put in. But we do not want to get the idea that there is a conflict. In making this program, I knew that Mr. Matteson is making a success—now, I am not measuring that success by the standards of Pierpont Morgan or John D. Rockefeller, but he makes a success in building up a nice farm home and raising and educating his family. On the other hand, I knew that Mr. Imrie, who went from a medium-sized farm and purchased a comparatively large farm, is also making a success right along the same lines, and my object in putting these two topics on the program was that we might get some pointers out of Mr. Matteson and some encouragement to make a living out of nine and a half or 15 or 20 acres, and, on the other hand, that we might get some encouragement also from Mr. Imrie in making a farm of two or three or four hundred acres pay. My idea was rather to draw out the methods by which these men made them pay. Mr. Convey has put in this link, and we have got a statement on it. Now, let us confine our questions to drawing out of these men what they do.

Each Man Works Four Horses.

Mr. Imrie—I would like to answer Mr. Convey's question a little more fully, that is, not about clearing up a new farm, but, in my own case, for instance, I sold in Buffalo county and

bought in St. Croix county. Land is cheaper there and we only paid $31.25 an acre. That was six years ago last fall, and it is now worth double that, or $62.50 an acre, so there is money it you want to sell a farm of that kind after keeping it for a time. The land is not as high yet as in the southern part of the state, and we can raise just as good crops, so I think perhaps a man can make money sometimes if he changes his location. My receipts do not compare with Mr. Scribner's, but perhaps the net receipts are not so much below. I take it in this way, first, figuring the value of the farm and interest on that money, as well as the live stock and machinery. The value of the farm, $20,000; stock and machinery to operate the farm, $5,000, and that makes $25,000. Interest at 5 per cent, $1,250. Two hired men, $550; extra hired men, $150; myself, $400; wife, $200; hired girl, $125; groceries and flour, $400. I figure that in, because I find that is eaten by the hired men and girl. I did not count in any clothing. I sold from the farm, $4,835; total expenses, including interest on investment, $3,085, leaving a profit of $1,750. That, of course, is without my own and my wife's wages, $600, so these could be added in, if you think proper.

Mr. Scribner—Then you pay your wife wages, do you?

Mr. Imrie—Yes.

Mr. Hill—And you only give her helf as much as yourself?

Supt. McKerrow—Mr. Hill thinks she is the better man of the two. Now, you have the showing of these classes of farms.

Mr. Martiny—Mr. Imrie said that he carried on dairy business on the small farm and went into some other business on the larger farm. Why wouldn't it be profitable to hire a little more help and carry on the same kind of farming where you are now?

Mr. Imrie—I hardly think it practicable, because the number of cows I could feed where I am now would require five or six men to do the milking, and we could hardly keep them to work when they were not milking the 100 to 150 cows.

Mr. Scribner—And you would have to have so much larger a boarding house that you would have to give your wife the $400.

Mr. Imrie—And I would have to take the $200.

Mr. Scribner—I suppose Mr. Imrie's idea is that he would like to feed out all the roughage on the farm that he could raise, and he doesn't care to sell any because it would impoverish his land, so he keeps more stock and doesn't have to keep so much help.

Mr. Imrie—That is it exactly. Mr. Scribner's help costs him nearly as much as mine.

Adjourned to 1:30 p. m.

AFTERNOON SESSION.

Convention met at 1:30 p. m. Conductor F. H. Scribner in the Chair.

FARM MACHINERY.

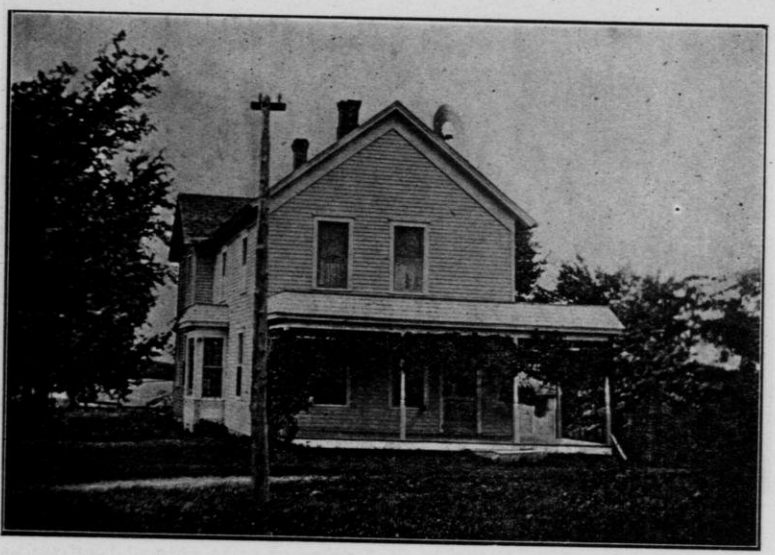
W. C. Bradley, Hudson, Wis.

Machinery has been a blessing to some farmers, and a curse to others. A great many farmers buy more machinery than necessary, a few buy less than they need. Diversified farming is all right, but it may be overdone, for in order to grow a large variety of crops like potatoes, tobacco, sugar beets, cabbage, etc., successfully, each crop requires different machinery; so I think it best for the average farmer to specialize somewhat and save machinery. With a few exceptions, like wagons, buggies, harnesses, separators, and powers, the large part of farm machinery is idle 11 months in the year, and an expense to us for shed room, insurance and interest on investment, while machinery in other lines of business keep their wheels turning night and day 12 months in the year.

Care of Farm Machinery.

A farmer is always safe in selecting machinery, wagons or buggies whose makers have a reputation for making good goods. The cheap buggies and cutters made from elm and ash, and the cheap milk separators are usually dear at any price. Let us buy good machinery and then take good care of it.

Build good sheds and keep under cover when not in use. The average life of a grain or corn binder, mower or plow is six years; it ought to be 12. Drills, seeders, rakes, cultivators, etc., last 10 or 12 years; with good care they



The Bradley Farm Home.

should last 20 or more. Farm harnesses would last twice as long as they do if they were cleaned, oiled and repaired thoroughly twice a year, for the stitch or rivet in time is worth a dime. Every farmer should have a repair shop with forge, anvil, vise, drill, files, etc., a work bench with saws, plane, brace and a good assortment of auger bits, square, several hammers, wrenches, pinchers, tools for mending harness, a can or two of paint, an assortment of bolts and rivets of different sizes and lengths, washers and extra nuts, a thread cutter and taps, and some lumber of different kinds for repairing. With an outfit of this kind, that would not cost over $50, a farmer can do much of the repairing, that, without it, would necessitate many trips to town.

Wagons and buggies should be thoroughly washed and painted each year, and before painting the wheels, have your tinner make a pan from heavy iron five inches wide and five deep and two feet long; fill half full of linseed oil, fix it so you can put a fire under it, hang the wheel so it will revolve slowly in the hot oil for 10 or 15 minutes; then, when dry, paint, and your tires will not require setting for many years. See that the neck yoke and whiffletrees are in good repair, and have extra ones on hand in case they are needed.

Before spring work begins, sharpen the drag teeth, drill and cultivator shovels, disc harrows and plow lays. Go over each piece with a wrench, tightening loose nuts, putting in bolt, nail or screw where needed. Tools of this kind when put in the shed after the season's work need to have the bright parts covered with grease of some kind to prevent rust. See that the mower is in good shape; keep the knives sharp; put new plates on the guards if badly worn; drive the tops down if space is too wide, so the sickle will run close; use good oil and keep bolts tight. The binder should be thoroughly cleaned up, and any badly worn parts replaced with new ones; loose slats on canvas, straps and buckles fixed; have one or two extra reel arms and slats in case of breakage, a few extra bolts, a small alligator wrench, flat and rat tail file should be in box with the monkey wrench.

Bradley's Oat Crop after the Storm.

The windmill is usually the worst neglected piece of machinery on the

farm, seldom oiled until it squeaks, but with the new mills with large oil cups and self-feeders there is less noise.

By having a work shop and tools, the farmer will take more interest in keeping his tools in repair. On rainy days sharpen the axes, hoes, mower knives, corn knives, draw shave, etc.; fix harness, halters, hay rigging, forks, racks, doors, stable floors, pig troughs, shipping crates, wagon tongues, whiffletrees; mend sacks and forty other things that need looking after in order that valuable time may be used to better advantage than running to town for some slight repair that should have been done at home.

I acknowledge we are the slaves of the big trusts that charge us enormous prices for machinery, but we should free ourselves from the bondage of carelessness and neglect.

Filling Bradley Silo.

DISCUSSION.

Mr. Jacobs—Have you any patent by which you can keep your tools in working shape with two or three hired men about?

Mr. Bradley—No, sir, it is lots of trouble to find them sometimes, but they are on the place somewhere. It is a good plan to take a rainy day and hunt up the tools.

Mr. Smith—How did you build your machine shed?

Mr. Bradley—Our machine shed is a lean-to on the side of the barn. At the very first Institute that was held years ago, I read a paper on farm machinery.

Mr. Scott—Is this the paper?

Mr. Bradley—I do not think that was published. I remember there was criticism on that paper because I said I built a machine shed at a dollar a foot. My idea was to have a long machine shed with doors that would roll past each other in front, so that we had wide spaces to back our machinery in. That was a great deal handier than the shed I have now, but I built that for a dollar a foot, but perhaps I would have been better off if I had spent $1.50.

Our machinery shed is on three sides of the granary, double doors, seven feet wide, so that the binder can be put in there.

Mr. Scribner—I think it has been truly said that machinery rusts out more than it wears out as a rule.

Mr. France—I rather object to blaming the hired man for leaving everything out in the field. I never allow a hired man to unhitch until he is in a building.

Mr. Bradley—They tell a story of a farmer who bought a new Champion mower; at the end of the year he unhitched right where he finished using it. The next spring, when he went to work, he couldn't find the mower in the shed, and he asked the boys where it was; they didn't know, and his wife didn't know, and he had to go to town and buy a new mower, and in the first swath he ran into the old one with the new one, and broke both of them.

Mr. Imrie—That land couldn't have been clover sick.

Mr. Jacobs—Isn't it a fact that a great deal of loss is caused on farm machinery by leaving it loose?

Mr. Bradley—Yes, and keeping the nuts tight, that is an important thing. There are so many people that hook onto machinery without looking it over. You run it until it breaks down, whereas, if the machine had been looked over carefully, it would keep in good shape much longer. Half the windmills in Wisconsin blow down simply because one bolt gets loose, and then it catches and then the whole windmill goes.

Mr. Scribner—We make a practice on our farm, when a machine is put away, of putting it away in shape to come out for the next year's work. We know where it is and that it is in good shape. It is cleaned very carefully, looked over and is ready for the next season's work.

Mr. Linse—If you fix it right at that time, you know just what the defects are, and if you wait till next spring you have forgotten what was the matter with the machine.

Mr. Roberts—In regard to plows and cultivators, they should always be bright and the nicest way to put them away is to oil them thoroughly, then the next spring you find them in fine condition to go to work.

Mr. Bradley—If the machinery is kept up right, the labor doesn't amount to much. On our farm we owned a drill for 29 years. That drill for the first 10 years did a good deal of work on new breaking, very rough land. Of course, it would not have lasted 10 years if it had not been constantly kept in shape. We have a wagon on the place that my father bought 39 years ago, and we are using part of that wagon yet—not all of it. The hounds and axles and bolsters are all right and three of the wheels are the same.

A Member—Then you contend that machinery will be better the more work you do with it, that age will contribute to its utility?

Mr. Bradley—Oh, no, I do not want to be misunderstood, but so many people use a machine three or four years and then throw it away when they don't need to.

A Member—I have used one binder on 600 acres for 10 years.

Mr. Bradley—Of course, a larger farm would have more to wear it out, but the average farmer, with 120 or 200 acres to cut a year, ought to make his binder last at least twice as long as the average binder does.

SILO CONSTRUCTION.

Prof. Geo. N. Knapp, Madison, Wis.

My subject today is silo construction. The speakers following me, as you will observe from the program, will tell you about good silage and how to feed it. I am, therefore, not under the necessity of telling you what silage is, what a silo is, nor how to feed silage. I assume that all here are interested in the silo, and wish to know how to build a good silo cheaply. But before I take up the subject of construction, I may venture a few general remarks on the subject of silage, even at the risk of encroaching on the field of the speakers that will follow.

Some Causes of Failure with Silos.

As we go through the country, we see a great many silos that are empty and abandoned. Now, if we inquire why this is we will find that there are a number of causes. First, we will find if we inquire about the empty silos, that in most instances they were built by men who do not consider what is implied in silage. And second, after having decided to build, they did not build carefully.

Now, silage cannot be handled as straw, corn fodder and hay can be handled; silage implies a little more care all along the line. If you throw silage into a silo like you throw hay into a haymow, and take it out the same way, pulling out a forkful here and another there, and throw it around the barn, as is often done with hay, you will have trouble in tainted milk and sick cows, rotten silage and rotten silo walls. If you follow that practice through one season, you will certainly get tired of the silo and condemn it. Many of the silos that you see standing empty are condemned for just that reason. They were put up by men who were not willing to pay the price of good silage, that is, a little extra care.

A second cause of abandoned silos is that they are frequently built following a plan of construction that is predestined to failure. The walls are built in such a way that they must rot out rapidly.

Silo construction is an important question, and the caution that I want to urge is, first, be sure that you want a silo. Second, when you are certain that you want it, make sure that it is rightly built.

The Form of the Silo.

As you go through the country you will find silos of all shapes and descriptions, built out of all possible materials. You will find silos in stone, concrete, brick, iron, wood, wood with cement lining, and wood with iron lining. You may find good silage in any of these types of silos, and you may also find poor silage in any of these types, so that it is not the type of silo that determines whether the silage shall be good or bad; it is, first, the way the silo is built; and second, the manner in which it is filled; third, the condition of the corn when it is put in. You may build a silo ever so good; build it the best possible, and let certain men fill it, and they will make poor silage. On the other hand, if you have a silo that is not properly built, you will have poor silage, no matter how carefully you fill it. Therefore, to get the best results, two conditions must be fulfilled. First, the silo must be well built; and, second, it must be properly filled.

The Essentials of a Silo.

First. The walls must be air tight. Ensiling corn is similar in principle to the canning of fruit, and if the ensilage is to be properly preserved, air must be entirely excluded. The walls must be air tight.

Second. Silo walls must be rigid. The pressure of the green corn when first put into the silo is very great, and if the walls spring or bulge, air is admitted, spoiling the silage. In the round silo the walls cannot spring. This is one of the reasons the round silo is better than the square one.

Third. The silo walls should be smooth and vertical inside, so that the ensilage may settle freely, without

dragging on the sides. The foundation wall should be flush with the inner wall of the superstructure, as in B. Fig. 2; that is, the shoulder of the foundation should be on the outside, and should not project into the pit.

Fourth. The silo should be convenient. It should be so placed that the silage may be gotten to the cows with as little handling as possible, and doors should be provided, so that silage may be gotten out with as little labor as possible.

Fifth. The diameter and height of the silo should be adjusted to the size of the herd and the length of time silage is desired. The height should not be less than 30 feet, as the silage settles much better and keeps better in deep than in shallow silos. The diameter should not exceed 25 feet under ordinary conditions.

Sixth. The silo lining should be material that will present a smooth surface, so that the silage will not drag on the walls, and should be material that may be readily repaired. As yet no material has been found that will permanently resist the action of the silage. The materials tried for this purpose include sheet iron painted, galvanized iron, paper, wood, wood painted with oil, tar, asphaltum, etc., and cement plaster. Thus far the cement lining has proved the most satisfactory, since it is most easily repaired or renewed.

Types of Silos.

It will be impossible in the brief time at my disposal to describe the manner of construction of all the types of silos; I cannot tell you how to build a silo in stone, brick, concrete, and wood. I will therefore take one single type, viz., the Gurler silo, of which many of you have read in various agricultural papers.

Now, I do not select this particular type because it is the best, for, as I think, there is no best silo. Certain types are best for one condition, others are best for another. Certain types are cheap, others are dear at any price; some are short lived, others are long lived; but if well built, any of them will keep silage for a time.

The Stave Silo.

In the east, the stave silo is used almost exclusively. In portions of New Jersey and eastern Pennsylvania, I have seen fifty stave silos to one of any other kind, so that when anybody tells you that silage will not keep in a stave silo, you may tell them they are mistaken. Scores of dairymen, who have been in business twenty and thirty years and are using their third and fourth silo, have used the stave silo continuously. But the stave silo is short lived; it is not a permanent building.

Moreover, in Wisconsin, we can build the Gurler silo as cheaply or more cheaply than the stave silo; and it will keep the silage better, and will last indefinitely. We can build silos in stone and brick that may last longer, but they will cost more money. There are silos in the state that cost $2,000 or $3,000, and they do not keep the silage any better than does the Gurler, which can be built for $250 or $300. The Gurler silo has a wood frame and a cement lining.

The advantage claimed for the Gurler silo is this: The lining of the silo is its vital part; when the lining fails the silo will no longer preserve silage.

Whether you build in stone, brick or concrete, you must plaster the wall inside with a rich cement plaster one-half inch or so in thickness. The acids of the silage would soon eat out the mortar between the brick or stone and ruin the wall if the cement lining were omitted. It is this half inch of cement lining which makes the silo wall impervious to air and to silage juice. Now, this half inch of cement can be put on wood wall in the form of a plaster just as well as on a masonry wall. It will stay just as well, last just as long, and preserve the silage just as well and some claim even better.

It is not claimed that the Gurler silo will last as long as one in brick, stone or concrete, for as we all know, a brick, stone or concrete building, if properly built, will outlast a frame building. What is claimed is that the Gurler is cheaper than the masonry silos as to first cost, and if the lining

is cared for the frame will last as long as any frame building, which is as long as most men will want a silo.

How to Build a Gurler Silo.

To build a Gurler silo, proceed as follows:

The foundation may be of stone, brick or concrete. The thickness of the wall will vary with the diameter and the height of the silo. A stone foundation for a silo 30 feet high and 16 feet in diameter should be about 12 to 18 inches thick, and should extend two feet or more above ground level to insure a dry sill. In case the foundation is carried up more than two feet above ground, iron rods should be imbedded in the masonry to prevent cracking of wall. The foundation may go as deep into the ground as the owner desires, or as the water level will permit. There are silos in use that go into the ground 30 feet below the feeding floor. Silos 10 and 12 feet below the feeding floor are numerous, but a depth of four feet is the most popular.

The Silo Floor.

If the bottom of the silo is four feet or more below ground, so that rats are not likely to bother, clay makes a satisfactory floor for a time, but after a few years the clay floor becomes saturated with silage juices and smells bad. In the long run, a cement floor is the most satisfactory.

The Sill.

The sill may be made by cutting 2x4's into two-foot lengths and laying them around on the wall two ply, so as to break joints, but a better job is obtained by sawing a 2x4 sill out of a 2x6 or 2x8 plank, cutting the sill to the curvature of the silo. Place the sill back two inches from the inner face of the foundation wall and imbed it in mortar.

The Studding.

Upon the sill set up 2x4 studding 12 inches apart on centers, as shown in the ground plan, Fig. 2, A. If the studding are more than 20 feet in length, they are best made by splicing short lengths, a 14 and a 16 foot, or a 12 and an 18 foot will make a 30 foot stud, etc. Set up the studding, toe-nailing them to sill, and staying them to a center post, or to an adjoining building, plumbing them toward the center. When the studding are in place, a piece of sheeting may be bent around the outside five or six inches above the sill, and tacked to each stud to stay them sidewise.

The Door.

At the point where a door is wanted, set up a door frame of the type shown in Fig. 3 and build it into the wall.

The Sheeting.

After the studding and door frame are in position, sheet up the inside with half-inch sheeting, beginning at the bottom and bending the sheeting around horizontally, nailing it to each stud. The sheeting is made by taking No. 1 rough pine fencing and splitting or resawing it. This will give sheeting about three-eighths of an inch thick and six inches wide, and may be had in any length, from 10 to 20 feet. Any well equipped planing mill can do this re-sawing at $1 to $2 per 1,000, or your local lumber dealer can get it for you if you give him the order a month or six weeks in advance.

Lath.

After the sheeting is put on, lath, and the wall is ready for the plaster. For this purpose the common house lath may be used, or the so-called Gurler lath may be obtained by ripping the one-half inch sheeting into strips with beveled edges. Fig. 3, C shows a piece of sheeting three-eighths of an inch thick and six inches wide cut into five strips. If the board were six inches wide to start with and there were no waste in sawing, then each lath or strip would be one and one-half inches wide on one face and three-quarters inch wide on the other, but owing to the scant width of the boards and to the unavoidable loss in sawing, the lath will be about one and one-fourth inches wide on the one face and five-eighths inch on the other. Or the six-inch board may be cut into four strips instead of five, in which case the lath would be about one and three-fourths

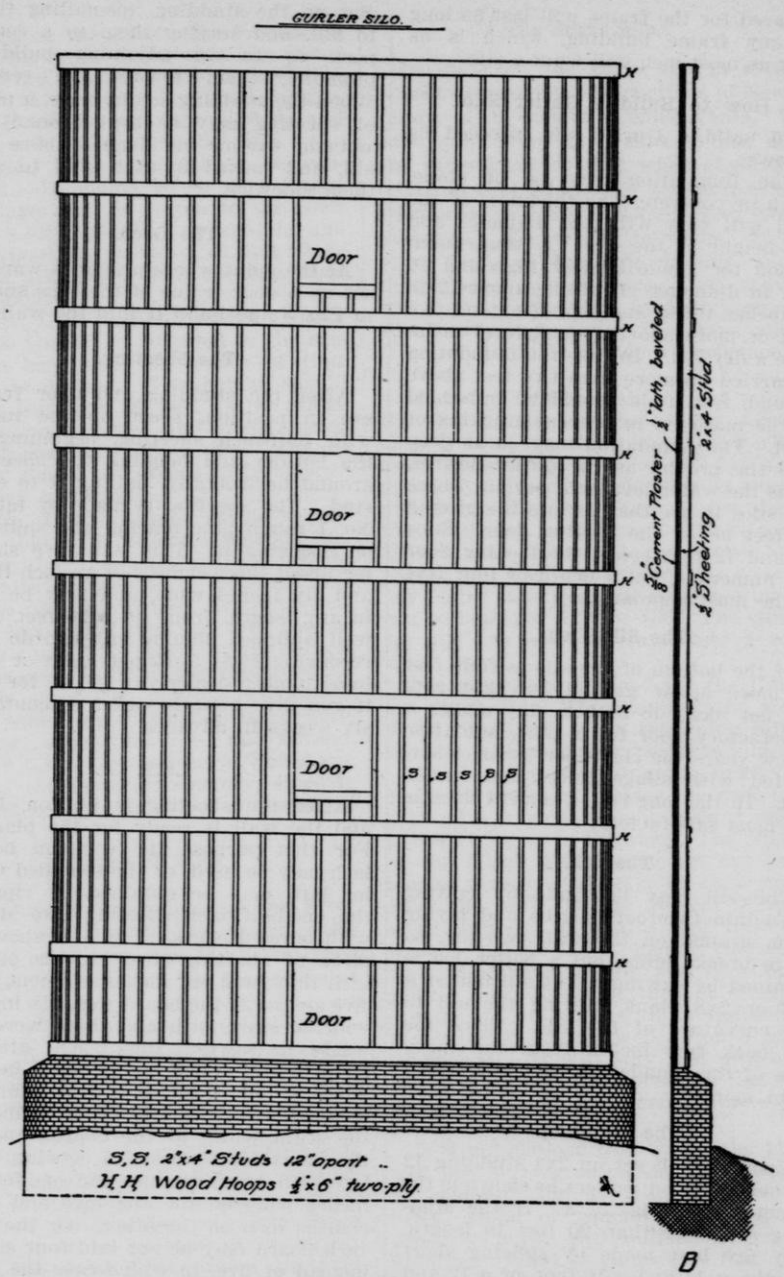


Fig. 1.—Front elevation of Gurler silo as seen on farm of H. B. Gurler, De Kalb, Ill.

inches on the one face and one inch on the other.

The Gurler lath are put on horizontally, putting the narrow face of the lath next to the sheeting, as shown at B, Fig. 2. This leaves a dove-tailed groove for the cement plaster, making an exceptionally strong clincher and a very rigid wall.

If common house lath are used, they may be nailed directly to the sheeting, or they may be set out one-fourth of an inch by nailing common lath vertically to the sheeting six or eight inches apart as furring strips and putting on the lath horizontally, nailing to these furring strips.

Plaster.

For the plaster lining, use good Portland cement, taking one part of cement to two of good, clean sand; mix the sand and cement very thoroughly dry, then wet it to the consistency of good mortar and apply as two coats. Put on the first coat, filling the clinches between the lath and covering the lath one-eighth to one-quarter inch. Twelve or twenty-four hours later, put on the second coat three-eighths to one-half inch thick, making the total depth covering the lath one-half to five-eighths inches. If the lath and sheeting are very dry, it will be well to wet the wall a few hours before the plaster is applied. The plaster should be put on at least three or four weeks before the silo is filled.

The silage acids will attack the cement lining slightly, even where a two to one mortar is used, but this is readily repaired by giving the lining a wash of cement once in two years. This wash is made by taking a gallon or so of water and mixing enough Portland cement with it to make a wash the consistency of whitewash and applying it with a whitewash brush or spray pump.

The Outer Sheeting.

If the silo is built inside of a barn or some other building, it need not have any sheeting on the outside. Fig. 1 shows a side elevation of a silo as seen on the farm of H. B. Gurler, DeKalb, Ill. The silo has sheeting, lath and plaster inside the studding, but on the outside it has only wood hoops placed three or four feet apart, and as Mr. Gurler says, even these are unnecessary as the inside sheeting has ample strength.

Weather Protection.

If, however, you are building out of doors, it is best to sheet up the studding outside for two purposes. First, to make the building more rigid or stiffer against wind rack, and second, as a protection against the weather. As yet no very satisfactory finish has been found for the outside of a round building of small diameter. Many round silos have been sheeted up outside with clap boards or common house siding, but these soon go to the bad, as Fig. 4 shows.

Fig. 2, C, D, E, and F illustrates four different kinds of finish for the exterior of a round building. C shows beveled siding, which consists of one-half inch sheeting with the edges beveled to shed the rain. This is not a satisfactory siding. It does not shed the rain as well as clap boards and the ends tear loose after a time, as do the clap boards shown in Fig. 4.

D, Fig. 2, shows clap boards in which the thick edge of the clap board is rabbeted out to receive the thin edge of the board next below. These do not last, as Fig. 4 shows.

E, Fig. 2, illustrates a common practice of reversing the clap boards, putting the thick edge up and the thin edge down. Clap boards being thick at one edge and thin at the other do not run straight when bent around the circle; the thin edge tends to kink or buckle. When they are reversed, as in E, Fig. 2, the thin edge describes a slightly larger circumference than does the thick edge, and the tendency to buckle is obviated in large measure. The boards, however, are still liable to tear loose at the ends.

Fig. 2, F, shows an outside finish of sheeting, lath and plaster, the same as inside. This promises to be the most satisfactory finish for the outside of a round building. For this outside plaster the same mixture of two of sand and one of cement may be used, or a somewhat cheaper plaster may be made by mixing one-third or one-fourth lime mortar with the cement.

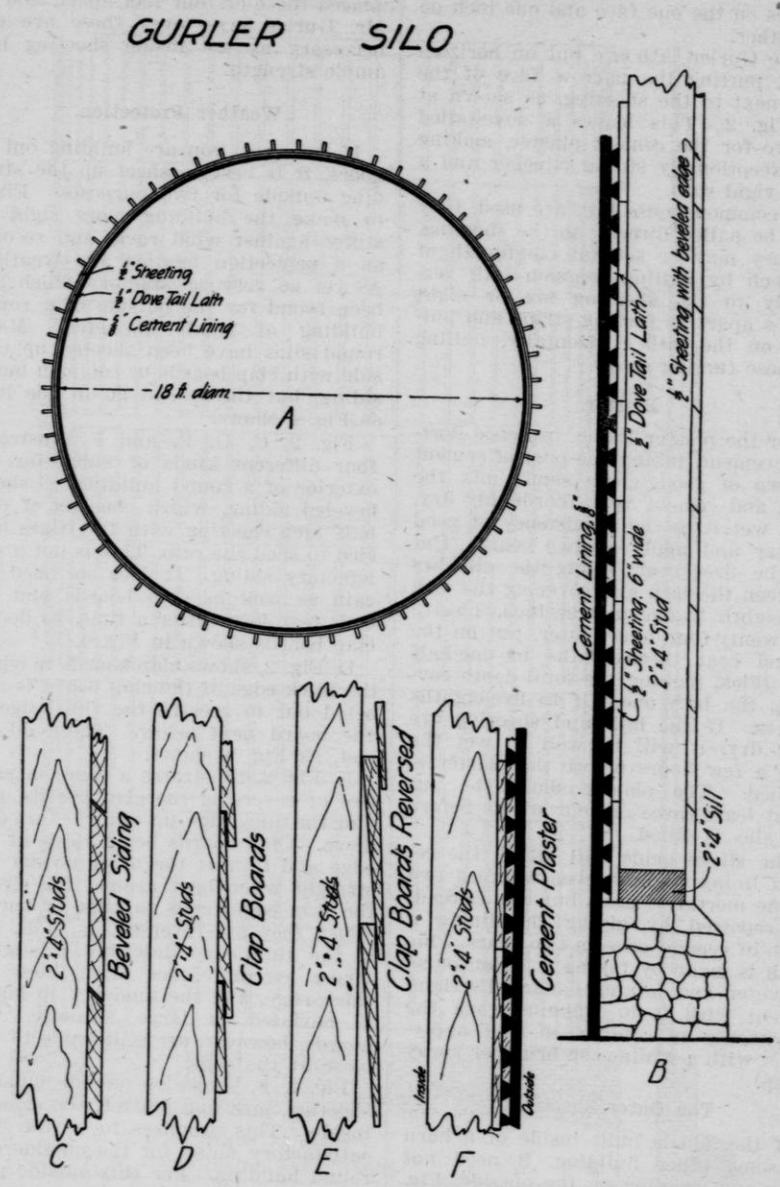


Fig. 2.—Details of construction of Gurler silo. A is ground plan; B, vertical section of wall showing cement plaster lining inside and beveled siding outside; C, D, E and F show different types of outer section; D, clap boards; E, clap boards reversed; F, lath and plaster outside.

Steel siding or galvanized iron is sometimes used for the outer siding, in which case it is put on as shown in Fig. 3. That is, one-half inch sheeting is put on first outside the studding, then tar paper, and then iron siding. The trade, however, is carrying such a poor grade of iron, or so-called steel siding, that it is scarcely worth while to put it on. It is very short lived. Even the galvanized iron does not last.

The Gurler silo as built by Mr. Gurler on his farm at DeKalb, Ill., is finished outside in two ways. First, the silos that are inside of other buildings have only a few wood hoops outside the studding. Second, the one silo which stands out of doors is sheeted up with beveled siding, as shown in Fig. 2, B and C. Neither of these methods are quite satisfactory for Wisconsin conditions, where some protection against frost is desired.

Caution.

In sheeting up tight outside the studding to secure a protection against frost, it will be well to provide some method of drying out the wall. Gurler silos have been seen seven or eight years old which showed no signs of decay. These silos, however, were inside of other buildings and had no outer siding, so that the sheeting had every opportunity to dry out. It is not known how much moisture penetrates the cement plaster, but cement is known to be slightly pervious when water is under pressure, and it is probable that in the silo some moisture would penetrate the cement lining and be absorbed by the sheeting. If the silo were sheeted up tight outside the studding and no provision made for drying out the wall, it is feared the moisture that penetrates the cement lining would be enough to cause the decay of the framework. Whether or not this fear is well founded is as yet not determined, but to be on the safe side ventilation between the studding is advised. This ventilation may be provided by leaving a hole in the outer sheeting just above the sill between each pair of studs, as shown at V V, Fig. 3, and similar holes at the top of the silo inside just under the plate. A convenient form of ventilation is a round hole one and one-half to two inches in diameter, as this can be closed in winter with a common cork. The ventilators must be closed in winter, otherwise the silage will freeze badly.

The Roof.

The roof is best made of cheap, rough lumber and covered with rubberoid or some prepared roofing. Make a tight joint between the roof and the plate. Provide a dormer window which can be used for filling the silo and for ventilator in summer, and can be kept closed in winter to retain the heat and prevent freezing.

The Silo Door.

In Fig. 1 the doors are indicated as a series of openings placed one above the other. They are not in any proper sense of the term doors. They are window openings, and it is just as convenient to go and come through these openings as it would be to climb in and out of the house through the windows.

The silo door is the opening through which one comes and goes and through which all of the work is done. In order that a door be convenient, the door sill should be on the level at which one is working. But in the silo the working level is constantly changing, each day it is two inches lower than the day preceding. In order that the sill of the silo door be on the working level, the door opening must be continuous, so that it can be gradually lowered.

All silos, whether stone, brick, concrete, or wood, should be built with a continuous door.

A common type of continuous door is illustrated in Fig. 3, A and B. It is made as follows: Take two pieces 4x4 for door posts, place them 28 inches apart, 32 inches center to center. On the inside of each put a piece of 2x4 for door jambs, as in Fig. 3, A. Then take one inch iron rods, 38 inches long, with eight inches of thread and a heavy burr on each end. With these rods bolt the door posts together in the form of a ladder, as at Fig. 3, A, placing the rods two feet apart.

Set this door frame up in place on the foundation at the point where a

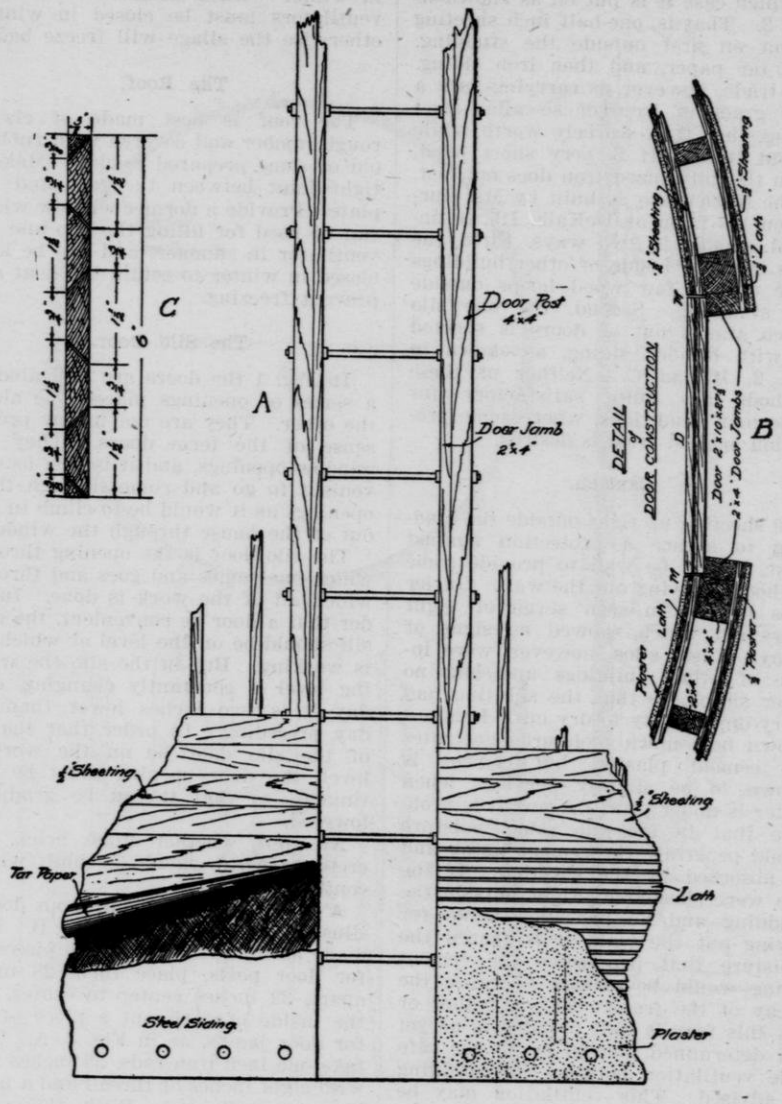


Fig. 3.—A shows door frame in place. To the right of door the outer finish is cement plaster; to the left is steel siding. The small round holes on either side of the door are the holes left between each pair of studs for ventilation, to dry out the wall. C illustrates the manner of ripping a piece of sheeting into Gurler lath, making 5 pieces of lath from one board.

door is desired and build it into the silo wall.

For doors take common matched planks, 8, 10 or 12 inches wide, and cut them 27½ inches long, that is, one-half inch shorter than the door opening, so there will be one-fourth inch space at the ends of the plank between the door plank and the door posts. The door planks are held in place by three-eighths inch bolts, or short rods having a burr on the inside of the door plank and the outer end bent down as a hook over the door rod.

2x4 door jambs are dressed down to about three and one-half inches, so that the door plank may be flush with the inner surface of the cement lining.

Fig. 3 shows the door frame in position. On the left of the door is shown the outer wall of sheeting, tar paper and steel siding, and on the right of the door is shown the lath and plaster finish.

The doors are sometimes made by taking two or three eight-inch or ten-inch plank and bolting them together with two heavy cleats ear the ends.

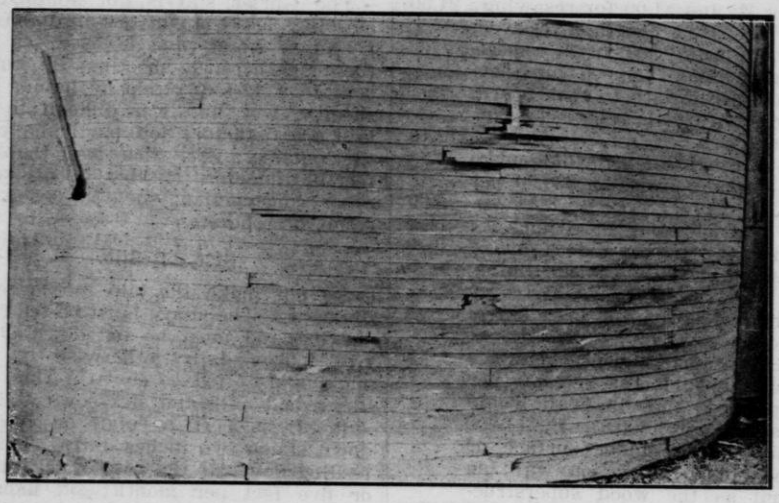


Fig. 4—Showing how clap boards go to the bad on a round building.

When the silo is filling, a pail of clay is provided and mixed with water, making a thick, pasty mud. As each plank is put in place the door jamb is filled with mud and the ends of the door plank driven into place, embedding them in the mud. The silage keeps the clay wet, in the form of mud, and makes an air-tight joint.

The mud costs nothing and makes a tighter seal than any form of gasket of rubber, felt or rope, yet devised for silo door jambs.

The detailed construction of the door and its jambs is shown in Fig. 3, B, where D is the door plank, with the mud joint at either end at M M. The This prevents warping of the plank, which is apt to occur where they remain as single pieces.

The Cost of the Gurler Silo.

The cost of the silo will vary greatly with different localities, with price of material and labor. In vicinity of Madison at current prices, the items of expense would be about as follows for a silo 16 feet in diameter and 36 feet high. We will assume that the stone for a six-foot foundation wall is on the ground, as is frequently the case, and will accordingly make no charge for stone.

Foundation 6′ wall, 2′ thick, 16′ diameter, would contain about 6 cords of stone, the mason work, lime and labor would amount to about	$30.00
150′ of 2x6 plank would make sills and plate at $20.00 per M.	3.00
The rods for a continuous door	10.00
1,000′ 2x4, 12, 14 and 16′ lengths would make the studding at $18.00 per M.	18.00
800′ of No. 1 6″ fencing resawed would make 1,500′ of ¾″ sheeting needed for lining at $26.00 per M. and $1.00 for resawing.	21.50
450′ of No. 1 fencing, resawed, would make 900′ of ⅜″ sheeting, which if ripped into beveled lath, 5 lath to each board, would furnish the necessary lath	12.15
250′ of rough lumber would make the roof boards, at $20.00 per M.	5.00
250′ of Rubberoid for roofing	5.00
Mixing two parts sand to one of cement for the cement lining, 1 sack cement would cover about 4 sq. yards, or 1 barrel would cover 16 sq. yards, at $1.75 per barrel for cement, the lining would cost 11 cents per sq. yard; the silo wall would have about 1,800 sq. ft., (1,800 includes the inner surface of the stone foundation wall, as well as the wood superstructure), 1,800 sq. ft. or 200 sq. yards at 11 cents	$22.00
Plasterer, 2 days	10.00
The outlay for material absolutely necessary would then be about	$135.00
The carpenter work would vary between $25 and $40	40.00
And nails $5 to $8	5.00
Total	$181.00

This, it will be observed, includes no outer siding. If the silo were built inside of some other building it would need no outer siding. If built outside the expense for outer siding would vary with the kind of siding used and the amount of insulation desired. If sheeting paper and iron siding were used, the items would be as follows: If one thickness of sheeting ($21.50), one thickness of tar felt ($7.00), and steel siding ($50.00), the cost of the outer siding would then be $78.50.

If lathed and plastered outside the cost would be: Sheeting $21.50, lath $12.15, plaster $18.50, plasterer $10.00, a total of $62.00. The Gurler silo 16′ in diameter and 36′ high, lathed and plastered outside and inside, would cost about $233.00. This estimate is for a 30′ wood frame on a 6′ stone foundation. The same silo covered with iron siding would cost about $250.00.

The Gurler silo is not adapted to buildings less than 14 feet in diameter. If No. 1 select pine is used for the three-eighths inch sheeting, it can be bent to a 12-foot circle by having the sheeting wet, but it is difficult to obtain a satisfactory job, particularly on the outside. For silos less than 14 feet in diameter, it is best to use some other construction, such as brick, or stone, or concrete.

Size of Silo.

Do not make the silo too large in diameter. The silage must be fed from the top and must be fed down about two inches daily, otherwise it will mold and if fed to cows in this condition bad milk and sick cows will result. It is best to plan on feeding down silage two inches daily. This is feeding down at the rate of 60 inches, or five feet per month; six months' feed calls for 30 feet of silage; silage settles four to six feet after filling; therefore, in order to get 30 feet of silage the silo must be 35 feet high. To find the proper diameter for your herd proceed as follows:

First—Determine how much you want to feed daily per cow. This you can best do by consulting some one who is feeding silage to cows of your type. Some cows will eat 60 pounds of silage per day to advantage, others only 20, still others cannot handle it at all.

Twenty-five pounds per day per cow is a safe estimate for ordinary cows. Forty pounds for extra good dairy cows that are heavy feeders.

Assume that we have a herd of 20 cows and we are to feed 40 pounds per cow. This would be 800 pounds of silage per day, or 12 tons per month, or

CAPACITY IN TONS OF SILOS OF DIFFERENT DIMENSIONS.

Depth of Silage in feet.	Inside diameter of silo, in feet.														
	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
24	34	37	49	58	66	77	87	98	109	122	135	150	164	182	200
26	37	46	55	65	74	86	97	110	123	138	152	168	184	202	220
28	42	52	61	72	83	96	108	123	137	154	170	188	205	225	245
30	47	58	68	81	93	106	120	135	150	168	187	207	226	248	270
32	51	62	73	87	101	119	136	151	166	186	205	227	248	272	295
34	55	68	80	95	109	128	147	164	180	202	223	246	269	291	313
36	57	70	82	97	112	135	158	176	194	212	234	260	290	316	341
38	62	76	89	106	122	146	169	189	208	224	249	275	301	330	358
40	66	81	96	114	131	156	180	201	222	245	268	296	324	355	385
42	71	87	102	121	140	166	191	214	237	262	286	316	346	379	411
44	76	93	109	129	149	176	202	227	251	278	305	337	369	404	439
46	81	99	116	137	158	186	213	239	265	295	324	358	391	429	466

72 tons in six months. The accompanying table shows that the desired 72 tons of silage could be obtained by silos of several different dimensions, for instance, the silo might be—

15′ in diameter and 24′ plus 5′ (settling) or 29′ deep
14′ in diameter and 26′ plus 5′ (settling) or 31′ deep
13′ in diameter and 28′ plus 5′ (settling) or 33′ deep
12′ in diameter and 32′ plus 5′ (settling) or 37′ deep
11′ in diameter and 36′ plus 5′ (settling) or 41′ deep
10′ in diameter and 43′ plus 5′ (settling) or 48′ deep

From the foregoing it will be seen that the silo 12 feet in diameter and 37 feet deep (giving 32 feet of silage after settling) would be about right. The silo 15 feet in diameter and 24 feet deep could not be fed down two inches daily by feeding 40 pounds to 20 cows and the silage would be apt to mold. The silo 10 feet in diameter and 43 feet (48 feet) high would be an ungainly building.

Prevent Freezing.

Freezing can be prevented in most silos if the roof is tight and all ventilators are tightly closed, and the silo doors kept closed. As you feed down the silage put the doors at the top back in place and keep a blanket hung over the opening you are using. This will retain heat enough to prevent serious freezing.

DISCUSSION.

Mr. Scott—How much will it cost to cement a silo 30 feet deep and 16 feet in diameter?

Prof. Knapp—Twenty cents per square yard, at the present price of cement in Madison.

Mr. Foster—We can buy it right here for $2.25 per barrel.

Mr. Linse—It has been bought here for $1.40 by the car load.

Mr. Utter—Portland cement sells at our station for $1.50 a barrel.

Prof. Knapp—Be sure to get good cement. Any of the Portlands are good. The Alpha is all right.

Mr. Scott—How is the Atlas?

Prof. Knapp—It is as good as the Alpha.

Mr. Scott—How is the Peerless?

Prof. Knapp—I am not familiar with it, but of course all Portland cement varies more or less. The same brand of cement does not insure the same quality. Few people have the facilities for testing cement, and the jobbers take advantage of this fact to unload cement

which is not up to standard on people who cannot test it. A car load of cement goes to big engineers in the city who have facilities for testing it, they take a sample out of every barrel, or out of every tenth sack, and if it is not up to grade they send it back. These rejected lots are simply rebilled to some country town.

Mr. Goodrich—Is the German imported cement better than that manufactured in this country?

Prof. Knapp—I do not think there is much difference.

Mr. Goodrich—I paid $3.25 for some German cement and there was some Atlas cement sold for half that.

Prof. Knapp—You are a little more certain of getting a standard brand in German cement than in the other, but for ordinary work the standard American brands are quite as good as the German.

Mr. Convey—Can you test it by mixing simply?

Prof. Knapp—We do not know of any method. I have had a young man helping me this winter who during the past season was testing cement for a large contractor in Pittsburg, and he had been working on that problem all winter and has not succeeded in devising any method of satisfactorily testing cement. That is, any sure test that the man inexperienced in cement can rely on to tell good from poor cement.

Mr. Utter—What kind of nails would you use?

Prof. Knapp—Ordinary six-penny wire nails.

Mr. Utter—What is the relative cost of iron siding and the wooden siding?

Prof. Knapp—This iron cost $3.25 100 square feet.

Mr. Meyer—How much would a silo 16 feet in diameter and 30 feet deep, built like that, cost?

Prof. Knapp—If you put no sheeting or paper on the outside, the cost would be about $225.

Mr. Meyer—I know of a silo that is made with concrete blocks, and it makes a good silo. Of course, you have to have a hollow space in between them and the inside plastered.

Prof. Knapp—And be sure there is a rod in the wall, too.

Mr. Bradley—You couldn't put a rod in these blocks, each block is countersunk.

Prof. Knapp—The molds can be so fixed as to leave a groove in the top of the blocks for the rod.

Mr. Scott—Are your door rods far enough from those door planks to be used as a ladder?

Prof. Knapp—If your toes are not too long.

Mr. Scott—Won't that continuous door weaken the silo?

Prof. Knapp—No. The continuous door has been in use a long time and has demonstrated its practicability.

Mr. Utter—There is quite a difference of opinion about how many rods should be in a stone silo.

Prof. Knapp—The number of rods needed will depend on size of silo, thickness of wall, etc.

Mr. Convey—A party from South Dakota wrote me to know whether it would do to make a 30 or 40 foot pit in the ground to use as a silo, and I thought it would be extremely dangerous to have a silo of that kind.

Mr. Goodrich—One of my sons has a silo 30 feet in the ground and has used it for several years and no accident has happened only once when a Jersey bull got loose and dropped down into it.

Mr. Thurston—How much does a silo 16 feet in diameter and 30 feet deep hold?

Mr. Scott—One hundred and twenty tons.

GOOD SILAGE.

Thos. Convey, Ridgeway, Wis.

The subject of good silage is an important one to the individual who invests his money in silo and machinery. The principles involved are not thoroughly or generally known. It is rare to find different samples of silage alike in color or quality, yet in almost every case interested parties are pleased with its use. It is an ideal way of handling a corn crop for all classes of stock except hogs, and it is no difficult matter to have it of good quality every year, unless corn is caught by frost in an immature condition, and even then it is better placed in a silo than in any other form. The farther north the more desirable the silo on that account. Corn of a suitable variety can be grown in any part of Wisconsin mature enough to make good silage every year. The trouble has been that parties have been anxious to get an excessive amount of green material, and in order to do so have grown a large and late variety of corn, containing a large amount of water without a corresponding amount of dry matter, and the latter also of less food value pound for pound than in the more mature crop. As a rule, corn has been put in too green, injuring it in the following: less dry matter, less digestible dry matter, and greater acidity, hence less food value. Mature corn has about five times the amount of dry matter when mature than when tasseling. I am fully satisfied that corn is at its best about the time we should begin to cut for fodder, but it is not always safe to wait until then when filling, as much of it may be overripe before we get through filling, and unfortunately we have it wrong side up, the greenest at the bottom and the driest at the top. If we could reverse this, we would be all right. For this reason we should have two lots of corn for silage, an early and a later variety, or same variety planted at different times. It is just as easy to tell when corn is fit to cut as it is to tell when grain is ripe.

When Corn is Best for the Silo.

Corn is at its best when it loses its dark green growing color and assumes a light green color. It can be determined at a distance without difficulty; however, if you let it all get that ripe you will have to hurry the filling, especially if it is hot, dry weather. If it becomes too dry, it will heat so much that it will cause discoloration and this is evidence of unnecessary loss in dry matter, digestibility and flavor. The drier the material put in, the higher the temperature, and heating is of no advantage in curing, it is unavoidable and is always at the expense of food value. For this reason filling should proceed as rapidly as necessary to prevent the surface of the silage from becoming heated. The old system of letting silage stand for three days to heat up was entirely wrong. Very rapid filling is not necessary, nor advisable, unless silo is refilled as it settles.

Merits of Clover for Silage.

Sweet corn does not make satisfactory silage, as it develops too much acid in fermenting. Clover silage is more difficult to put up than corn. It is subject to about double the loss in curing and has not given as much satisfaction in feeding. No matter how moist we have put it in, it seems to have a burned flavor. Stock eat it with a relish, but it has not kept up the milk flow like corn silage; however, where corn is scarce or needed for other purposes, second crop clover can be used to better advantage in the silo than in any other way. We prefer to cut it and mix with corn, and not put any clover near top of silo. The danger is in having it dry out. It needs all of its natural juices, so do not let it become partly cured before putting in.

Filling the Silo.

We use the same variety of corn for silage as the rest of the crop. It is

planted somewhat thicker. All our corn is drilled. The silage corn is about six inches apart, be sure to have it thick enough to have a good stand. A variety having good leaf development is desirable, as it will contain the most protein and be the most palatable. Cut silage is preferable, is easier put in and taken out, there is less danger of careless packing, but it is doubtful as to better quality of silage, as a small variety of corn, carefully and intelligently packed, made one of the best samples I ever saw, although uncut. Short silage is not necessary, unless it be at the top of the silo where it packs better, but one and one-half inch cut will be eaten without waste.

Machinery.

Do not buy too small a cutter, a larger one will do the same amount of work with the same power, and will do double the work if needed. Many people are prevented from putting in silage because they regard it too expensive, but they are mistaken. It costs less for storing the same amount of feed than any of the dry feeds that are bulky, and it can be handled at less expense than the corn crop in dry form. The expense for machinery can be avoided in a large measure. We own our outfit, but cannot put in silage as economically as where, say, three farmers club together, buy a large cutter capable of cutting bundles as they come from the binder with bands uncut. The help of three farms together, working a short day, can get in 100 tons without extra help, except to hire engine and engineer.

Silage spoils by first drying out, then molding, later rotting. The remedy is obvious, keep it moist on top. We fill our silo with about five hands and two teams; one team and hand on binder, one team and two hands loading and hauling with two wagons, unhitching from full one and hitching on empty, the second loader remaining in the field and picking up corn broken off by binder, this with two men to unload, run corn through cutter and level silage.

Corn should be kept level in silo, if it is not feed will not be well mixed, and the grain will slide down outside against the wall and spoil.

DISCUSSION.

Mr. Jacobs—Is it good practice for us to plant soy beans in this locality with our silage corn?

Mr. Convey—It has been done and reported a success; that is, where you can get sufficient growth of the beans to make it worth while.

Mr. Hill—I have found it partially practical. We plant them with corn and it grows all right, only if the corn field is near the road people think we have an awful weedy corn, it looks bad. The only trouble we find is that if we have a heavy rain storm just before it is ready to cut, it lays it down partly and we don't get it all. It grows all right with the corn and makes good silage.

Supt. McKerrow—What variety of beans do you use?

Mr. Hill—I don't know the name of them. They should not be ripe to make good silage.

Mr. Meyer—Have you had any experience with frosted corn?

Mr. Convey—Yes; the first time I filled the silo it was mostly with frosted corn, and I had very good silage, not as good as if it had not been frosted. We did not use very much water. The leaves were killed and part of the stalks were killed. If it is too dry, it may be helped by the addition of water, although water adds nothing to the food value.

Mr. Meyer—Could not four or five farmers use one engine?

Mr. Convey—That has been done in parts of this state with satisfaction. I have figured with a party who owns part of a cutter, and I think he got his corn in more economically than I did.

Mr. Scott—Regarding frosted corn, the amount of moisture depends on the stage at which the corn is caught with the frost. Up here we are liable to have frosted corn when it is immature, and in that case we will have too much moisture. We have found that silage that was allowed to remain a few days after the frost caught it, made better silage than that that was cut immediately. Just a word about clover and corn for silage. Two years ago we had some clover and some very immature corn and we mixed them, put into the silo a lot of clover and a lot of corn

with an excessive amount of moisture and had quite satisfactory silage, perhaps not as good as if the corn had been riper, but still it was way ahead of dry, frosted corn, or second crop clover improperly cured. I think this means a good deal to us in the northern part of the state, where we are rather long on clover and short on corn.

Mr. Bradley—Is there any one in this part of the state who has tried soy beans mixed with corn?

Mr. Cummings—I have filled the silo for three years. One year the corn was planted by itself and every third row a row of soy beans, and we cut it with the corn together and filled the silo. Last year I filled the silo with soy beans and corn together, and I like that method of doing it and I shall do it again this year. I shall try it with cow beans also.

Mr. Story—We raised soy beans on our farm 35 miles south of St. Paul three years ago and they were very satisfactory. They grew about three feet high and were ripe enough to make ensilage. They were not thick enough to lodge. I do not remember the variety.

Mr. Goodrich—What is the object of putting in soy beans? Do you get any more tons to the acre, or do you get a feed that has more protein in it?

Mr. Convey—More protein, it makes up a balanced ration.

FEEDING SILAGE.

C. P. Goodrich, Ft. Atkinson, Wis.

If we could turn back the wheels of time 28 years and have an audience like this, and a man should talk about building a silo as Prof. Knapp has talked, how the people would wonder and stare; and they would go away and say to each other, "What do you want a silo for?" Some one might say —I think it would be Mr. Convey—to make silage in. Then the question would be asked, "What is silage?" Then Mr. Convey would give his little speech, and when he had got through, they would say, "Well, what do you want silage for?" Then the chairman would say, "Goodrich, get up."

Supt. McKerrow — And Goodrich would be up before the chairman could say anything.

Mr. Goodrich—Goodrich would be up and he would say, to feed the animals kept on the farm, and nine-tenths of the people there would say, "There is a trio of lunatics;" and I want to say that even today, after this subject has been studied for 28 years and has been talked about and written about all over the country, there are lots of people that think we are lunatics yet.

Silage is excellent food as part of the daily ration for all kinds of stock kept on the farm. In winter all stock do better to have some succulent food fed in connection with their dry forage. This succulent food can be provided cheaper by making corn silage, in parts of the country where corn does well, than in any other way yet known. More food can be raised per acre, consequently more stock can be kept on a given farm, and the food can be prepared for feeding and preserved with less cost of labor.

Silage for Milch Cows.

Perhaps there is more benefit derived from silage by feeding it to milch cows than by feeding it to any other kind of stock. At any rate, it is used more and thought more of by dairymen than by any other class of farmers.

You all know that green, succulent grass, or other forage plants, stimulate the production of milk much more than the same forage would if fed to cows after being dried. It is the same way

with silage, for silage contains all the natural juices of the plant and it stimulates the production of milk just the same as though the plants were cut fresh and green in the field and fed to the cows.

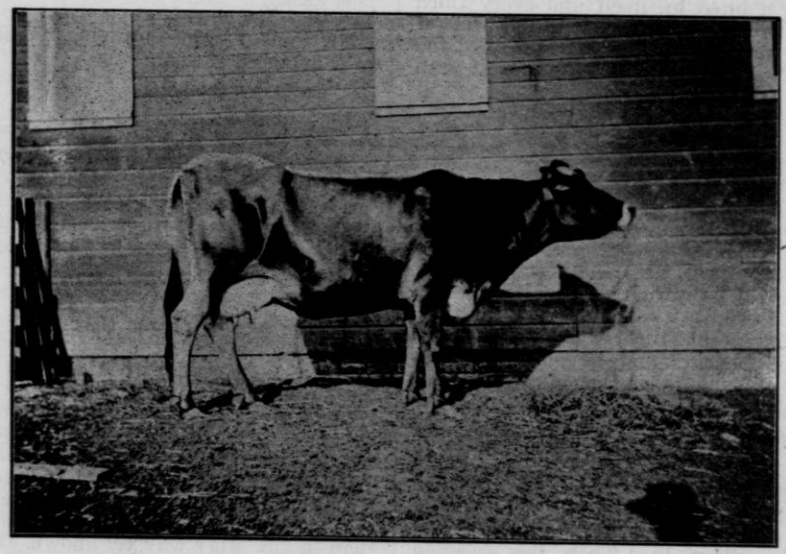
Silage Not to be Fed Exclusively.

Cows should never be fed exclusively on silage. They need some dry forage to go with it, they need a variety. Besides this, corn silage is a carbonaceous food and needs some more nitrogenous food to go with it to make a well balanced ration. About 30, or at most, 40 pounds a day of silage is as much as should be fed to each cow. It should be fed from the top of the silo, taking off about two inches in depth from the entire surface each day, for, if it is long exposed to the air, it will be damaged. If the feeding commences immediately after filling the silo—and this is a good way to do—there will be no damaged silage at all. Care should be taken at each time of feeding to leave the surface smooth and even and not pick and stir it up with the fork, for that will let in the air and cause damage.

My way is to feed the silage ration in two feeds, both night and morning, and it is better to feed after milking, because the peculiar odor of the silage might affect the flavor of the milk.

Palatability.

Cows, as well as other stock, have a wonderful liking for silage, and I believe much of the success in feeding it can be attributed to its palatability. They even prefer it, to a certain extent at least, to fresh cut forage or good grass in the pasture. I have seen cows in June when on good pasture, which had been fed silage every day, come to the gate at four o'clock in the afternoon and bellow and ask to come to the barn and get silage, which they would eat greedily and apparently with great relish. I have seen the experiment tried of offering the cows at the same time corn cut fresh from the field and silage that was put up the year before. Every cow chose the silage and ate that first. It is true these cows



Jersey Cow, "Baroness Lilly," No. 120445. Owned by Wm. B. Goodrich, Climbing Hill, Iowa. Made 625 lbs. butter in one year. Was fed on silage every day during the whole time.

had been fed silage every day all summer, and it may be the habit of eating silage had something to do with their preferring it, but they surely would not have done it if silage had not been pretty good feed.

There is no better and cheaper feed to supplement short pastures, which we are almost sure to have every summer on account of drought, or other causes, than good silage. I know some of the most successful dairymen in the country who feed silage every day in the year—winter as well as summer.

Silage for Beef Cattle.

I have never fed silage to beef cattle, but it has been tried by some farmers and at several of the experiment stations, including our station at Madison. The reports are all favorable, especially in the first stages of fattening. Large steers were fed 40 to 50 pounds daily and they made rapid growth. Of course, the steers were fed other forage with it, but the succulent silage seemed to aid digestion and cause a better assimilation of the food. The gain in weight was put on at less cost than it could be with dry forage and grain alone. As the fattening period progressed the amount of silage fed was somewhat reduced, until near the end it is nearly all left off, so as to make the flesh more solid.

For the calves and yearling steers, silage is said to be, by those who have fed it, one of the best and cheapest foods; and who can doubt it? I know it is for heifers intended for the dairy.

Silage for Horses.

I know silage is good feed for horses, for I have tried it. I have not, however, fed to any great extent because I did not have as much silage as I wanted for cows and horses both, and as I thought more of my cows than I did of my horses, the cows had all they needed and the horses had to go short. One winter we had a brood mare that was fed silage all winter, probably 20 pounds a day. She had some hay and straw to go with it, and no grain except what was in the silage, and she came out fat and with a glossy coat in the spring and had a fine, healthy colt. Horses like silage as well as cattle do after they get accustomed to it.

A man in Michigan a few years ago wintered 200 horses on silage and straw exclusively with no grain. They came through in fine shape and the brood mares all had fine, strong colts.

The Ohio Experiment Station tried feeding horses on silage through the winter and reported that they came through until spring in the best condition. Mr. W. C. Bradley, of Hudson, whom you all know, says that one year during spring work he was out of hay and the only coarse fodder his horses had during all that period of hard work was silage. He says that his horses never stood work better.

Silage for Sheep.

I have never fed silage to sheep, but a good many others have, and where it has been fed with judgment, and in limited quantities, say from three to five pounds a day per head, good results have been obtained. Sheep, to do their best, must have some succulent food in winter, and silage furnishes it much cheaper than can be done by raising roots.

Our Superintendent McKerrow feeds his sheep silage, and that should be evidence enough to convince anybody that it is a good and profitable thing to do.

J. S. Woodward, of Rochester, N. Y., who was so famous for raising winter lambs, recommends silage. Many others report favorably on feeding sheep silage, but this is enough.

Silage for Hogs.

Some have tried feeding silage to hogs, but they do not all report favorably. I know one man who filled a silo with well-matured, heavily-eared corn; he put it in whole. During the fall and fore part of winter he fattened 90 hogs with corn he husked out of his silo. He says he never had any other hogs fatten as rapidly as they did. The corn being kept soft in the silo was easier masticated and better digested than it would have been had it been husked and dried in a crib.

Possibly there are other animals that silage is good feed for, but I guess this list will do for me now.

DISCUSSION.

Question—What is the percentage of waste in silage?

Mr. Goodrich—It is almost nothing, if it is put up at the right stage. If you commence feeding right away after you have filled it, you keep going down and nothing is wasted.

A Member—Is not combustion waste?

Mr. Goodrich—I suppose it shrinks somewhat in weight. I am afraid if you crowd me too hard, I will say something I did not mean to say here, and I hope you won't, because, while it is true, you won't believe it.

Mr. Meyer—Isn't it more profitable to have two small silos than one that is too large?

Mr. Goodrich—Yes, if the large one is so large that you cannot feed off about two inches a day. In further answer to this gentleman's question, I will say, while there is loss in weight, I do not believe there is any loss in feeding value.

Mr. Convey—I have looked up the figures on that point. There is an unavoidable loss of from four to eight per cent actual dry matter, but there is another loss, and that is the food material that is left is not so digestible, so there is a double loss, and it runs all the way from 30 to 50 per cent.

Mr. Goodrich—I beg the liberty to differ from my friend Convey. I believe that there is more digestible matter in it after it has been in the silo. I believe the fermentation that is set up there has partially digested it, so that the animal can digest more of it, and I think that has been proved.

Mr. Convey—I am always a little anxious about making a statement of that kind, but I know that experiments have been conducted and the reports are positive in that respect that silage, as compared with green corn—I am not comparing silage with corn fodder—loses in actual dry matter and it also loses in digestibility.

Mr. Goodrich—I admit the loss of the dry matter, but I deny the loss of the feeding value.

Mr. Scott—We can only feed green corn a few weeks, while we feed silage or corn cured and fed in dry form for several months. Now, how does this silage or this loss compare with the loss in corn cured and fed in dry form?

Mr. Goodrich—In a good silo, put up right, there is less loss of dry matter in the silage than there is in the dry corn fodder.

Mr. Scott—Then I think that is a fact that, as compared with corn cured and fed in dry form, there has been a gain in favor of the silage from five to 20 per cent by actual experiment.

Mr. Foster—And isn't it the consensus of opinion among silage feeders, men who have fed silage all through the summer, that silage a year old will make cows give more milk than the fresh corn fodder? If that is so, there has been no loss.

Mr. Goodrich—That is just what I have seen done. My son was feeding silage that was four years old last summer, and those cows never produced so well in their lives.

Mr. Linse—I used to soil my cows with green corn a great deal, because I had more stock than I had pasture, but since I built my silo, 24 years ago, one of the first in the state, I have found that my cows will do fully as well on this silage whenever I had any left over during the summer, as they would on green corn.

Supt. McKerrow—Do you now feed silage to your cows?

Mr. Linse—Yes, I do.

Supt. McKerrow—I understand that the Dairy and Food Commission of Wisconsin has analyzed the milk supply from nearly all feeds fed in the state, and in their report they say that the city of La Crosse has the best milk of any city in the state, and that the milk of Charles Linse is the best furnished in La Crosse.

Mr. Goodrich—When they first commenced to build silos, of course they boomed them up high; they claimed that the feeding value of silage was more than the feeding value of the corn put in the silo. I said at the time that that was unreasonable, I didn't believe it. I said: "How can you get more out than you put in?" and I kept saying that for many years and at the same time studying and observing, and I have now come to the conclusion that I believe I can say you can get more feeding value out of the silo than you ever put in, and my authority is the cow.

Mr. Donaldson—Can you tell us anything about pea vine silage from the canning factory?

Mr. Goodrich—I have never seen silage made of that. It ought to be good food, of course, if it was well preserved.

Supt. McKerrow—I have never put it up, but knowing that it was being put up at Randolph, Wisconsin, in connection with the canning factory, and that Mr. Louis Lewellyn, of Waterloo, had a silo into which he was putting pea vine, I corresponded with these parties and I judge they have been very well pleased with the results of feeding pea vine ensilage.

A Member—Pea vine ensilage has no grain. Corn is generally put up by farmers who have rich land and an immense amount of grain.

Mr. Goodrich—The grain makes it more valuable. I think that a ton of grain is worth more than a ton of the other part of the corn plant in ensilage, but you can make very good silage without any grain.

The Chairman—It is about equally divided, according to the authorities.

Mr. Goodrich—I can't quite let that other question go. I have so much respect for friend Convey that I must make it plain. Now, silage has been compared with sauerkraut, hasn't it? Now, then, isn't sauerkraut more nutritious than the raw cabbage to eat? Then silage by the same principle is more digestible than raw corn.

Mr. Linse—We had a hog breeder attending our Farmers' Institutes and he laid great stress on sour milk for his pigs. He thought they were doing better on it, because it was easier of digestion on account of the fermenting process the milk had undergone, and they made a good deal of fun of him, but lately it has been proven and shown that it is a fact that sour milk is more digestible, even to the human, more easily handled by a weak stomach than sweet milk coming right from the separator.

Mr. Goodrich—It is like curing cheese, the action of the bacteria—I don't know what you call it, but it is the same kind of fermentation.

Supt. McKerrow—I think they have Convey downed.

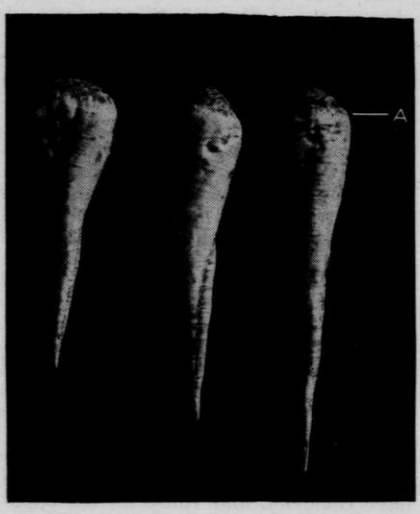
Mr. Convey—Don't you feel the least bit alarmed about Convey. I have fed silage for many years, and I am as strong an advocate of silage as anybody can be, but when we fall back on the question of digestibility, we have to go to the experiment stations, and you will find all the authorities, Armsby, Henry and Roberts, say that silage is not as good as green feed. It is, of course, more digestible than corn fodder. I am not arguing against the use of silage, but I am not going to claim anything for it to which it is not entitled.

Supt. McKerrow—With all due respect to Mr. Convey's authorities, we have Goodrich and Linse on the opposite side.

SUGAR BEETS.

Irving Smith, Green Bay, Wis.

Any good potato soil is a good sugar beet soil, but the ideal soil is a sandy loam with a slight mixture of clay, having a soft, red clay subsoil just below plow depth. It must be well drained, and should be rich enough to produce a good crop of potatoes or onions to secure the best results. If



Ideal Sugar Beets.

From photograph of beets grown by J. M. Smith's Sons, Green Bay, Wis. A marks place where beets should be topped. The long beet is about 4 inches diameter by 20 inches long. The short one 5 inches by 15. They were grown on sandy loam slightly mixed with clay having a soft red clay subsoil about 10 inches down.

soil is too heavy and hard, the beets grow too short and too many side roots and tails. If soil is too loose and fine, like the very fine loam—almost dust—the beets grow too much out of ground and too bulging in the middle, but on the ideal soil they grow long and tapering, with no side roots other than the fine hair roots, and are the greatest diameter at a point just below where the lowest leaves have grown, which is about at the ground level. In our experience this type of beet has the highest sugar content, while those grown in wet soil had the lowest; the very hard clay and the very light loam taking an intermediate place.

Plowing and Harrowing.

We have discovered no difference in crop which could be attributed to fall or spring plowing, other things being equal. Plow as deep as the soil will permit, that is, turn up all the good soil or else go to a depth of eight to ten inches. In some places we plowed 10 to 12 inches, by actual measurement. If other conditions are right, the beets will go down, not only as deep as the land is plowed, but will push a long, slender tap root a foot or more into the subsoil. This gives the perfect form and high grade stock.

The harrowing should be very thoroughly done, so as to provide a fine seed bed for the young plants to start in. After the disc and spike tooth harrows, we use the Meeker smoothing harrow to finish the horse work. If the land is reasonably free from lumps, this leaves a smooth, even surface, except a few hoof tracks, which should be covered over with a hand rake. The board leveler in the middle of the Meeker covers most of the tracks.

Seeding.

There are horse seeders made which will plant several rows at one time, but we think it would hardly pay to buy one unless help is very scarce, or you are growing beets on a large scale. We use our garden seeder, and a man can easily plant three acres per day on good soil. Allowing rows to be two feet apart, and one-fourth of the time for stopping to fill machine, etc., the man will have to walk only about one and three-fourths miles per hour for ten hours to plant three acres per day. Care should be taken to get the seed an even depth—about half an inch—and to see that the machine does not

get clogged with small pieces of the seed stocks in the seed. Walk at an even pace to get best results.

Quantity of Seed.

This is an important point. The Menominee River Sugar Co., Menominee, Mich., provides in their contract for the season 1905 that "the grower shall plant eighteen pounds of sugar beet seed per acre, which the company shall furnish free of charge." This may seem to be a waste of seed, but is it likely that the company would make such a statement in their contract if it was not a paying proposition? Of course, we all know that all that seed would not be necessary if we could be sure that we got the seed exactly where it was needed. This we cannot do with any machine now on the market, consequently we must sow a large amount of seed to be sure that we will have no vacant places where beets should be growing. When 18 pounds of beet seed is planted per acre, there should be a continuous row of plants. This aids the young plants to break through the ground, should a hard rain come just after planting and form a crust on the surface soil. Then it makes the cultivating and thinning easier, too, so be sure to get in plenty of seed.

Care of the Crop.

First comes the hand cultivator. This can be used before the plants are large enough to go through with a horse. It should be done as soon as the rows can be seen, using a common straddle wheel hoe, such as is commonly used in all small seed garden crops. Set the knives or hoes as close together as can be worked, about two and one-half to three inches apart. This cuts out the weeds and loosens the soil close to the row, where you cannot get with the horse cultivator. Then when the plants are one and one-half to two inches high go through them with the fine tooth horse cultivator, and we are ready to thin.

First comes the "blocking" or "bunching," which is done with a common hoe. Cut through the row, leaving only a small bunch of beets between each cut, the width of the hoe governing the distance apart the beets will be left. Then follow and thin the bunches, leaving only one good plant in each place. The distance should vary according to the soil, from eight to twelve inches. Follow this work with the horse cultivator and keep the soil in first class condition throughout the season. If the thinning and weeding are properly done the first time over, there will be but very little more hand work to do in growing the crop.

Meeker Smoothing Harrow. M'f'g'd. by C. O. Jelliff & Co., Southport, Conn.

Some Mistakes to be Avoided.

There are some mistakes which one new at the business is liable to make, and which are worthy of mention. In preparing the seed bed the novice is inclined to say: "That's good enough for beets," thinking that those big seeds can surely grow. Break open one of the seed balls and you will find not one, but several small seeds in the ball, consequently these small seeds need a very good start to do their best. Then we get rows too close together. The company instructions say 18 to 21 inches. This is all right on land that will produce only a small amount of foliage, but for rich, strong soil, the rows should be 24 to 30 inches apart.

Another common error is to plant too little seed, then leave too many beets to grow. This is a very common cause of a poor crop. The beets are so thick on the ground that they cannot grow to a profitable size; whereas, if they were planted two feet apart and thinned to one foot in the row, they would need to grow only to two pounds each to produce a crop of over 21 tons per acre, while rows two and one-half feet apart and one foot in the row would need only three pound beets to produce over 26 tons per acre. This last statement is what we have set for our 1905 mark.

Let no one think to grow an immense crop by leaving the plants very close, any more than you can get a full crop of corn on a field planted for the silo. The sun must have a chance to get at the leaves if we are to get sugar. Crowd them together so the leaves stand straight up and you will get but little more than leaves; and what you do get will be very low in sugar content.

Harvesting.

We must have some kind of a plow to loosen and raise the beets, so they can be picked up. There are "beet pullers," made for the purpose, but if you have one of the narrow subsoil plows it will do very well. After a little practice, one can start them very nicely by using a steady plow team that does not walk too fast. After they have been pulled and thrown into piles, comes the topping.

Get some of the regular beet topping knives, as they are much better than any kind of a butcher knife. Cut the head off square, just below where the leaves have grown. This is very nearly in the largest place on the beet. A single stroke of the knife will cut all ordinary sized beets. The reason for cutting so low is that the head has no sugar to speak of, but instead has salt and other impurities which do harm to the good portion of the beet. Do not get the "head," or part on which leaves have grown, confused with the part above ground. It is not necessary to cut off more than the head just because it grew out of the ground.

Pulp and Profit.

These two should go together, as by feeding the pulp we get a considerable part of the profit. Chemists tell us that the pulp is worth nearly as much as the same amount of beets. That is, if we take a ton of beets and take 15 per cent (300 pounds) of sugar out of them, the remaining 1,700 pounds is worth nearly as much as 1,700 pounds of beets. If this be true, surely it is a good deal like selling the beets and yet having them to feed. A silo is the best place to keep pulp, but if that is not convenient, store it in a large bin that is nearly air tight and it will keep fairly well if cool.

As to the profit, we should get $100 per acre for beets from good, rich land, besides the pulp. This cannot be done by using careless, haphazard methods any more than high results can be obtained from a herd of scrub cows handled in a careless way. The old adage, "You cannot get something for nothing"—is most emphatically true here, but it is also true that if you take care of the sugar beets they will take care of you.

DISCUSSION.

Mr. Goodrich—What is the expense of raising a crop? You said you got $100 on some crops.

Mr. Smith—The only accurate figures that were sent down to the company is one crop of a single acre that was planted with the object of experimentation. It brought about $112 and the expense was about $56, just about half the returns.

Mr. Goodrich—That was a remarkably good crop, a good deal above the average, wasn't it?

Mr. Smith—That crop produced about 23 or 24 tons to the acre and it was sold on a flat rate at $4.50 a ton.

Mr. Goodrich—I have made some study of the sugar beet question, though I never have raised any. When I was in Michigan a year ago last winter, I engaged to write up a series of articles every week on the beet sugar business, but I could not get at any actual figures, only that the average yield in Michigan that year was about ten tons to the acre. Of course, we want all the information we can get

on this subject, the good as well as the poor. They put a sugar beet factory at Janesville and there were a good many beets raised for that factory, and I got the exact figures from one man and I will read a summary of it. Mr. T.—I won't give his name—raised five acres of sugar beets in 1904 on Mr. M.'s land. Each was to pay half the expense and share the proceeds equally. Mr. T. was not able to do any work, only to oversee it. Mr. M. put his land against Mr. T.'s overseeing it, and they paid the expenses equally. Every bit of the work had to be hired and paid for and they hired men who were in the habit of working on the streets in the city. He kept strict account of expenses. The beets brought $300—$60 to the acre, and the profits divided between the two were $7.50. I haven't got all the items. I have the cost of harvesting the beets and putting them on the car, which is less than half a mile hauling, that was $90, or $18 an acre. I know a good many have made a good profit where they have their own help on their own farms, but where a man had to hire men, they didn't get any profit—where they hired men that worked by the whistle and were waiting for the whistle most of the time, and if those men got a beet up and the knife ready to clip it off, if the whistle blew, they dropped beet, knife and all.

Mr. Meyer—I have raised some on a small scale. I sent them in to Madison, but they contained a very small percentage of sugar, so when I found out about that I got some German seeds and planted them about six inches apart on good, rich soil. I found out that those small beets contained a good deal more sugar than the larger ones, and I could grow always more tons to the acre. The imported seeds with me did not raise the large tops that the gentleman speaks of. I think the great secret of success is to have room each way plenty big enough, and still your beets must not be too large.

A Member—It costs more to raise small beets and handle them than fair-sized beets?

Mr. Smith—Sure; and it is not necessary that good sized beets be poor beets. If they are properly grown, they will have a good amount of sugar in them.

A Member—There were 3,000 tons raised in this neighborhood last year; we had some awful poor beets and some awful good ones. We had some that went 20 tons to the acre and some that went three tons.

A Farmer—Why do the company furnish the seed free?

Mr. Smith—The seed was furnished to the farmers because they wouldn't buy it. I have heard people say that five pounds were enough, and it might be enough if you knew exactly what you were planting, but the trouble is there are spaces where they are wasted.

A Farmer—We were forced to buy machinery, too. My neighbor planted with me last year, he went over the row by hand and could keep his beets cleaned out some way, but I couldn't keep them cleaned. I planted mine with a little cultivator this year and planted them 24 inches apart.

Mr. Smith—In the prizes offered by the sugar factory last year, they went down as low as $36.40 for two acres. That man got the third prize in Manitowoc county. On the other hand, they went up to the highest—$100 per acre—last year.

Mr. Goodrich—What effect does it have on the fertility of the soil?

Mr. Smith—Beets require considerable fertility and they should not be grown year after year on the same ground without heavily manuring.

Mr. Goodrich—How far are you located from the company?

Mr. Smith—It is about sixty miles from Green Bay to Menominee, and the freight was 60 cents a ton by rail, which we had to pay.

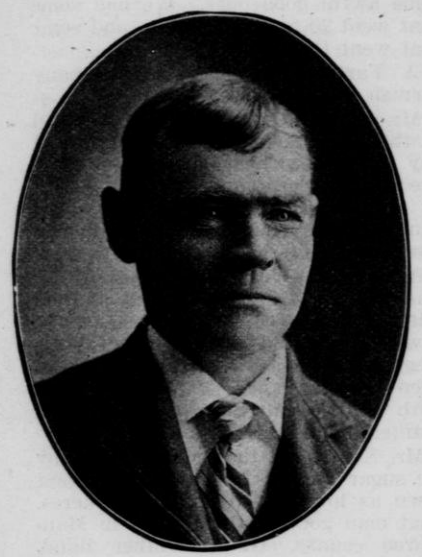
Mr. Goodrich—Did any of you people get back the pulp and feed it?

Mr. Smith—Yes, there were some. I do not believe there has been enough done in that line to warrant any statement on that point.

A Member—I think it is just as good as any root crop. I have tried roots a week and then the pulp a week, and so far as I can see with my dairy cows it is about the same thing.

CORN CULTURE.

H. M. Culbertson, Medina, Wis.



Mr. Culbertson.

During the last five years there has been very much interest aroused in corn culture, because the more the subject has been thrown open by research, the more has been found of value, and instead of just being corn, it has become a great, broad panorama of beautiful studies with each feature traceable by almost inexhaustible interest. All branches of agriculture are underlaid with principles, the understanding of which measures the operator's chances for turning unfavorable conditions nearer to his profit.

The Soil.

In taking up our subject, principle No. 1 is soil. Any open soil with a fairly liberal supply of moisture (not standing water), in a good stage of fertility, will grow corn in the climate adapted to this crop. Open soils, because these are warmest, and corn plants require warm soils, so if not naturally an open soil it must be made so. Sandy soils are open soils, and so are most of the prairie soils, but the extreme fineness of the soil particles in clays cause them to be very close and naturally more or less cold. These may, however, be made comparatively open if naturally well drained from surplus water by plowing under and mixing through them large quantities of vegetable matter, called humus when partially decayed. So to grow corn on the clays, the farmer will be required to study his own soils and find out what they can be made to do.

Drainage, and deep preparation by making them open with humus, is likely to be the governing rule, not always, however, as regards deep preparation, but fine particled and close textured soils do not permit the overplus of moisture to soak down readily and this prevents the air entering, therefore are cold, late, and not suited for crops requiring a long growing period.

Moisture.

Moisture is required in the soil together with warmth to progress nature's process of changing unprepared plant food into the form that it can be conveyed by this moisture into the roots, up through the stalk, and the moisture disappear out through the leaves, leaving by this leaf evaporation space for more water, and the process continuous through the growing life of the plant.

The moisture question in growing a corn crop is almost an incomprehensible one. King found that water was used in proportion of three hundred tons of water to produce one ton of the matured corn plant on the basis of dry matter. With a good crop this would mean about 12 inches of water over the land if applied at one time. Whether these estimates are absolutely accurate or not does not matter, but the conclusions are positive that tremendous quantities must be at the command of the plant for it to make its greatest growth.

Nature's way of holding soil moisture for the plant to use as it needs it

is in the form of that little dampness which clings to the outside of each soil particle, and to keep this amount in constant supply by sinking deep during rains and climbing back gradually to the surface, and we cultivate to keep the surface soil in the finest possible form, which stops this climbing process here and holds it back for the plant.

Fertility.

Fertility is food for the plant as we supply it for animals, and corn being so abundant in its growth it must be liberally fed.

Stable manure is the most practical fertilizer known, for an application of it means the adding of both the elements of fertility and humus, but the plant foods sold on the market supply no humus comparatively, and all soils, sand or clay, must have humus in them to permit nature to carry on her work of making the foods ready for the plant and have a place to hold them for use.

Sod land is the best for corn, because sod must be in the rotation and leaves the soil too open for some crops, but just right for corn, for sod furnishes humus, the great regulator of soil conditions and plant growth.

Preparation.

Plow whenever convenient, but when this is done, except it be late fall plowing, work the land up immediately with the disc harrow to retain moisture. Late fall plowing may be pulverized as soon as the soil is sufficiently dry in the spring, and must be done then or a great loss of moisture will follow the sweeping of winds across the rough plowed surface.

Our method of applying manure is when there is but little snow on the land in winter, or before the frost is out in the spring, and that accumulating later spread before the land is planted, spreading immediately generally. On a fall plowed surface we run the common tooth harrow over first and follow with the disc, which does the work of preparation thoroughly, and if turned under by spring plowing the same tools do the work perfectly. The common drag harrow should pass over the field every two weeks or more frequently, up to planting time. An abundance of horse power to properly fit the land, and then get the crops in in their season is good, sensible farming.

Thorough and early preparation of the land will enable the seed to be put in several days sooner than had this previous work been neglected, and likely save the moisture falling in two to three inches of rain by preventing its evaporation.

Planting.

The horse planter drops the seed as satisfactorily as any way devised, and covers it just right. That is, it can be so adjusted, and shallow enough so it will usually be up very quickly and the whole planting be equally ready for cultivation. The hand planter is a nuisance, because the covering is from a scant quantity to the depth of five inches, and it comes up accordingly, the plants develop accordingly, the maturity is likely to be accordingly, and possibly the quality, and because of the unevenness of the plants' development the first cultivation cannot be done so satisfactorily.

Planting in drills is growing into preference as rapidly as the methods of handling to keep the weeds out is learned, but one having weedy land had better delay planting much in drills until a method of keeping clean is positively established.

Cultivation.

There is so much of importance attached to each principle one scarcely knows which to put the most stress upon, but the cultivation must be thorough or crop a failure. It is usually advisable to harrow after planting, before the plants begin to appear, because there is always weed seed germinating to be destroyed, and we prefer to harrow to cover all marks, so the crows cannot exhibit their wit, and in this way they learn to bother the fields where they can follow the row and when they once learn the place, I mean the other fellows, we have but little trouble.

How much harrowing can be done after the plants are up depends on the fineness of the soil, the depth of planting, and how familiar one is with the practice. It has not met our preference as a whole. If done, it must not be done in the morning, because at that

time the plant cells are so full of water and so tender they break off badly.

The principle of cultivation after planting is to save moisture, but the weeds must be destroyed or they will use the plant food and moisture the corn should have and reduce the yield very much. Four stalks of corn, says King, when tasseling and developing ears, used nearly three pounds of water to each stalk daily for 13 days.

How deep shall we cultivate? Some say deep the first time or two and then shallow. The little corn plants will have roots more than twice as long as their height above the land, and the depth the seed was covered is the place the roots will be running parallel with the surface, and here is the limit to the depth for cultivation.

If a root, which is the plant's feeding power, is broken off, that is the end forever. Very truly after a time new ones will develop, but what has the plant lost, for it only has so many days to live, and it is losing time getting ready for a new start.

The tool with large shovels and few of them must dig deep to cut away and replace the dirt, besides tearing away a large part of the root system, and if the land is a little hard it is left so lumpy and open that the winds sweep through and carry away great quantities of moisture, which should be retained to carry food up continually into the stalk to make growth, but of course if the roots are cut away there would be no means of taking moisture anyway. If shovels are used, many small ones are preferable to cut away and replace the dirt when running not more than three inches, but the proper cultivator is the one which can be adjusted to cut one to three inches deep with a leveler or surfacer attachment, following which presses downward by carrying some of the weight of the cultivator upon the disturbed surface and pulverize it as finely as soil can be, and leaves the surface smooth and compact, and a so-called dust mulch made, which does what is desired and disturbs the root system least. Repeated experiments with this method have proven it to produce the most corn.

When to stop cultivation is not dated, only to go through with one horse after the last time, but if several weeks have passed since this last time, and a very dry time is being realized, unless the cultivation is shallow and the shovel furrows filled and leveled and pressed, and not more than the center two-thirds of the row disturbed, no work had better be done. Very often these late cultivations are the making of the crop, but this will depend upon the favorableness of the growing season.

DISCUSSION.

Mr. Jacobs—Isn't it an important point in the cultivation of corn that the cultivation should be started as soon as the ground can be worked?

Mr. Culbertson—That is right, of course. We follow that rule as thoroughly as we can, considering other work. We have sometimes used a so-called weeder, having fine teeth, and your work is done very well when the soil is in the right condition for using that kind of a tool, but we haven't made any practice of that, because, when corn gets that high, we prefer some other system of cultivation.

Question—Have you ever used the weeder when the corn was six or eight inches high?

Mr. Culbertson—No. We have used it on potatoes, but not on corn, because we have been using a cultivator, which did the work better than the weeder did.

Mr. Utter—I have used a weeder on corn 18 inches high without injury to the corn.

Supt. McKerrow—We have used it on corn 16 inches high after cultivating one way, and then crossing with the weeder. We have used two classes of weeders—one of the old Breed's, wooden frame, comparatively heavy, too, but we are now using the light steel weeder. That has more weight and it will take hold of the grass better. The teeth are a little further apart than the Breed's weeder, and it will get into the soil better, but we do all of the cultivating; even if the corn is up to 15 or 16 inches we like to cross it then with the weeder. If your corn is in hills and you cultivate one way, just go the other way with the weeder.

A Member—How about drilled corn?

Supt. McKerrow—Yes, do it with drilled corn.

The Member—I did that one year and I thought I was doing damage, but the results were satisfactory.

Supt. McKerrow—You do not want to get scared when you are using a drag or a weeder.

Mr. Scott—Always remember Lot's wife and don't look back; look forward all the time.

Mr. Smith—I want to bring that corn up a little higher yet and say until the stalk of the corn gets up so that it will strike the beam of your weeder, sometimes it will be nearly three feet.

Mr. Utter—You must use caution and go through your corn in the heat of the day or the afternoon, not in the morning when it is brittle.

Supt. McKerrow—Yes, that applies to the weeder and the drag.

Mr. Scott—How deep do you plow for corn?

Mr. Culbertson—Our method is from six to eight inches deep. The corn is on the sod usually, manured, the sod plowed as a rule about six inches. The land, after it is worked up thoroughly, will be deeper, perhaps seven or seven and a half inches.

A Member—What is your soil?

Mr. Culbertson—I do not know what chemists would call it, I call it a soil with a clay subsoil; the upper soil is clay, some sand and some humus mixed through.

Mr. Scott—Is that depth ascertained by actual measurement or by guess?

Mr. Culbertson—Actual measurement. We prefer to plow in the fall, if we can.

Mr. Jacobs—What kind of a sod is that?

Mr. Culbertson—Considerable of it is June grass, some timothy and a little clover. The land is seeded to hay one season and the next season is pasture and then it is plowed up.

Question—Do you manure this land after it is plowed or before?

Mr. Culbertson—If it is fall plowed, it is manured in the winter and spring.

Supt. McKerrow—What is your experience as between the actual results of fall and spring plowing?

Mr. Culbertson—I couldn't tell you. It has been found by testing that the soil contains the most moisture the following season after fall plowing and grows the best crops generally with us.

Mr. Scott—Is this manure plowed under six or eight inches as available as it would be if it were four inches?

Mr. Culbertson—Some will reach a depth of six inches and some will not be down deep, and when the disc harrow does its work, the manure gets through the land pretty thoroughly. I believe that land which has been prepared in this way for a number of years will hold most moisture, but there are lots of things we do not know, especially about manure.

Mr. Scott—There are some things we do know. We know that corn never can be benefited from that manure until it decomposes, and we know that it will decompose more quickly near the surface of the ground, whereas six inches down it may be as sound as it was 10 years ago.

Mr. Culbertson—I admit that some seasons if you plow under a lot of bulky matter at a depth of six inches, it will remain there in that form some time, when there is a lack of rainfall, but ordinarily that manure is rotted, I believe, and ready for a crop like corn or potatoes when they need it in their latest growth. I want to have it mixed through to a considerable depth, because I think the root system develops better. If I had as heavy soil as some of you in central Wisconsin, I would not follow that method, but I provided for that by saying the farmer must study his own soils.

A Member—Did you ever try plowing sod four inches deep?

Mr. Culbertson—No, I have not.

The Member—I advise you to try it sometimes.

Mr. Culbertson—In our system of rotation of crops, perhaps we depend on the potatoes as much as any, and I have no faith in the shallow preparation of land for potatoes. This method is not just simply for the crop we are growing this year, but for a series of crops as well.

Mr. Todd—I think if this gentleman will ever experiment practically, he will find the roots going down six inches. In this sandy soil, I do not believe six inches is any too deep, although my friend from Fairchild, Mr. Foster, wants it on top of the ground.

Mr. Scott—If you will go not more than 20 miles to the northeast, you will find very large trees, larger than

were ever grown in Eau Claire, and the roots of those run very close to the surface.

A Member—You can see that all over the country, those pine trees get their vitality out of the air. I think some of them get seven-eighths of their food out of the atmosphere. In some places the rocks won't let them go any farther down; they would have gone farther if they could.

Mr. Scott—I am not referring now to the pine district, I am referring to the hardwood districts, maples, elms and basswoods, where we find surface rooted trees. You often see large plants in your houses with a little pot of earth feeding a great, big growth.

Mr. Culbertson—I think that those trees there are growing on top because they cannot get any deeper. With us the pines root very deeply, you can hardly pull them up with a stump machine. Up in Clark county, you will find all the roots are shallow, too much water there perhaps, or because of the character of the soil.

Mr. Scott—There is a clover plant that went down in just that character of soil, nearly four feet in depth. Some said it went down by the root of a stump, but I doubt if there is a root of that stump that goes that deep.

Supt. McKerrow—No doubt that plant started along by the side of the stump, but it is the nature of that plant to root deeply, and I doubt if the stump root went down anywhere near as far. It all depends on the kind of soil; the soil and crops must come together. Light, sandy soils and all vegetable soils, as a rule, should be compacted in their tillage; and clay soils, as a rule, should be loosened up. Now, the question of the depth of the loosening has come in with several other things. Mr. Scott speaks of keeping the manure near the surface where it is favorably situated as plant food, and that is correct. On the other hand, for some of these deep rooted crops, like the sugar beet, there should be a depth of seed bed sufficient to let the root down. You are all right, and you are all wrong.

A Member—I have farmed in Eau Claire county 20 years, I have some sandy soil and I have clay land. I find that where I plow six inches or more, I didn't need to plow for two or three years, because I didn't get anything, no matter how I plowed. For 15 years I farmed in Dane county, and there we could plow clear up to the beam and the deeper we plowed the better it was or as good, but four inches is better than six here.

Mr. Scott—There is much truth in what this gentleman says. I have been in Winnebago county and for a crop of corn I plowed four inches deep in one part of the land, and another part six inches deep, and we had the better crop on the four-inch plowed ground, and yet I have noticed clay brought out from probably 30 feet below the surface that would produce fairly good oats and grass. We had on our old farm there a gravel pit and after removing six feet of gravel, the clay below, with a very little surface soil spread upon it, would produce good oats and grass and corn if we could work it, but you take these sections up in northern Wisconsin we find that where we have pulled a stump, that that clay will only produce clover, or little, spindling corn, as compared with the good growth from surface soils.

Mr. Culbertson—Some of the land I am farming has been farmed for over 50 years. This land has been dug up gradually deeper, and until I get some different information I shall probably continue to plow six or eight inches deep, because I find I can grow better crops with a deep preparation of the land with a good quantity of humus in it. The corn plant roots very deep, three to four feet, possibly because they want the moisture below, so if I can plow six inches deep on old land, not new, on clay, not Eau Claire sand, I think it proper to do so. Of course, a farmer must use his judgment and profit by mistakes.

Supt. McKerrow—Each farmer may test this for himself. Set your plow to plow four inches for one field, five on another, six or eight on another, and then watch your crops. I am inclined to think that with some crops the deeper plowing will be favorable and with other crops the shallow plowing will be favorable, but the soil will determine which will be right, and every man ought to study his own farm, make something of an experiment station of it.

Adjourned to 7:30 p. m.

EVENING SESSION.

Convention met at 7:30 P. M. Conductor L. E. Scott in the Chair. Music, High School Glee Club.

WHY GIRLS SHOULD STUDY DOMESTIC SCIENCE.

Miss Emma Conley, Instructor in Domestic Science, Marathon Co. Agricultural School, Wausau, Wis.

Miss Conley.

The history of civilization has been a history of almost unbroken progress. Nearly all progress has come to us through the silent forces of evolution, but whenever evolution has not moved fast enough for enlightened thinkers, seers and prophets, they have forced progress through revolution. The progress of of the civilized world during the past 500 years was not rapid enough for the forerunners of advanced thought and so modern history has been a series of revolutions.

The intellectual revolution of the 15th and 16th centuries lit anew the torch of learning in Europe by opening up the treasures of Plato, Aristotle, and all Greek thought; it led men from scholastic philosophy to truth. The political revolution of the 17th and 18th centuries overthrew absolute monarchy and established democracy. The industrial revolution of the 18th and 19th centuries, through discovery, invention, and hence machinery, led to a complete change in all industry, business, commerce, and in the modes of life. The revolution of our century is the social. Each revolution has made the other possible by broadening men's minds and making them ready for further progress.

All revolution that has changed the civilized world has been brought about through men. No woman's hand or brain has changed the character of a single age or movement; all revolutions in household affairs have been brought about through men, and in those household industries now left in woman's hands no progress has been made—rearing of children and the feeding of the human race. No one dare deny it when I say that the child of today is weaker than the child of yesterday, weak eyed, poor teeth, feeble digestive powers, prone to disease, has no power of endurance. No one dare deny that the cooking of the past produced healthier men and women than does the cooking of today.

This is not the arraignment of women nor an encomium of men. It is a simple statement of the fact that so long as any industry is learned by intuition and practiced by untrained, unskilled laborers no progress is made; when it becomes a trade, a profession, when skilled labor takes hold of it, it becomes progressive.

We women talk about reforming society when we are society, and the most needed reform is in the home. We talk about the liquor habit, when science has fully proven that unsufficient and ill-chosen food, villainously cooked, is one great cause of man's need for stimulants. We talk about public sanitation, garbage disposal, waste paper boxes, etc., when the sanitation in our own home is vile, because we do not even know what sanitation means, and scarlet fever, diphtheria and tuberculosis are dreaded but expected guests, and cellars are damp and dirty, and sewer gas is always welcome, and the same air is loved because it has remained in the same rooms for so long.

When we realize that all over the country, from Maine to California, in all grades and classes of schools, from the primary, intermediate, high school and country school of our public school system to the leading universities, as Cornell, Columbia, Leland-Stanford, Chicago, Illinois, Minnesota and Wisconsin, new courses have been added to complement and supplement the old system of education, we know that thinking men and women have come to the realization that something has been lacking in our educational system—a something more important, more vital, more essential to our social and economic welfare than Euclid, Ovid, or Horace, and that something relates to the most sacred institution of civilization—The Home.

Need of an Educational Awakening.

As I have said before, the revolution of our century is the social, and the spirit of our age is social reform. A new science evolved from the old political economy studies society as it has been, as it is, and by its knowledge of past and present marks out the line for future progress.

It was found that the root of most social evils was in the home, that something was lacking in many homes, not because of poverty, drunkenness or vice, but because the woman of the home was utterly ignorant of her duties as a homemaker and her daughters were growing up with no more knowledge, and society as a whole was suffering because of this. Something was lacking in the ideals and education of girls when they no longer cared whether they could make good bread, could look after the household when mother was sick or away on a visit, could help with the darning or mending. Something was wrong when the girls play the piano, draw, paint and do fancy work while mother works in the kitchen.

And right here let me say that some of the prominent educators complain bitterly that girls no longer care to marry early, that they wish to become teachers, doctors, lawyers, private secretaries, and earn big salaries, that they wish for political rights, bachelor apartments and to live free like men, that they do not want the responsibility of a family. Educators, like every one else under the sun, reap what they sow. They have planned the educational system of today. Where in all that system of education, until the last few years, did they have one single word that would interest a girl in home-making? Latin, Greek, German, bookkeeping, typewriting, medicine, even music and drawing, but where one thing that relates to the practical duties of housekeeping? In the public schools a girl was ashamed if she had to help at home. Her mother was ashamed to ask her to help. This educational system, planned by men who will bitterly wail that woman has become masculine, this educational system contained nothing that would make her anything else, and as I said, our great college professors and educators have reaped what they have sown.

There is a class of people who believe that anything American, customs, manners, laws, political and business methods, is as near perfection as anything can be. There is a class of people who believe that all they know is all that is to be known about a subject, that their opinion is the final word. They move in small circles, they do not come in contact with the world of progress, change and growth, and Chinese-like, they worship ancestral light. They mistake their ignorance for knowledge, and their prejudice for conviction. The whole progress of evolution in education, religion, industry, society—in all life, in fact—is an unknown quantity to them, because in

their ignorance they look at the changes that are sweeping all barriers before them with impatience, distrust and contempt; a new idea is a positive pain. This condition of affairs is found among women oftener than among men, because men come into contact with all the forces of evolution in the business world, and when they do not get into step with it they are swept away. It is just this condition of affairs that makes it impossible for some people to understand what we mean by domestic science. They cannot or will not see the forces at work around them. They understand domestic science to mean something for the poor, the ignorant, the outcasts of society, or their misguided neighbors, but never for themselves.

Whenever a woman is sure that no epidemic, invidious disease, as typhoid fever, diphtheria, or tuberculosis, can touch her; that impure water, impure air, defective lighting, poor plumbing, have no effect on her; that drunkenness, crime and misery do not concern her; that her own physical condition cannot be improved on in any way; that her child has the strong, healthy body nature intended him to have; that her home is so restful that she does not have to go away to escape the "comforts of home" when she is worn out; whenever the family income is judiciously spent; whenever she is sure that her household runs as smoothly as any well managed business, then she has mastered domestic science and her work is to join the little group of reformers who are struggling to improve the human race physically, mentally and morally. If she has not learned any or all these things, then domestic science is for her.

We meet people who pretend to think that domestic science is all very well for the poor, the ignorant, the servant class, the submerged tenth, but for the parvenu there is that uneasy feeling that any interest in the matter might lead some one to discover that the subtle force of atavism was leading her to take an interest in ancestral pursuits. We meet people who think that a domestic science school is just a cooking school, a dressmaking establishment, a place for servants, anything, everything, but what it really is. So at the risk of telling you what you already know, I am going to tell you what domestic science is not.

What Domestic Science is Not.

A domestic science class is not a training school for servants. It is safe to say that not one per cent. of all the girls who take up the work of domestic science in the school will ever become servants. We seem to miss the whole force of the servant question. The work, hours, wages and social position of a servant rank with the unskilled laborer. If she is skilled in any particular line she no longer remains a servant. In our American system of education the daughter of the manufacturer sits beside the day laborer's daughter in the public school, receives the same instruction and has instilled in her mind the same ideas of American independence and equality. She receives the same education and often has the quicker intellect. Educate the girl and you make her free, she will no longer dream of serving, of doing unskilled work. If she is too stupid to feel her heritage, she remains a "hewer of wood", and she becomes a servant.

Remembering that in America the social ladder is easily mounted, that it is only a question of a generation or two when all Americans started from the same bottom round, that no one is too poor, too ignorant, too lacking in ambition to desire to reach the dizzy heights, we may realize that while we can get servants they will come more and more from the hopelessly ignorant class. When they lose their ignorance they rise above the servants' class and only by keeping them ignorant can we keep them servants in the present sense of the word. Increasing wages will not solve the servant problem. Wages have increased and servants are more and more incompetent. Domestic science will not solve the servant problem, because an educated girl is a skilled laborer and you will never get a skilled laborer to do unskilled work. This is an economic question.

A domestic science class is not a cooking school. A cooking school is a place where they teach fancy cooking, and fancy cooking, highly seasoned

foods and indigestible concoctions have filled more sanitariums than has any other evil. Did you ever stop to think that of all diseases the great majority come through the digestive tract and are wholly due to improper food?

A little knowledge of foods would put a quietus on the business of health resorts and water cure sanitariums. But then, what would women talk about if they had no ills? Mrs. Gilman says about the conversation of women: "They have nothing to bring to each other but personalities, some slight variation in recipes for sponge cake, cures for measles, the endless servant question, or stitches for fancy work. Poor lives, when fancy has no work but in stitches, and no play at all."

It is considered genteel to be sick, and when our friends' and neighbors' shortcomings have lost their charms—if they ever do—we have always real or imaginary ills to talk about. It is much easier to take medicine than a course in proper feeding.

Domestic science classes are not classes for teaching hemstitching, embroidery, or Battenberg work. Too many women, now and always, spend their lives in taking little stitches in handkerchiefs, ruining nerves and eyesight, while outdoors the sun is shining, the birds are singing, the world is bedecked with hundreds of shades of green, and there is beauty everywhere, while the only beauty they know or see or dream of is in a piece of muslin nine inches square. No wonder women have narrow, circumscribed lives. What broadness of vision can one get by taking stitches so small that they are invisible! "The hand of the dyer is subdued to what he works in'', and if a woman's work is taking little stitches, can she be expected to rise above little things. Domestic science does not teach fancy stitches. Since civilization began woman has had too much of it. We make things, make them for use, simple, strong, durable, and their beauty is in this. There is no economy in spending weeks in making a basket when we can purchase one much more beautiful for five cents, and the fingers can become just as skilled by using them to lighten mother's burden, or by closing the holes in some stockings.

Sewing Room, Marathon County School of Agriculture.

Girls Should be Trained in Home-Making.

I shall prove to you that every girl and woman should have a course in scientific home-making. I do not mean that a girl should have work in domestic science to the exclusion of all other subjects, because she could not. To understand domestic science, we must have at least a good general knowledge of the sciences, but I would not stop there. It has often been said that American women are over-educated. On the contrary, American women are under-educated. A man is willing to send his son to college, but in many cases he thinks such education is useless for girls. No one can have too much education. The educated woman can read something more than the fashion or theater page of a newspaper or a modern novel. The educated woman is in touch with all the questions of the day and is a part of the life of the world, not a butterfly nor a drudge. The educated woman can find pleasure in works of science, philosophy, literature, while the uneducated reads fiction or talks about people. Tennyson says: "Knowledge is to them no more a fountain sealed. Drink deep, until the habits of the slave, the sins of emptiness, gossip, spite and slander, die."

So I do not want you to understand that by domestic science I mean a course in a cooking school. I mean as good an education as a woman can get, but with that general education should go work to fit her for her life work. First fit her for her life work, then add the music and the art.

We can prove that domestic science is needed by all classes of women—the girl who is ambitious for money making, fame, or to live her own life, who believes in single blessedness, or who prefers to endure present ills than fly to those she knows not of; and the girl who intends to marry. I shall touch on the first class only indirectly; my purpose is to deal with the girl who intends to marry.

Hats and Dresses made by Students at Marathon Co. Agricultural School, Wausau.

What the Home-Maker Should Know.

Nowadays most girls work at something, because they do not care to be idle. The girl who intends to marry makes what preparations? Does she study about foods and cooking, about

feeding and bringing up children, about prevention of diseases, about spending the family income judiciously, about general household management, about care of herself, and the hundred and one things a housewife and mother should know? No; this girl who intends to marry decides to earn a little money in the meantime, so she spends six months learning to be an indifferent dressmaker—for it takes several years to become skilled—six months learning to be a stenographer, from two to four years after finishing High School to become a teacher, four years for law or medicine. Her life work, by her own choice, needs no preparation; she learns that by instinct; but work she intends to follow for a few years is done in the business world, on business principles, and hence needs from one to four years of preparation and study. Unless she has this, no business man will employ her.

What kind of business do you think any manufacturer would now have if he knew nothing at all about it? If he just folded his hands and thought: "I should like to own a large factory. I'll wait, and in the meantime I'll work at the shoe trade. I'll spend four years in the shoe business, and then, when the time comes, I'll know all about lumber and the manufactured products. I can go out into the country and be able to pick up enough farm hands to do all the work." Or take the man who decides to be a lawyer eventually, but while waiting learns the blacksmith trade. When he gets ready to practice law he hires a teamster to look after his business and he takes the fees. No human being would expect success under such circumstances; even a woman can see how ridiculous this is, but all women do just exactly this thing.

How many women live their own lives, wear the clothes they would like to, and do as they please? The whole life of many women is a struggle to imitate those above them in the social scale, in seeming to be what they are not. Else why this striving to keep up appearances when the only one deceived by the appearance is the face in one's own mirror? Why this desire for luxury that one cannot afford, and a scale of life that wears out mind and body to maintain? Artificial friends, superficial learning, shallow lives, due to their never knowing the shadow from the substance.

The greatest foe to culture, to refinement, is luxury. It takes more culture to know what we can let go, eliminate, than it does to take things on. Money buys nearly everything, even immortal souls, but it cannot buy health, refinement and culture. These come through elimination, education, training. William Morris says: "I had thought that civilization meant the attainment of peace and order and freedom, of goodness between man and man, of the love of truth and the hatred of injustice, and, by consequence, the attainment of the good life that these things breed, a life free from craven fear—that is what I thought it meant—not more stuffed chairs and more cushions and more carpets and more dainty meat and drink."

The Commercial Spirit Too Predominant.

All around us we see a movement towards the simplification of life, the getting of something more than money from this existence that has been such a struggle that most of us question whether it is worth while, and yet it has become so natural for Americans to look only for financial gains, for quick returns for money invested, that we have reached the point when it is almost necessary to apologize when we offer something that will benefit intellectually, will make a home better and happier, or will keep the children on the farm instead of causing them to rush into the cities to become round pegs in square holes.

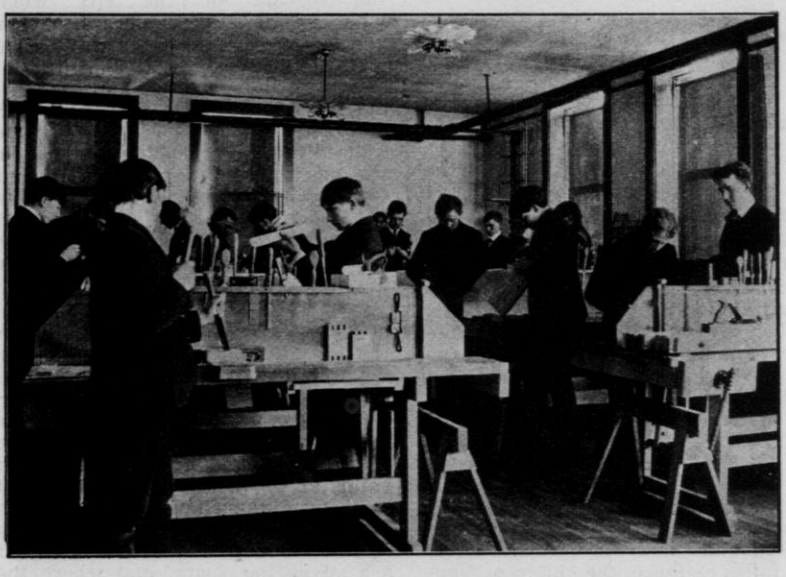
Instead of considering what is best for boys and girls, what will make them happier, better physically and morally, fathers and mothers seem to think first, how can they earn money? When you talk with them about attending the school that was established to keep the boys and girls on the farm, mothers ask: How much can they earn when they get through? Dollars and cents! Where do these people expect to find happiness? They slave and slave for money, the children leave home as soon as they can work for

money, and the old-fashioned, happy home life is no more.

Boys and girls from the farm rush to the city to become servants, clerks, teachers, dressmakers, bookkeepers, and because they have had little education, no chance to broaden their ideas and ideals and get a different view of life, they are discontented, dissatisfied and mediocre, and seldom advance beyond the very meagre salary that they received at first.

Towns and cities are crowded with talent of the mediocre quality. If parents have sent son or daughter to college or university, they have sent them where they may become doctors, lawyers or teachers, but seldom or never where they can learn scientific farming and return to the farm to improve it. Those of you who have heard Dean Henry relate his struggles to get students for the college of agriculture at the University of Wisconsin know that this is true.

Farmers in Wisconsin, their wives and children have worked early and late to clear the land and bring it under cultivation, and as soon as the children are old enough they leave the farm to work in cities. When the farmer gets too old to look after his land, his sons have gone, and some city man, possibly the same man who sold the stumpage, the uncleared land to the farmer, buys it back and starts a stock farm. For what has the farmer toiled early and late? To buy more acres, to clear more land, to buy more stock? Evidently not for his children, for when the children are grown the farm and farm work do not interest them and they go to the city.



Carpenter Shop, Marathon County Agricultural School.

The New Agricultural Education.

The greatest industry in America is agriculture. America's future greatness depends on her farms, and one of the greatest problems of today is how to keep the boys and girls on the farm. It is not a difficult thing to see why boys and girls do not care to remain there. They have neither the incentive nor the motive that their parents had when they undertook to clear the forest land. Conditions are different, everything is in evolution. To keep boys and girls on the farm they must be given a new incentive, a different motive,

there must be something more than toil, toil, in store for them. They must see some light along the horizon, something to toil for. You must drive out apathy, discontent, indifference, by putting new ideas in the mind, for when work is no longer mere drudgery but intelligent work, it changes in character. The worker is no longer a cog in a wheel, but a creator of something, and therein lies the joy of all work.

The individual who knows exactly how to do a thing, knows the results, knows that intelligent work brings better results and greater returns, takes pride and joy in what he does. He feels that he is a little better than the man who in blind prejudice closes his eyes and ears to everything new and progressive, fearing the pain of a new idea.

It is to keep boys and girls on the farm and make them contented and satisfied that the State has made possible the existence of such schools as Marathon and Dunn County Schools of Agriculture; all other schools take boys and girls away from the farm. Pupils in other schools are apt, in their ignorance, to make the child ashamed of the farm and he longs to get away from it. Agricultural schools teach the dignity of farm labor, the freedom of farm life, the sure returns from up-to-date methods, the love of the broad acres and beautiful fields. And yet it looks as though the farmer cares nothing about his children's future, for while he adds more sheep, more acres, more miles of fence, the children, from lack of interest, become discontented and leave him. He cannot spend the money to interest them in the farm, he thinks that everything that relates to it can be learned at home.

Are all good things to belong to city people? All benefits in education, culture, health, right living, and all that goes to the enjoyment of life? Is the little country girl to be left on the farm until she becomes discontented because she has had no chance to learn to do home work in a way that makes it a pleasure, and to love to do it, no chance to earn money for herself right at home? Is she to find her way to the city to become the servant of the city woman who considers her ignorant, uncouth and beneath her in every way? God's birthright to every one in America is equality, and farmers have much to answer for, if, while they have acres and acres, fancy stock, good horses, well filled granaries, they forget that the only thing in life that really counts for anything is the welfare of the little boy and girl that they let drift into the city to become the unskilled laborers of people that the farmer himself could buy and sell.

Send them where they will learn to make their own clothes; to care for their health and the health of the family, so that contagious diseases are warded off, so that indigestion and dyspepsia caused by poor food and bad cooking do not sour the disposition of the household and make them invalids at 40; where they can learn to earn spending money right on the farm and be contented there and a help and comfort to the overworked mother in her advancing years, and where they will learn how to be successful homemakers when they get ready to begin life for themselves.

COUNTY SCHOOLS OF AGRICULTURE IN WISCONSIN.

Prof. K. C. Davis, Dunn Co. Agricultural School, Menomonie, Wis.

Since county schools of agriculture were opened in the state of Wisconsin in the year 1902, this class of schools has been watched with much interest. They have truly been on trial in the public mind. The progress of these schools has been one of the most interesting educational problems since the establishment of the so-called land grant colleges for the teaching of agriculture and the mechanic arts. This new step in the extension of agricultural education to the masses was one which made the educators of the country look on with mingled doubt and hope—doubt that the new schools, established on a county basis, could be a success—hope that their experience, if successful, would lead other counties and states to undertake similar schools. A local study of these schools on the grounds should prove of value.

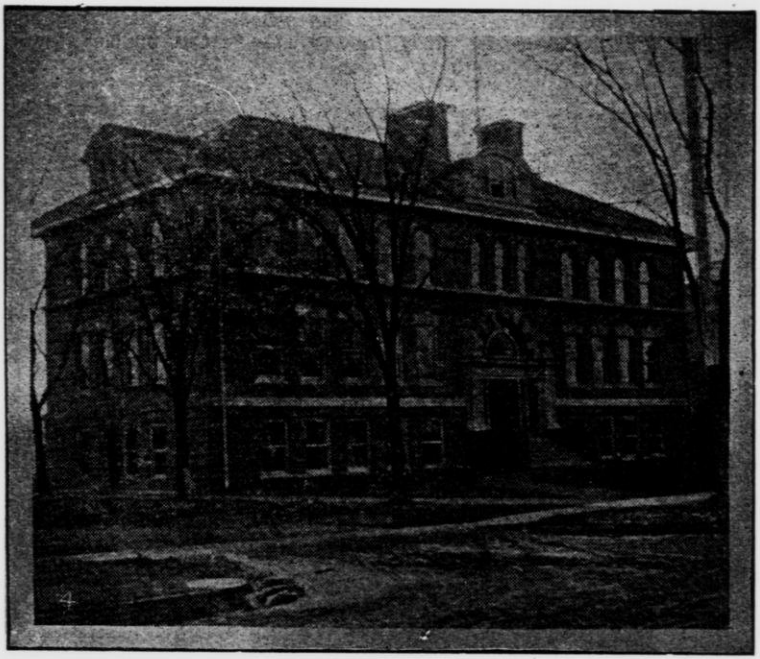
The schools have been equipped at the expense of the counties where they are located. This is true as to buildings, furniture, apparatus, machinery and stock. But the state aids each school to the extent of $4,000 a year to apply on the running expenses. The total running expense thus far has been only $6,000 a year for each school.

Group of the First Graduating Class with Instructors of the Dunn County School of Agriculture.

General Equipment.

The Dunn County School of Agriculture has three buildings located on a half block in the center of Menomonie,

the county seat. Here there is still room for poultry runs and a small garden for girls' practice. Philanthropic citizens and the city gave these grounds to the school. The school farm consists of six acres located on the county fair grounds nearly one mile from the school. Here the boys of the school have practice in farm, orchard and nursery work. The area may be increased from time to time.



Main Building, Dunn County School of Agriculture, Menomonie, Wis.

Buildings for Agricultural School.

The school has the use of four buildings:

The main building, built by Dunn county, is 42x96 feet, three stories high, built of brick. The first and second floors are devoted to the uses of the School of Agriculture and the third floor to the County Teachers' Training School. A glass wing 30x30 feet, given by Mrs. Bertha Tainter, is used for greenhouse purposes.

The mechanical building, given by Senator J. H. Stout, is 24x50 feet, two stories high over a high bank basement.

The horticultural building, given by citizens and the city, is 28x50 feet, two stories high over a bank basement. The basement story is what gives the building its name, as it is used for potting of plants, grafting and budding lessons, winter storage of roots, bulbs and tender plants.

The farm tool house, built by students, is 14x16 feet, one story high. It is located on the county fair grounds, near the school farm.

The probable number of students that could attend the County Agricultural School at any one time is about 125.

The carpentry and blacksmith shops are supplied with the best of tools, substantial and handy benches (made by students), forges, anvils, vises, lathes, circle saw, steam engine, gasoline en-

gine, etc. The sewing department has its cutting tables, work tables, sewing machines, tracing boards and wardrobes. The kitchen equipment, of utensils, dishes, tables, cabinets, ranges, food sets, cupboards, sink and refrigerator, is complete in every detail. The laboratory is provided with apparatus necessary for chemistry, physics, plant life and soil experiments. Facilities for stereopticon illustration are provided. Machinery and tools for use on the farm and garden are of the most modern types.

The equipment in the dairy includes cream separators, Babcock testers, combined churn and worker, ripening vat, milk heater, scales and complete set of utensils. The sloping cement floor and brick walls make the creamery quite sanitary and modern.

Poultry quarters are constructed on model plans of economy and cleanliness. The department is supplied with two incubators and two brooders. Brooders were built by carpentry students. A Dandy bone grinder helps materially in the winter production of eggs. The best types of farm poultry are kept.

In regard to building and equipment, it should be remembered that for the amount which the county has expended it has two young institutions established, viz., the Agricultural School and the Teachers' Training School. Much has been saved by building for two schools at the same time. The main building cost $16,500; the horticulture building, given by citizens and city of Menomonie and repaired by insurance money after the fire of 1903, is valued at $2,600; the mechanical building, given by Senator J. H. Stout, was moved by the county onto a basement built by the county, valued at $3,000. The farm tool house, built by students, is valued at $100. The complete school equipment, besides buildings, is valued at $9,000. This includes all apparatus, furniture, and tools purchased, donated to the school, or made by students.

The entire property of the two county schools (Agricultural and Teachers') has cost the county $23,035. But the total valuation of the property, including the small farm, is $39,103.85. The difference is made up largely by gifts from manufacturers and citizens, and by articles made by students in the School of Agriculture.

Cost of Running the School.

The state law authorizes any county (not to exceed four) to build and equip a school of agriculture and pay the running expenses for one year. After that the state will pay two-thirds of the annual cost of maintaining the school—not to exceed $4,000 for each school. Experience of two years shows that the annual running expense is about $6,000, two-thirds of which is paid by the state and only one-third by the county.

The assessed value of taxable property in Dunn county is about $10,500,000. Any person with an assessment of $100 will pay less than two cents to support the school.

Property assessed at $1,000 requires a payment of less than 20 cents a year to run this school. Thus it is seen that the annual cost is almost nothing to the individual taxpayer in the county.

When such are the facts, all who may have had some fears regarding the matter of annual cost may feel at ease; for surely a county in an agricultural region can easily support its own "Farmers' School."

The farmers of the county can each receive many times more benefit from the school than it costs them.

Correlative Lines of Work for Farmers and Teachers.

Much agricultural information is disseminated from the Agricultural School to the farmers of the county. Directions for planting, suggestions as to varieties, combatting noxious weeds, helping establish co-operative creameries, planning barns, silos, school houses, dwellings, devising ventilators, selecting stock, and many other subjects are taken up by the instructors with individual farmers. The school has done a great deal of milk and cream testing for farmers for the purpose of helping to improve dairy herds. On the school farm we try such new crops as should be used by those living in the section. Many hundreds of bulletins on special farm topics have been placed in the

hands of farmers desiring information on these subjects.

A novel feature of the school's work in Dunn county is the introduction, through the teachers, of elementary and manual training into the district schools of the county. By an interchange of classes with the County Teachers' school the Agricultural school teaches the rural teachers to handle these subjects in their school in a very creditable manner.

ing courses are made far more practical and useful than such courses usually are. Nearly all of the time of the classes has been engaged in making articles of use on the farm, in the home, in the school and shop. The same feature of useful training has prevailed in domestic economy, plant life, farm accounts, study of soils, poultry and, in fact, all subjects.

We believe that young people of the country have the right to just such

Teaching the Art of Pruning Trees at the Dunn County School of Agriculture.

Character of the Instruction.

In all the instruction in the Dunn County School of Agriculture the useful side of the knowledge and training given to students is emphasized. This is the principle on which the school is founded. The extended knowledge which the farmer must have should be made as practical as possible. At every point the school is made to cooperate with the farm, the shop, the dairy and the home. The manual train-

knowledge as they gain in a practical school of this kind. Farmers' sons and daughters are just as much entitled to a special training as are the young people of the cities. A special education is needed for farming as well as for the practice of medicine or law.

The farm demands men who are prepared in special schools, such as this new line of agricultural high schools being created by counties in Wisconsin. Men with the best brains are

wanted on the farm. The time is rapidly drawing near when no occupation can be found which will demand a better preparation than farming. A wide knowledge of science, a thorough understanding of basic principles of plant and animal life, a thorough acquaintance with the world's markets and how to use them, a clear insight into the reasons underlying all farm operations, a thorough attention to all details of the business, a steadiness in all matters pertaining to life on the farm, courage to act and act quickly at the proper time, good physical strength and power of endurance—these are some of the qualities demanded of the farmer by the farm of to-morrow. Already we hear the call for such men.

The courses of study for these county schools were the result of a careful study of the courses in the state colleges and similar institutions in Europe. These courses were planned by the principals of the county agricultural schools and the state superintendent, and were published in a special report from the state department in January, 1903. Each school has found it necessary to modify the course to suit local conditions.

The regular course covers two years of eight months each, beginning in October and closing in May. Pupils are admitted to this course after finishing the work of the rural district or village schools.

The winter short course for farmers is completed in two winter terms of 12 weeks each. This is offered in the Dunn county school only.

School Attendance.

The agricultural school continues growing in numbers and usefulness. While the attendance is not so great as we may reasonably expect it to be in a few years, it is better than the highest expectations of its warmest friends.

The total enrollment the first year was 64—40 young men and 24 young women. The average age of all was nearly 18 years. The second year the enrollment reached 79—45 young men with an average of 18½ years, and 34 young women with an average age of 19 years. Eighty-five per cent of the students are from the farm and all are preparing for life on the farm. At the first commencement exercises 21 were graduated, 15 from the regular course and 6 from the short course.

Attitude of Students.

To show the attitude which the students in the school have toward it, the following question was asked: "Why should rural young people attend the Dunn County Agricultural School?"

A few of the reasons may be of interest here. "In sewing one may learn to make her own garments." "We can learn good housekeeping, sewing, laundering, how to plan a house, how to work quickly and quietly." "We learn a great deal about the food value of different food materials, and the right way of cooking foods." "It offers the most practical course in domestic economy of any school I could find." "We learn the effect of diet upon the health, and how to prepare foods in the most healthful manner." "We learn the easiest, quickest, and best way to do our work." "I love housework, and by attending this school I have learned many things that will make it easier; also many ways to economize time, strength and money." "Attending this school has made me more interested in all work."

"I have learned the care and use of all tools used by the farmer." "In my opinion it prepares students for a much more pleasurable and prosperous life." "This school has such a large range of studies for such a brief course." "To secure practical training in blacksmithing and carpentry."

"I came here because I know that I will become a better farmer and American citizen by it." "It is necessary for the future farmer to have a course in such a school to enable him to be the most successful farmer." "It teaches how to farm with success, how to keep a farm in good order; what crops pay the best, and what ones are hardest on the land." "I have learned how to run an engine; the proper care of milk and cream, and how to make good butter." "The school has helped me to secure twice the wages I could get before." "We learn that a farmer's life and work is not all drudgery."

The graduates of the school are all following agricultural pursuits and are in all cases putting into practice many of the things they learned while in school. This is a good standard from which to measure the success of the school.

County schools of agriculture cannot be a success unless the farmers of the vicinity take an abiding interest in them. The experience in Wisconsin shows that the farmers look upon these schools with much favor. They are proud of them. A farmer will speak of the school as "the farmer's best friend," "the best place to send our boys," "the college for the rural classes," and in such complimentary ways only.

Young Men in the School Learn to Readily Judge and Select the Best Types of Stock for Special Purposes on the Farm.

Methods of Instruction and Facilities.

In the study of Soils the classes use text books and laboratory methods. The physical laboratory serves as a suitable place for considerable soil work. This is supplemented by experiments in the greenhouse and in the grafting room. Numerous experiments, such as those suggested in Chapters I to IV of Bailey's "Principles of Agriculture," are performed by classes.

In Feeds and Feeding, the new text book by Dean Henry is used in each county and the classes go to the county asylum farm near by and to other good stock farms to study methods. The best stockmen in the section are invited to address the classes. This work is all aided by the early experience of the students, who are nearly all from farms.

In the subject called "Care of Animals," Dr. Mayo's text is used by the schools. The work is made very practical by trips to the best barns in the county, and by careful examination of many sound and unsound animals of

all kinds. Considerable stock judging is carried on by classes in connection with this subject. Young farm boys become very familiar with all types of farm animals. No farm animals, except poultry, are as yet owned by the county agricultural schools, though it would be of great help to have barns and stock on the school farms if funds were available.

Dairying is taught only in the Dunn County Agricultural School, but is soon to be introduced in Marathon county. Full instruction is given in regard to running farm separators and the care of milk and cream. Students receive a practical training in the ripening of cream, churning, working and making of butter, testing the value of milk by the Babcock test. The practice work is carried on in a well equipped dairy containing cream separators, Babcock testers, combined churn and worker, ripening vat, milk heater, scales and complete set of utensils. The sloping cement floor and brick walls make the creamery quite sanitary and modern. Milk is bought from farmers who haul it to the dairy, and the butter is sold at the highest market price to local customers and stores.

For short course students the subject matter varies only a little from the winter term work in the regular course. This avoids a multiplication of classes. One subject, given only to the short course students (men), covers the general science of agriculture in a broad way. A suitable text is used in this class, and a number of farmers' bulletins issued by the Department of Agriculture are used by means of a topical method of recitation.

A brief time is given to experiments in the laboratory, teaching those principles of physics which are most applicable to farm practice, such as heating, lighting, ventilation, friction and lubricants, principles of pumps, eveners and pulleys.

At present only a short study is made of the more common chemical elements and their chief compounds. For the young men these lessons lead up to the

Students Learning the Use of the Babcock Tester at the Dunn County Agricultural School.

study of the composition of soils, fertilizers and feeds. For the young women the elementary chemistry forms a fundamental groundwork for the chemistry of foods.

A very small proportion of farmers in the west keep Farm Accounts. A very thorough course in this subject has been worked out by the principals of these schools. The students formulate accounts in books suitable for home use, in all subjects found dealing with the high school is taken up. Studies in regard to how plants grow, how they feed, their effect upon the soil, lessons in pollination, germination, natural and artificial methods of propagation, as layering, grafting, budding and by cuttings, are taken up and supplemented by practice. Numerous experiments in plant physiology are performed by the students in the laboratory and greenhouse. There is much need of a suitable text book in plant life. At pres-

The Metal Working Class is Taught Forging, Welding, Tempering, Pipe-Fitting and Soldering.

farm work of to-day. A brief study of Commercial Law of importance to farmers is taken up. Business forms, contracts and land survey are studied.

Practice in Vegetable, Flower and Fruit Gardening is given to both sexes. The land areas already mentioned in this article are used for that purpose. Farm machines of the best types are freely given by manufacturers for advertising purposes. A few necessary tools purchased by the school make the farm equipment quite complete and inexpensive.

In the study of Plant Life very little of the old fashioned botanical work of ent the subject matter is gathered from numerous sources.

Poultry quarters are constructed on model plans of economy and cleanliness. The department is supplied with facilities for artificial incubation and brooding. Brooders were built by carpentry students. Bone and meat grinders are given by manufacturers. The best types of farm poultry are kept. A term of lectures on poultry raising rounds out the practice work in this subject.

Both injurious and beneficial insects are studied from life and dried specimens in the laboratory. A part of the

term assigned to this work is given to a similar study of Diseases of Plants. There is considerable practice in making and using spray materials, such as emulsions, poisons and fungicides. These are applied in the greenhouse, gardens and private plantations. Students thus become familiar with different forms of spraying apparatus.

The Carpentry is not mere manual training as taught in high schools. We call it "Farm Carpentry." After the necessary preliminary work, the students soon learn the construction of buildings, machines, cupboards, paper racks, mail boxes, match holders, milk stools, bookcases and a variety of useful and ornamental articles for the home and farm. In the Dunn county school the classes in carpentry have ceiled and done the interior finishing of the poultry department, and the gymnasium. They have made the work benches and tool racks for the carpentry department, and hardly a week passes without showing the completion of a number of articles for school use. The farm tool house built by the students has already been mentioned. The carpentry departments in both schools are equipped with such tools as should be used in farm shops. It is thought that equipments too elaborate for use on any farm would have a detrimental influence upon the students. Simple, plain tools of the very best quality are used.

The blacksmith department in each school is equipped with portable forges, anvils and a few simple blacksmith tools for each student. All the work is of a very practical nature. Articles useful on the farm are made, such as clevises, chain links, brackets, cold chisels, punches, rings, tongs, repair parts for machines, harrow teeth. Practice is given in welding, tempering, sharpening, soldering, painting.

Class in the Cooking Department of the Dunn County School of Agriculture.

Incidents of the manual training work are the operation of steam and gasoline engines, and other farm machines, splicing and tying ropes, renovating and repairing dilapidated machinery. Students and farmers are encouraged to have farm shops of their own.

Mechanical drawing is practiced in the shop and class room, where working drawings are made for use at the carpenter's bench, or to be followed in the construction of farm buildings, such

as dwellings, barns, granaries, silos, poultry houses and machine sheds.

The Cooking department is equipped as nearly like a home kitchen as is consistent with the number of students to be accommodated. Wood and gasoline ranges are used instead of individual gas plates. Convenient cupboards and kitchen cabinets are such as should be in any well equipped home. Even the work tables used by the pupils are models of convenience in every respect. Food sets, showing the composition of each of the standard foods, are conspicuously placed for constant reference and study in the preparation of meals. Students get practice in preparing and serving meals to each other and to numerous visitors. This is supplemented by a series of lectures in Home Economy touching upon Chemistry of Foods, Invalid Cookery and Hygiene of the person and the home.

In each school the Sewing department is equipped with sewing machines, draughting tables, and everything necessary to teach the girls the best methods of making their own garments. They furnish their own material and use the finished products. They make underclothing, shirt waists, skirts, wool dresses, and some millinery work is done by all girls in the regular course.

Well equipped, modern home laundries are used to teach the principles of Laundering, with special attention to the removing of fruit and other stains, and disinfecting; special treatment of flannels, silks, fixation of colors, starching, polishing, composition and action of various soaps, soda, bluing, borax and washing powders.

The courses in Home Nursing and Emergencies are given by means of lectures with occasional illustrations, and are very popular.

Academic Work is carried on by all students throughout the two years. Wherever it is possible, as in arithmetic, the subject matter is adapted to farm use.

Purpose.

The chief purpose of the County Agricultural schools as now established in Wisconsin is to popularize agricultural education more than can be done by a well-filled state college. The schools are subordinate to the state college in that they are not so advanced, especially in their academic subjects. Students are admitted directly from the rural schools. Most of them would never go to an agricultural school if this new class of schools were not brought close to them. Some students board at home and help with home chores; others visit home at the end of each week and are dominated by the home spirit throughout their school life. Certainly these county institutes reach a class of pupils that would not feel that they could spare the money necessary to attend the State Agricultural College. And yet there are students who, after getting the work of the county school, will feel like continuing their education and will attend the State College of Agriculture. Several graduates are already planning such a course. More county schools of agriculture will help fill the state school to overflowing.

Adjourned till 9 o'clock a. m. next day.

SECOND DAY.

The Institute met at 9 o'clock a. m., March 8, 1905. Conductor W. C. Bradley in the Chair. Prayer by Rev. Mr. Nuzum of Eau Claire. Music.

EGGS IN WINTER.

John L. Herbst, Sparta, Wis.

J. L. Herbst and his new Strawberry, the "Tardy."

There is always a rise and fall in the markets of the various products which are consumed daily, and the egg quotations are watched with much interest by both city population and country folks. For the past few years the price of eggs has taken a jump during the winter months from 15 cents a dozen up to 30, 35 and 40 cents. Statistics show that the population of the cities is increasing more rapidly than the rural districts, and so long as this continues there always will be a good demand for fresh eggs. But there is a cause for this great difference of price throughout the year. It is a fact that during the winter months eggs are at a high price, while during the spring and summer months they are at a low figure. Each year the cold storage concerns throughout the country are sold out before the winter is over. There never is an over-supply and so long as the population in our cities increases much more rapidly than the rural districts the egg business will never be overdone.

Breeding Stock.

There are several reasons for a shortage and the high price of fresh eggs during the winter months. Improper breeding of the stock, improper feeding and care in bringing the stock to maturity, improper housing and improper feeding to produce the required results.

By improper stock, I mean hens that have no record of being an egg-producing strain. I venture to say that 90 per cent of the farmers who are raising poultry for eggs do not know how many eggs his hens are laying in the year. He does not know which hen is laying 50 eggs, or which one is producing 150 in a year, and yet he continues to breed from the whole flock, a mistake too often made. If some attention was paid to the flock, he would soon note the birds that are his best layers. If he would then breed from these birds and continue breeding from his best layers, he would soon have a laying strain. The egg-producing hen is the active bird. She is the one that is inclined to be nervous and continually moving about. Invariably when in laying condition can be noted by the brightness of the face and red comb. These are the birds from which to breed.

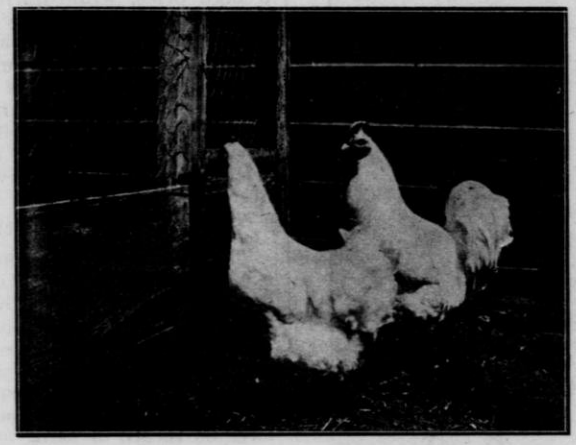
An experiment has been carried on in the state of Maine to show what can be done by careful selection and feeding to produce eggs. The experiment was started some years ago, with, I believe, 1,000 hens. A record was kept of the amount of eggs layed by each hen during the year. The best hens were bred from the following year and a record kept of the offspring. This was continued until at the present time one hen has a record of 281 eggs to her credit for a year; another 260, several 240, and a goodly number have a record of 200 and over. The experiment is to be continued with the hope of securing a 300-egg hen.

It has been estimated that the cost of feed per hen for a year is from 75 cents to $1.00. Now then, if you kept a record of how many eggs each hen laid during the year, you could soon determine which were the money makers and which ones the spongers. With eggs at an average of 15 cents per dozen throughout the year, the hen would have to lay from five to six dozen to pay for the feed consumed. Now, if your hens are not yielding more than this amount, you are losing money in keeping them, and the sooner you get rid of them the better.

Hatching and Rearing the Chickens.

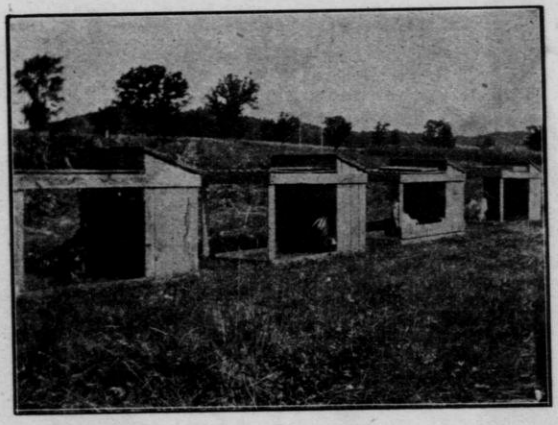
Another point of importance is the hatching and rearing of the chicks to maturity. In these times of progression I believe the farmer who intends to make anything out of his poultry must use the incubator. It has too many advantages over the old way of setting hens to be ignored. The one who is in the business for eggs or market poultry cannot afford to be without one. One reason for the scarcity of eggs during the winter months comes from the fact that the young pullets were hatched too late in the season and not being properly fed did not mature before cold weather set in and consequently were not in a condition to go to laying. Here is where the incubator has the advantage over the old way. The larger and heavier breeds take a much longer time to mature than the small breeds, and in this climate must be hatched earlier and kept growing before the cold weather sets in. Always keep in mind that the pullet will not lay until matured. The methods of running incubators vary with different machines, but most of them are so simple that most any one can run them.

The chick to become a layer and a money-maker must be kept growing



Laying Type of White Plymouth Rock. Note the Long, Deep Body.

from the time it is hatched to the time of maturity. No food should be given it from 24 to 36 hours after it has been hatched. Its first feed should be a goodly proportion of sand, to which can be added a hard boiled egg or siftings of dry bread crumbs. It should be fed sparingly at first, but often, never giving more than it will eat up clean at one time. Gradually it can be fed dry cornmeal, rolled oats and millet. As the chicks grow older, corn and wheat cracked and steel-cut oats make a very good food. No soft or sloppy food should be given. I find quarters early. Get them into the new quarters before the cold rains of the fall and early winter weather. Now, when we do this what happens? The frosts and freezing weather have destroyed the green feeds, bugs, grasshoppers and worms have disappeared; the weed seeds have been covered up. The weather will not permit them to be out and they have been deprived of their variety of feed, which brings them to a standstill unless supplied by other means. Right here I believe is the whole thing in a nut shell and the real cause for no eggs.



Male Birds Kept Separate Except in Breeding Season.

I get better results from dry feeding than from soft food during the chicks' growth to maturity.

Plenty of fresh water and grit should be before them continually. Skim milk and green cut bone should be given them occasionally. Give them a variety of feed, plenty of range and shade, keep the brooders clean and disinfected, and your chicks will grow to maturity before cold weather sets in.

Winter Quarters.

The winter quarters for your layers should be looked to early. These should be warm and dry, well lighted and ventilated, without drafts. A ground floor is preferable to board. Get the young stock accustomed to their new

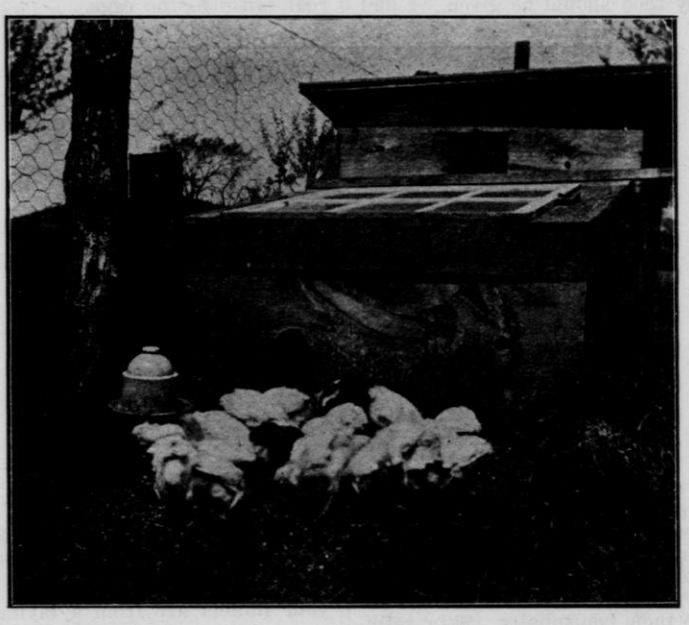
Make their winter life as near like the life they lead in the spring and summer months as possible, and if your pullets are from a laying strain you will have no trouble in getting eggs. Bear in mind that you must have the qualities in the pullets to produce eggs before you can get the required results. I believe those principles which go to make up the dairy and beef breeds of cattle apply in some respects to the hen. You cannot get eggs out of the hen that will put all her feed onto her back, breast and legs, neither can you get quantity and high test from the cow that puts all her feed into beef. Discard all lazy, inactive birds and those that keep the roost warm.

Winter Food.

Make your hens work for all they get to eat. Keep them moving about during the day as much as possible by throwing their feed in chaff, cut straw, shredded corn stalks, or other material. Give them as much of a variety of grain as you possibly can. Wheat, oats, cracked corn, barley and buckwheat are all good, but should be mixed together when fed. Never feed all one kind of grain at one time. They like a variety.

Care of the Quarters.

Bear in mind that while we are taking great care in the feeding, we must not neglect the quarters in which our birds are housed. Clean and disinfect often; never allow the droppings to accumulate; change the bedding on the floor and material in the nests frequently. Go among the birds carefully, never scaring them by any quick moves. Take an interest in their welfare and you will be well repaid for your labor.



Starting the Winter Layers in a Home-Made Brooder.

For green food, second cutting clover is one of the best. Cabbage, carrots and mangel wurtzels can also be fed to advantage. They should be fed meat of some kind at least three times a week. Beef scraps soaked and mixed with bran enough to take up the moisture answers this purpose. Skim milk added to the mash will give good results. Plenty of fresh water and grit should be where they can have access to it at all times.

DISCUSSION.

A Member—Do you allow the hens to get out doors in winter?

Mr. Herbst—Not when the weather is too severe, no, sir. I do not believe my hens have been out of the building more than six times this winter.

Mr. Matteson—That is from the standpoint of egg production; but if you desire to use a portion of those fowls for spring breeders, you would

try to get them out of doors the whole winter, wouldn't you?

Mr. Herbst—Yes, I like to give them all the fresh air possible, but I do not like to have them out in very cold winds, or rain or sleety snow.

A Member—What do you have for a scratching shed?

Mr. Herbst—I use the floor of my coop for a scratching shed. The ground floor is changed two or three times a week.

Mr. Meyer—How much room do you allow per hen?

Mr. Herbst—From 6 to 10 feet is about what they should have, each.

Mrs. Howie—Would you let them out at any time during the winter when you wish to get the highest amount of egg production?

Mr. Herbst—No. I believe the cold ground has an effect on the laying qualities. I have known it to be so, at least where they stopped laying and there was no other way to account for it.

The Chairman—Sparta has the reputation of being the coldest spot on earth.

Capt. Arnold—What objection have you to a cement floor for your chickens?

Mr. Herbst—It would be all right if you had a foot of sand on it. I do not like the bare cement floor. I would rather have the sand, and you can feed your buckwheat or corn or anything else on the sand.

Mr. Reitbrock—Do you use artificial heat in your chicken house?

Mr. Herbst—Yes. If I could keep the building warm enough without, I would like it better, but I can't. It freezes in my coop sometimes, but not hard enough to affect the birds.

Mrs. Howie—In what we call the dairy breeds, I think it would affect the egg production if it got down to freezing.

Mr. Herbst—But the heavier birds will stand much more cold. The Asiatics can keep much warmer, they are a fluffy breed.

Mrs. Howie—What season of the year would you hatch for very early Leghorns?

Mr. Herbst—The Leghorn class of breeds, and in fact the smaller breeds which have, I believe, the best record as egg-producers, must not be hatched too early, because they mature very quickly and begin laying very early, and then at about seven months of age they will begin to molt and they will not be well throughout the entire winter. The best time for hatching these breeds is along in May. The heavier birds should be hatched earlier, because it takes them longer to mature. Plymouth Rocks should be hatched early, I should want to start my eggs now so as to hatch in this month or the first part of April.

Mr. Matteson—Doesn't the Barred Plymouth Rock mature a little slower than the White?

Mr. Herbst—With me they seem to mature about the same. The Wyandottes about the same time as the Plymouth Rocks.

Mr. Matteson—Don't you think it would be better to defer feeding your chicks even longer than the 24 to 30 hours you mention?

Mr. Herbst—I begin feeding when I see them begin to get restless and moving about considerable.

Mr. Matteson—I never feed a chick sooner than 48 hours, and I have waited 72 hours for a great many of them.

A Member—If your hen house gets below the freezing point, are the walls covered with moisture?

Mr. Herbst—No. The frost will gather on the walls of the coop if it is not well ventilated.

A Member—How do you ventilate your chicken coop?

Mr. Herbst—I use a system about on the same principle as that used in ventilating barns, with an inlet at the bottom outside and inside at the top, an air chamber leading out to the roof of the building. One building I ventilate by opening the doors and windows during certain times of the day, and I am not bothered with moisture in either building. You must have fresh air in there.

Mr. Matteson—Fowls do not need the same amount of air as other animals that are larger, and I think there is more danger of over-ventilating than of under-ventilating.

Mr. Herbst—There may be if you have a small flock, but you take a large flock and I think they will take as much ventilation, comparatively, as a cow.

Mr. Matteson—I think this over-ventilation causes more roup than anything else.

Mr. Herbst—It might, if it was arranged so that the air formed a draft on them.

Mrs. Howie—I think, too, that if the quarters are kept perfectly clean they will require less ventilation.

Mr. Herbst—That is true. One mistake a good many of us make is that we do not clean out often enough and that undoubtedly is the cause of a great deal of disease in our poultry.

Mrs. Howie—Is not a damp hen house a very bad thing?

Mr. Herbst—I should prefer a cold, dry building in preference to a warm, damp one.

A Member—How do you arrange this artificial heating?

Mr. Herbst—This winter I have put in a very small stove and run my pipe the whole length of the building, 54 feet, simply to take off the chill. I had some birds that I did not want their combs frosted. I believe there is danger in using artificial heat, because sometimes you cannot control that heat, and it is liable to get too warm, then you go to change it and it gets too cold, and those rapid changes are bad things.

Mrs. Howie—We have pipes running through the different pens and a stove at each end, because we have found it quite necessary in order to keep up a proper temperature.

Mr. Matteson—To what age would you recommend keeping fowls, from the farmer's standpoint?

Mr. Herbst—A good many farmers probably have now birds six or seven years old. I do not believe you can keep them to advantage after they are two years old, and you should use some method of marking those birds, and dispose of them. The easiest method is with a small punch to punch a hole in the web of the feet the first year.

A Member—But suppose you want to keep over a few of those yearlings?

Supt. McKerrow—Then Mr. Herbst would put the second hole in.

Mrs. Howie—In selecting your breeding stock, would you breed from pullets if you expected to improve the quality of your stock?

Mr. Herbst—No, I prefer to breed from hens.

Mrs. Howie—We have found blood meal a most excellent food to mix with the corn mush. It is easily handled and we like it very much, it takes the place of cut bone. Of course, we have oyster shells.

A Member—Are oyster shells better than small gravel?

Mr. Herbst—They are used for two different purposes. The shell does not answer the purpose of a grit, we need both.

Mr. Meyer—Do chickens raised by incubator grow less robust as you keep on with that system?

Mr. Herbst—No.

Mr. Meyer—How many birds do you keep in one pen or one separate compartment?

Mr. Herbst—That depends on the size of your pen. I said six to eight square feet floor surface to the hen, 15 or 20 in a house.

A Member—In our hen house this winter, when the temperature got down to four above zero, it decreased the egg production, while it apparently did not have any effect if it didn't go below 10 above. Ours are Barred Plymouth Rocks.

MODERN BEEKEEPING.

N. E. France, Platteville, Wis.

Well do I remember in 1870 the never failing harvests of white clover honey, followed with abundance of basswood, and in the fall the winter stores of well filled hives from the acres of buckwheat. With little care, a colony of bees found something from which to gather honey all summer. It is not so now in Wisconsin. It pays me to sow alsike clover, keep less bees in one place, and use modern methods. Bees used to swarm at their pleasure, often going to the woods; now we divide the bees in a swarm at swarming time, or practice the shook swarm method and avoid all swarming, also keep the bees gathering honey. In the spring, we strengthen the weaker colonies, so at the beginning of the honey harvest each hive is full of young hatched, worker bees. Formerly the bees in a few straw hives were killed in the fall, and the honey cut from the brood combs. Next came the box hives, with large boxes on top to hold the several pounds of crooked combs, containing all grades of honey, which sold at 25 cents per pound. In 1875, Adam Grimm, of Jefferson, Wis., with 1,400 colonies of bees, selling comb honey at 25 cents per pound, colonies of bees at $10.00 to $15.00 and queen bees at $5.00, received a total income from his bees that year of $10,000.00.

Residence of A. K. Leeber, Reedsburg, Wis. Cost $2,000.00, and Paid for by his Bees in One Year's Honey Crop.

About this time the four-piece, two-pound section box came in use; soon to be improved with a one-pound box,

and soon this was made all in one piece of snow white basswood, size of box four and one-fourth by four and one-fourth inches.

Comb foundation was not yet in use and many crooked combs were built. Then tin strips or separators were placed between the rows of boxes, and a heavy sheet of comb foundation used as starter. This made the center of each comb tough eating, and by the way, some still use too heavy foundation in boxes.

iums at national, state and county fairs, with no better honey than Wisconsin clover or basswood.

Perfectly finished sections, with full sheets of extra thin comb foundation, in non-dripping cases, and all in same case of same grade, sell at top prices and are in demand. We have to compete with the snow white alfalfa and sage honey from western states; palmetto, mosquiet, catclaw and orangebloom from the south; also snow white comb and ex-

Foul Brood Combs in Front of Hives. They were Taken from Within the Bee Cellar. German Wax Press in Front, Between the Piles of Diseased Combs. Three Full Wagon Loads.

Next came thin wooden separators, with a beeway space at edges of separator. Now the slatted, or so-called fence separator is in common use, which admits bees to pass between the slats. Recently in New York I saw an improvement in the Betsinger tinned wire cloth separator, one-fourth inch meshes, and bordered with tin. Bees pass freely through it anywhere, do not stick burr combs to sections, produce more honey and better finished combs. As proof, Mr. House, using them near Syracuse, N. Y., gets the first prem-

tracted honey from Cuba, now selling very cheaply in the United States.

Comb Honey Lie.

Another trouble in marketing honey is the suspicion of consumers who read in reliable papers false statements that beekeepers have become so skilled in their profession that they manufacture and sell comb honey without the aid of bees. Such statements are false, and I stand here to offer a forfeit of $2,000.00 to any one who can show

proof of one pound of manufactured comb honey offered for sale without the help of the bees. It is impossible to manufacture full honey comb. The best we can do is to make the center wall with very slight sidewalls as seen in this comb foundation. Some dealers possibly adulterate extracted honey, but not the producer, of whom you should buy direct if possible.

Extracting the Honey.

In 1875 we got the first honey extractor in Wisconsin. The outside can revolved as the honey was thrown out with centrifugal force from one side of the two combs inside the can. The combs were taken out and reversed to extract the other side. By hard working I was able to extract 500 pounds in 10 hours. Now we have the modern four frame, ball bearing, automatic, reversible attachment and lever brake so that one man now extracts 4,000 pounds or over per day. Too many beekeepers extract honey before it is ripened in the combs.

Other Improved Methods.

We also have better uncapping methods, use double brushes to brush bees from both sides of a comb at one stroke, improved bellows smokers, modern bee veils.

Some of the Uses of Honey.

Honey comb is not digested in our stomach, and the ripened honey from extracted combs is nature's sweet unadulterated and free from the acids found in the various brands of syrups sold cheaply in grocery stores. Large bakeries now use car loads of honey every year for sweetening the better grades of bakings, it keeps the goods fresher; also is cheaper sweetening. Many of the best candies have honey in them; even plug tobacco is sweetened with cheap grades of honey. Bakeries buy honey in any kind of packages, but the Wisconsin beekeeper no longer can sell his white honey to bakeries who buy western honey so cheap; he must sell to consumers.

How to Detect Foul Brood.

Marketing the Product.

The five-gallon jacketed, round tin cans for shipping extracted honey in are cheapest and best selling package today. For home market, the one, two, three, five and 10-pound friction top cans are the best, when properly labeled, so the grocery dealer can handle them the same as canned goods. We must put up our honey in such sized packages as will suit the customers.

The Queens.

Modern beekeepers buy a few good queens to change the blood in the apiary, never introducing her in the cage she came in, for fear of disease.

Foul Brood.

In 1879 there was foul brood in 23 counties in Wisconsin, with entire apiaries of from 25 colonies to as high as 165 in one yard all dead with foul brood, and diseased combs scattered around endangering neighbors' bees. To day it is confined to four counties and light cases in a few apiaries. I get the beekeeper to treat his bees, McEvoy method, thus saving all the bees, hives, beeswax; also often getting a good honey harvest from the treated bees same season. It costs the beekeeper about 15 to 20 cents per colony to treat the bees and the new combs are worth much more, besides it gives the bees renewed ambition and they do much better. My 1905 annual report, free to Wisconsin beekeepers, describes all bee diseases and treatments of same.

The Modern Beekeeper.

The modern beekeeper reads one or more bee journals, attends conventions, uses modern implements, modern methods of wintering; no more spring dwindling, or swarming, and thus makes the pursuit on the farm both pleasant and profitable. In several places in Wisconsin there are large dwelling houses, also large farm barns, each paid for from one year's sale of honey from same farm.

DISCUSSION.

A Member—Did you ever try clipping the queen cells off from the comb to prevent swarming?

Mr. France—Yes, that will do it to a great extent, but it won't entirely prevent swarming.

Mr. Liebau—About what is the average in Wisconsin of what the colony gives of surplus honey?

Mr. France—It varies greatly; all the way from 10 to 15 pounds, up to as high as 60 and 70, and there are cases of over 100. It varies, according to the season.

Mr. Liebau—I mean, what would you call the average? I got some up to 100 pounds and some don't give any.

Mr. Bradley—Then call 50 the average.

Mr. Liebau—Last year I had 60 pounds average.

Mr. France—According to the United States census, taking all the bees of the state, the average is only 28 pounds.

Mr. Liebau—Then I stick by my kind.

Mr. Meyer—What kind of a house do you recommend for wintering your bees?

Mr. France—If I winter in the house, I keep them in the cellar, and it should be properly ventilated and dark; if there is too much light in there, the bees will come out more or less and go to the light and they don't know enough to return. I would not advise any light at all in the cellar, although I have been in cellars this winter in Pennsylvania where there was an open window and the bees were doing nicely, but it is the exception to the rule.

Mr. Meyer—I notice mine are all spindling out and lying around the cellar if I have any light.

A Member—What is the proper time to put them out of doors on the farm?

Mr. France—I wouldn't care to put them out until the weather is warm enough so that they can soon begin to gather pollen. I would keep them as long as possible in the cellar quiet, and when I take them out of the cellar, take them out in the evening instead of the morning, then they will come out gradually in the morning and will not get excited and drift away.

A Member — Do you mean along about the first of May?

Mr. France—It depends on your latitude, when soft maple is about to bloom.

A Member—Have you ever had trouble with the bees of one hive robbing another?

Mr. France — Yes, especially if the colony becomes weakened the other colonies go in and take out the honey. We should contract the entrance, so that those bees at home can guard and protect it, but in case a hive should become in an uproar and that colony is worth saving, during the day I would throw a little straw in front of the entrance, so as to make it more difficult to get through, and then sprinkle that straw with water.

A Member—How long will a queen bee live?

Mr. France—A good queen bee will live from two to three years, and I have had them five years old. Worker bees will wear themselves out in about three weeks' time, in the summer season.

Question — When these queens die, will the hive form a new queen of their own?

Mr. France—Usually the queen will have cells formed before she swarms or is lost, something to supersede her.

Mr. Coolidge—Have you any way to prevent bees from swarming?

Mr. France—On the farm, the most practical method is what is called the shook swarm method. Just at swarming time, take an ordinary hive, set old hive to one side, put another hive on the old stand and shake most of the bees into that hive. The bees going into this one themselves will go on with the work and there will be no swarming.

Question — What do you think of clipping the queen?

Mr. France — I would do that certainly.

Mr. Scott—What time would you do that?

Mr. France—Just when they are getting ready to swarm, when the queen cells are swarming. Your increase is in the old hive that you set one side.

Question—You do not get out the queen cells?

Mr. France—Usually not; the queens will attend to that themselves.

Mr. Jacobs—I wish you would give us some idea of the extent of the bee industry in Wisconsin.

Mr. France—There are 11,000 beekeepers in the state, and the honey product last year was about 165 carloads. The cash value of that was somewhere in the neighborhood of $150,000.00.

Mr. Convey—And lots of it not reported at all.

A Member — What is the price of honey put up in five-gallon cans?

Mr. France—Wisconsin white clover honey extracted has been sold generally at seven cents per pound, wholesale price.

A Member—I understood a gentleman that he sold it for 25 cents a pound.

Mr. Bradley—That was 25 years ago.

A Member—Why is it so cheap now?

Mr. France—We are producing more by far than we used to; competition.

Mr. Meyer — Do you ever have any trouble to get the bees to go into old hives where the swarms die?

Mr. France—I wouldn't want to put bees in old hives until I knew the cause of the old swarm dying. Unfortunately that has been the trouble, bees have been kept on old combs and the new swarms going in have become diseased.

Mr. Meyer—Which is the more profitable, comb or extract honey?

Mr. France—That depends on every one's individual location. With the majority of Wisconsin beekeepers, where the honey season is a very short season and you have more than you can dispose of in your home market, as a rule you will find the extracted honey will pay better, for you can ship that any day in the year without breakage. You can control the swarming to your heart's content, which you cannot do with comb honey, and, all told, I find that those who are making it a specialty are drifting out of the comb honey and more into extracted.

A Member—Will not bees put up a good deal more honey where they put it into the comb?

Mr. France—Yes. The bees put it all in the comb.

A Member — Why is it that one swarm will put up a large amount of

honey, while another swarm, right adjoining and equally as strong, will not put up any to amount to anything?

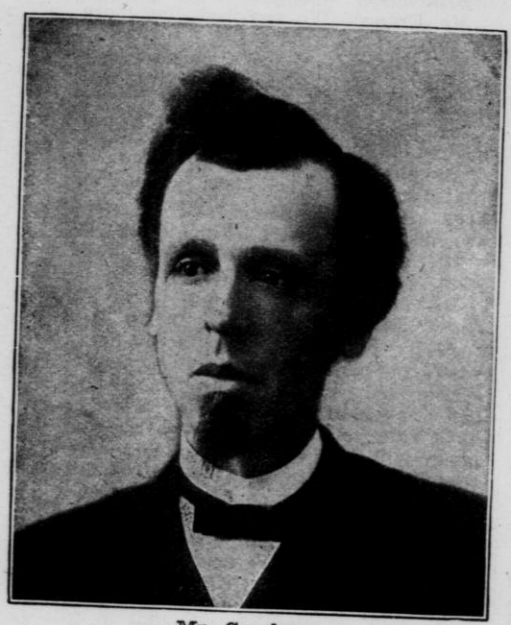
Mr. France—There is just as much difference in colonies of bees as in cows in a dairy. It is very hard for us to control all those conditions. I will speak, in closing this subject, of that fence separator, made by Mr. Betsinger of New York, the wire fence separator I have here, and you can look at it. I want to say also that every variety of flower has a honey peculiar to that plant, so that is why white clover honey does not look like buckwheat or basswood. At St. Louis I had an exhibit on a large United States map, showing the varieties of honey produced in every state, and samples from all the states, over 60 varieties. I have those 60 samples here that you may look at at your pleasure, and you can see some of those honeys that our competitors are producing.

Mr. Bradley—Are they large enough to sample?

Mr. France—I didn't dare bring enough for that. Institute workers are good samplers.

POULTRY ON THE FARM.

M. F. Greeley, Gary, S. D.



Mr. Greeley.

I hardly know how to begin a talk about a subject that has already been so ably discussed. Something must necessarily be left out that otherwise should be mentioned.

Small as it may seem, this subject is one experience has convinced me is of great importance. The little things in farming I have learned to like. I have been able to do pretty well with them, while some of the big things have proved too much for me.

Just about 25 years ago, I took George McKerrow's advice and bought a few sheep, and shortly after took Horace Greeley's advice and went west with them. I had about 125 of them, I remember, also two cows, a few swarms of bees, and a lot of brown Leghorn hens. These were all small things, calling for small investment, but, you see, they were all productive. It is the unproductive things—things that are neither growing nor producing—that drag down a fellow who is trying to pay for a piece of land.

I went from Waupaca county in this state to where I now live in Dakota, and at the same time another Wisconsin man landed in the same neighborhood. This man did not bring any hens, but he unloaded four old horses, a threshing machine and a binder. When the sun went down on our first day in Dakota, I noticed that my cows were chewing their cuds, made of something they had found going to waste, my sheep were full of grass and weeds, gathered on the unbroken prairie, my bees had made the acquaintance of

many wild flowers, and my hens had gone to roost with full crops, containing mostly bugs, worms and weed seeds that otherwise would have done harm instead of good, but the old binder which my neighbor had brought with him had not made a move of any kind, neither had the threshing machine, and the horses were eating oats which their owner had to pay 75 cents a bushel for. Do not understand me as saying that old horses and old machinery have not a place in farm economy, but I did find that, while beginning, the less unproductive property of this kind I kept around me the better.

For three years I did not own a team. I kept the little money I had in chickens, bees and sheep, and gave two days' work for a team and man one day whenever I needed one. Although I came from New England originally, I had run into debt for most of my land, and this debt had to be raised by the sheep, while the poultry's little job was to take care of myself and family. You know down in New England if a man wishes to borrow $50.00, he will consult all his neighbors about it, talk it over with his family for weeks and lie awake nights thinking about it for months — and then he won't borrow it, but let that same man take one sniff of northwestern air and he will run into debt for a steam thresher, a two thousand dollar stallion and 640 acres of land without even speaking to his wife about it.

I did not go into debt for all of these things though, for I have often said I had rather have one good, live, business hen to start to make a living with than a steam thresher—I know how to run a hen and I don't know how to run a thresher—is one reason for it—and again, the right kind of a hen will do a whole lot of business with very little outlay for repairs.

Well, to make a long story short, the sheep paid for my land and put up the greater part of my buildings, but all the time they were doing it the hens fed and clothed my family, yes, and paid the taxes on the land and sheep. There was much sickness in my family during those early years, with many seasons of discouraging drought and blight, and I do not believe that without the help of my poultry I should be the owner today of, what I think is, one of the best farm homes in the two Dakotas.

What a Hen Will Do.

For years I kept a strict account of what my hens did. I had to keep accounts in those days, I could not afford to make mistakes, I had to make money, and I found that with the right kind of hens, properly handled, I could clear about one dollar a head above cost. These accounts were carefully kept, you understand, for when I began I had so little that to break an egg was a pretty serious matter, and if I tumbled down and broke a dozen or so going to town, I broke it to Mrs. Greeley pretty carefully when I reached home.

Best Hens for Beginners.

In the first place, after much experimenting, we kept only young, active, live, business hens. The large, big-eating, non-foraging, seldom-laying, and everlastingly setting kinds may pay better here, but where I am located the eggs are what we must look to for profit. Poultry flesh brings little, so we keep nothing now but Leghorns, though there are several other breeds about equal to these. A hen that lays early and long, is a great forager and non-sitter, must necessarily be more profitable for a farmer than one that is just the reverse of all this. Of course, where both eggs and flesh are desired, the Rocks, Wyandottes, etc., come in nicely. We keep a few of the former for sitters. Incubators have not yet come to our farm, and by putting two litters of chickens with one good mother, we do not find it a very expensive method. Besides it is economical in both feed and time, and we think we get slightly stronger chickens when they have the warmth of the live mother, and the greater variety of food she gets for them.

I am no judge of the fancy points of a fowl, know little about bars of feathers or points of comb, and could not "score" a hen properly to save my neck, but I sometimes feel like scoring men who award prizes regardless of whether the bird ever laid an egg or not—and then expect farmers to tumble over one another to get these birds

— sometimes intimating that we are "moss backs," whatever that may mean, if we do not.

I learned very early that, to have lots of eggs, I must keep lots of hens and keep them laying. They must be young hens and all hens. Old hens are no good on earth, and roosters won't lay worth a cent. So many farmers say poultry don't pay, and when I visit their farms I don't wonder they think so — hens of all ages, and nearly as many roosters as hens — and all of them of some great clumsy breed that eat nearly as much as a cow and don't lay so very much more. They are usually bred "in and in" too, till they have about as little life and gumption as some of the royal families of Europe. A vigorous, fresh-blooded sire should be mated with a few of the best hens every season. When one has a small flock, to get a sitting of fresh blooded eggs every spring or so is a good plan, and frequently two or three small flock owners can club together in this. It is an important point.

A small breeding flock, as well as the setting hens, can be nicely kept separate from the others by a small portable yard and house, which can be set on to fresh grass or weeds every night after they are on their roosts or nests. The yard can be made of four wide boards and slats, not over one and a half or two feet high, and covered over with hen netting. They are much cheaper and more convenient and healthful than high-fenced, permanent yards and houses. The house, too, should be low, light and easily moved, with a small hole or door, to be placed opposite the one into the side of the portable yard.

A two-year old Leghorn, Hamburg, or Minorca is not old. I have seven four-year old hens of the small breeds, still very profitable. When a hen is red-combed, bright-eyed, active and laying most of the time, I never say anything to her about her age, any more than I would to one of you young ladies about yours. It just won't do.

In handling a large flock of good, foraging hens on a farm, it pays much better to fence the garden and let the poultry have free range than it does to reverse this procedure. A hen will make better use of a shock of wheat than any animal I ever saw get at one.

The Hen Quarters.

The hen quarters should be roomy, tidy, sunlit and comfortable. All the walls should be perfectly smooth. Nothing should be inside that is not absolutely necessary, and what there is should be easily portable and still more easily cleaned. A plastered, whitewashed wall is perhaps the best; next a smooth, tightly sealed one. If, between the ceiling and the outside wall, both overhead and on the sides, sawdust or dry, fine hay can be firmly packed, there will never be any damp or frosty walls, and the house will be very comfortable during the coldest weather.

The roosts should be large, round ones, hung from the ceiling by wire, raised high in the winter, and lowered to near the floor in summer for warmth and coolness. The nests should be small, neat boxes, hung on nails or spikes along the smooth wall, in a secluded or darksome part of the house. The roosts should be hung nearly level, but not quite; coming back each roost should be just a little higher than the one preceding it, for good reasons. The roosts should be often taken out and cleaned with kerosene or turpentine; the nests taken down frequently, thoroughly dusted and replaced, with a little sulphur and slacked lime in the fresh hay or straw put in them.

A dust box, 3 or 4 feet square, 6 or 8 inches high, and kept filled with summer saved dust and gravel, is an all important thing. And if a little sulphur and slacked lime can be sprinkled in the dust, it will prove a mighty discouraging thing for all kinds of vermin. This box should be set where the sun can shine into it, or a hen will not get into it any quicker than you would.

Too much glass cannot be put into the south side of a hen house, if it can be curtained during the cold winter nights. I knew glass let in lots of sunshine and warmth, but I was surprised to find out one cold winter night that it was just as good a conductor of cold as of heat and that if I curtained or shut off the windows by night, it added greatly to the comfort of the fowls. If

you are ever in a hen house on a cold winter night, (I hope it will be your own) just notice this. A curtain of old carpeting or heavy gunny sacking to drop over the windows cold winter nights means much in comfort and eggs.

The best ventilation we have ever known for a hen house is one or more openings a foot or so wide and perhaps as long again, over which strong gunny sacking has been drawn closely. It stops all drafts, but permits a fair circulation of fresh air. One of the best poultry men in my state has the entire front of one of his hen houses made with strong ducking drawn tightly on both sides of the studding, in place of the usual sheeting and siding up. The house, though crowded, was sweet, dry and comfortable as a house could possibly be, and not a comb was frosted, although it was 40 below during the experiment.

Food and Feeding.

I have found no better egg ration than wheat and oats in the bundle, for forenoon and principal feed, with corn late in the afternoon, a good, warm, well-seasoned mash of some kind on cold mornings three or four times a week is greatly relished, particularly if mixed up in milk. The grain should be kept in the bundle, and be fully three-fourths wheat. A little millet is excellent, fed in the straw. I save much labor and other expense by feeding hens, sheep and other stock their grain in the bundle. Early cut corn and oats fed this way to stock gives most satisfactory results with me.

A steeply slanting floor in a hen house can be kept dry and clean much easier than a level one. Feed them bundle grain on the upper end, and straw and everything else will be scratched to the lower end, where there should be a small door to throw it out of. The hens will sometimes scratch it out themselves, if good, live ones. A floor 20 feet long should be at least 18 inches higher at one end than the other. Earth, gravel, or cinders make a much better floor than boards, for a number of reasons.

With these surroundings, and the birds and feed described, with plenty of fresh water and green food, and a little fresh meat now and then, it is not a difficult thing to get both pleasure and profit from a large flock of poultry. Clean quarters, with ample range in summer, and as nearly as possible summer conditions in the winter time, are what insure success.

DISCUSSION.

A Member—What is the interior of your house, lumber or plaster?

Mr. Greeley—Lumber, outside and in.

Question—Do you like clover hay?

Mr. Greeley—Yes; alfalfa or clover help greatly in the winter.

Mr. Matteson—Isn't plaster much better to keep down vermin?

Mr. Greeley—I have never used plaster; some people think it is a little cold, but I am inclined to favor it.

Mr. Matteson — I have used it for years and prefer it.

Mrs. Howie—How many hens would you keep in a flock to secure the best results?

Mr. Greeley—To secure the very best results, I would want them about 50 to 75 in a bunch, but I can keep 300 hens with three houses easy enough where they have the run of everything and go where they please. Of course, where crowded, large flocks are not profitable.

Mr. Matteson—From a winter standpoint, they are more liable to contract bad habits where you have them in large colonies.

Mr. Greeley—Yes, but a great variety of food, especially cabbage, fresh meat and well seasoned mashes, will tend to prevent this.

Prof. Emery—You do not have four feet of snow out there three months of the year?

Mr. Greeley—No, but we have cold weather and sometimes lots of snow. I never have had artificial heat, and wouldn't want to, unless I could be around myself to look after it.

Question — What grit do your hens have?

Mr. Greeley — Nothing but coarse sand and gravel. All they get is in the dust box, but we change that frequently; that should be about one-fifth gravel.

Mr. Matteson — Are you speaking from a summer or a winter standpoint?

Mr. Greeley — Winter, for I want eggs the year round as nearly as possible.

Mr. Matteson—You succeed, do you?

Mr. Greeley — Oh, yes. From the moulting season to the middle of January our eggs come slowly, but we manage to keep them going pretty well.

Mr. Matteson—Do I understand you keep a correct account about your poultry business?

Mr. Greeley—I have not kept an account for years, but I did keep a strict account for years when I began.

Mr. Matteson—Do you know what is your average, what your hens give of eggs the year around, and the average price?

Mr. Greeley—My eggs have averaged me a little over a cent apiece the year around; over a shilling a dozen most of the time, and my hens will average something like 130 to 160 eggs apiece, sometimes more than that. I am too busy now to keep accounts.

Mr. Matteson—And it is not necessary to do that. After a man has done it a number of years, he knows how many eggs he is getting and how much it costs him a year. He has learned it from experience.

A Member—I differ from you; the account is very necessary.

The Chairman—My friend, Mr. Greeley has told you that for years he kept an account, and his hens brought him in a dollar apiece, profit.

Mr. Matteson—There is no poultryman who can afford to run an experiment station, and he doesn't need to, to know what he is doing.

Mrs. Howie — What season of the year would you consider the best for hatching stock to be winter layers?

Mr. Greeley—I don't like them too early, they are too much trouble and are apt to be stunted in their growth.

Mr. Matteson—Then there is danger, where you get them out too early, of their going through a slight moulting in the fall.

Mr. Greeley—That is a good point. I prefer to get them out in April and early May on the farm, and then force them along in good shape, and I get excellent returns the next fall and early winter.

Question—What breed of Leghorns do you consider best?

Mr. Greeley—I have had very good results with the White and the Brown, and I never saw any difference between them. I have Brown now.

Mr. Smith—Where you have a large number of hens, three or four or five hundred, and only a few houses, won't they bunch a good deal more than the proper proportion into each house?

Mr. Greeley — Not if they are put there, they will keep pretty fairly well apart where you put them.

A Member — Is there nothing in color? Do white chickens get to laying earlier than colored?

Mr. Greeley—I do not think there is a particle of difference.

Mr. Foster—Do you let them run all through your stable with the stock?

Mr. Greeley—My stock is sheep altogether. I have only two cows on the farm, and I wouldn't keep but one if I could make it give milk all the year around. There is nothing in the sheep shed that would make trouble as it would with cows. If you have comfortable hen houses, roomy scratching shed, and clean, pleasant quarters, there needn't be any trouble.

Mr. Foster—Have you had any experience mixing breeds, two or three different kinds of Leghorns, or do you keep one breed?

Mr. Greeley — Just one, the Brown Leghorns.

Mr. Matteson—Isn't it a fact that Leghorns will lay more eggs for a certain amount of food consumed than any other fowl?

Mr. Greeley—The Leghorns are admittedly, I think, the greatest layers. I have found more profit with them than any other breed.

Mrs. Howie—Do you use an incubator?

Mr. Greeley—No; I suppose that is where I make a mistake.

Mr. Matteson — Do you have any trouble making Leghorns set?

Mr. Greeley—I don't try to make them, though old ones will set some.

Mr. Matteson—I think you would do better if you would use a hatcher.

A Member—Do you think it necessary to feed cut food to chickens?

Mr. Greeley—If I had it, I would feed it, but if one has a variety of natural food, it will do all right,especially if they are given a little meat.

Question—Do you feed any soft food?

Mr. Greeley — Just a little, about once or twice a week, sometimes oftener in cold weather. I am only a farmer, not a fancy breeder.

Mr. Matteson—In regard to the animal food. A great many of you dairymen are selling off canners and getting a cent and a half a pound. Instead of selling those to the butcher, as you do, I would advise you to butcher them on your own farm and feed them to your fowls, and you would probably realize four or five times as much as you do from your butcher. We slaughter it in the fall, just the same as we would for ourselves, it is stored away, we shut out the sun and light, let in the air and it freezes up and stays frozen all during the winter, and we take it out as we want it. The whole carcass is ground up, bone and all, you can put it right through the bone cutter in its frozen condition, and we feed it to the fowls raw.

The Chairman—We have had an interesting talk on this poultry subject, and I hope that many of you will go home with the determination to get better results from your poultry.

WISCONSIN AS A LIVE STOCK STATE.

Supt. Geo. McKerrow, Madison, Wis.

I believe the topic that I am assigned to talk upon this morning is "Wisconsin as a Live Stock State."

At these Closing Farmers' Institutes, we have gone over the practical topics from A to Z and threshed them a second and a third time, using a different machine, sometimes going out of the state to get better machines than we have here, until it bothers the person who gets up the program to interject a little more variety into it, so that the Bulletin will be a little more readable to our farmer friends in Wisconsin. That is one reason why I placed this subject upon the program.

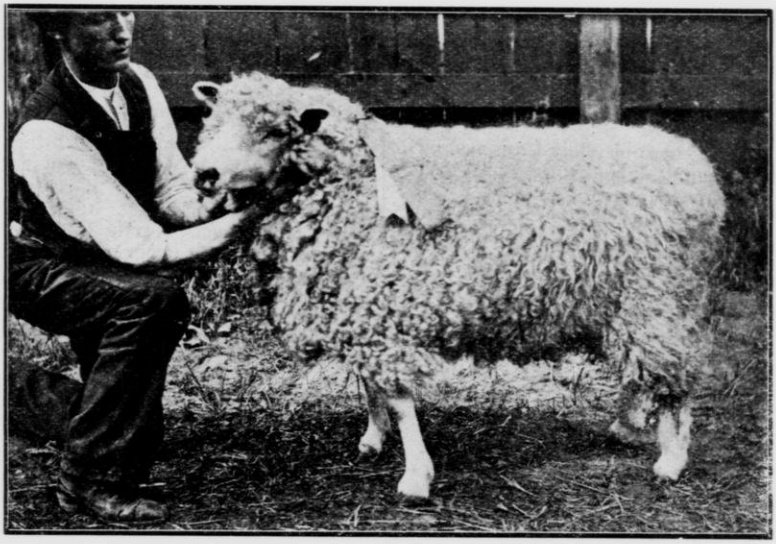
Shropshire Lambs, Prize Winners in Senior and Junior Classes at St. Louis World's Fair. Owned by F. W. Harding, Waukesha, Wis.

When I, as a boy in my teens, began to raise live stock in Wisconsin, I kept thinking that when I grew a little older and had a few more dollars to invest

I would go farther south where the climatic conditions were better, where I could grow live stock cheaper, but, not getting those dollars very fast, not getting to that changing point very rapidly, circumstances seemed to keep me in Wisconsin, and the longer I stayed in this state and the more I studied her live stock conditions, the more I saw Wisconsin's live stock coming up alongside of the live stock from other states, and even from other countries, the more I became educated up to the idea that Wisconsin could possibly grow some of the things that I think prove these statements that I have made.

Wisconsin Live Stock as Seen in the Markets.

Where do we get a chance to size up Wisconsin live stock alongside of the live stock of other parts of the world? Our average live stock, the grade stock from the farms, as a rule has to be sized up with the live stock from other states in our live stock markets. Many of you just now know about and are thinking about how Wis-



Champion Lincoln Ewe Wisconsin State Fair, 1905. Owned by Alex. A. Arnold & Sons, Galesville, Wis.

live stock as well as could these more favored sections. Then my education went on until I got to think Wisconsin could grow live stock as good as the most favored section, and today I think I am advanced far enough to believe that Wisconsin can grow live stock with the best of the world.

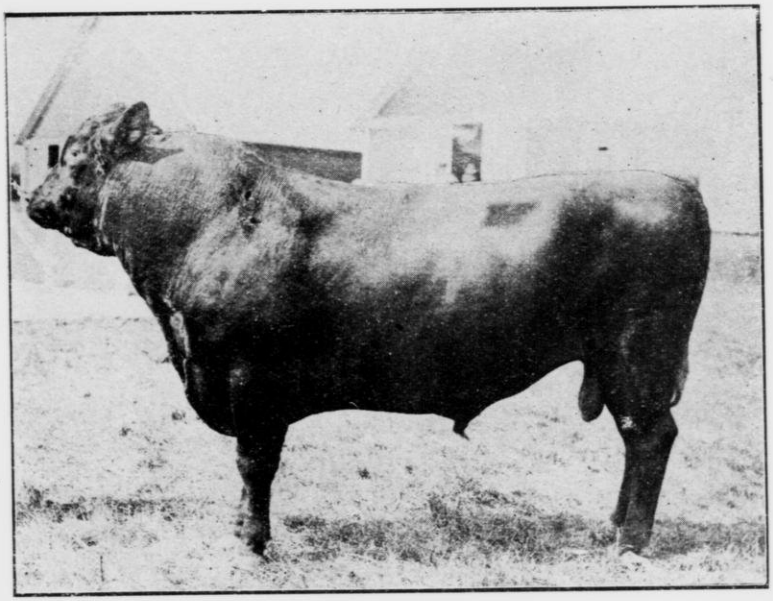
Of course, it is useless for any man to get up before an intelligent audience like this and make statements of this character unless he can bring something to prove these statements, and so, briefly, I am going to hold up to you consin steers sell down in Chicago alongside of the steers from the neighboring states of Illinois, Iowa and Missouri, and you think at once that my statement is proven wrong. If we were to depend just upon the conditions as our steers meet the steers of other states on the average in these live stock markets, I would immediately have to sit down with no more to say, but when we analyze those conditions, we find the trouble is not in Wisconsin, the trouble is not in the conditions surrounding the feeding of these animals in Wisconsin, but the main trouble is

in the man who has fed and bred these animals, and in the particular class of animals that that man has sent into the market.

Wisconsin is a dairy state, and we find people in Wisconsin foolish enough to be making beef out of dairy steers. Some of our dairymen who have experimented along this line have found out years ago that this was a foolish, unprofitable proposition, and they have quit. Our own Experiment Station only about four years ago fed a dairy steer, a very nice smooth one, fed him to the best of their knowledge and ability, and sent him to the Chicago Live Stock Show, where he went into the dressed carcass competition and showed up a very good carcass for a dairy bred steer, and as there was not a heavy competition in that class, such as there is now, they succeeded in winning third prize for that dairy steer, and they sold him for about a cent a pound extra on account of his having taken this prize, but when they figured up the actual cost of producing that steer as against what they got for him in the Chicago market, that steer had been fed at an actual loss of some 16 or 17 dollars.

A year later they fed another class, a high-grade steer, from one of the good beef breeds, put him in the Chicago show; he was not good enough to win a prize and had to be sold for his actual value in the market, and when they figured up with this beef bred steer, it was demonstrated that he had won back what the other steer had lost, he had made a profit of 17 or 18 dollars, notwithstanding the fact that his dam was an excellent shorthorn dairy cow. Now, if the state of Wisconsin had never fed a dairy steer, but had only fed a beef steer, we Wisconsin people, many of us, would not have lost that 17 or 18 dollars on the one kind of steer before we made it on the other.

Now, if Wisconsin stockmen will be ignorant and not intelligent, that is no fault of Wisconsin and her natural con-

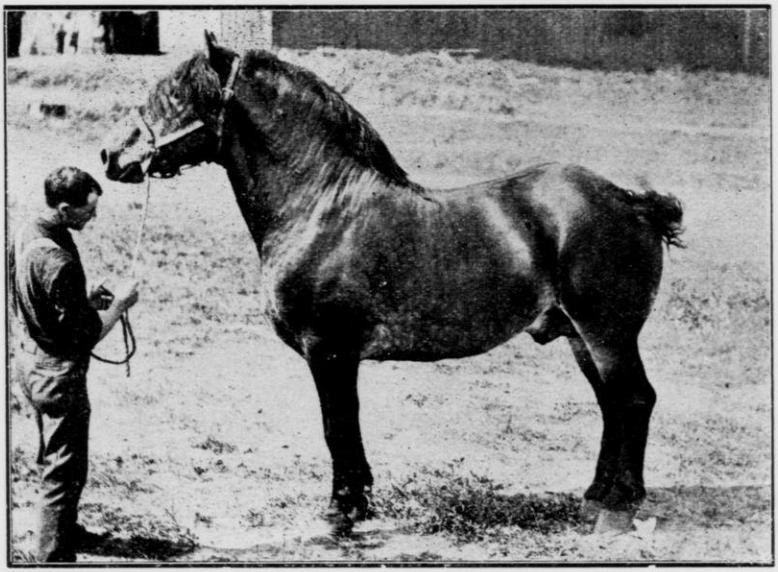


May Duke 8th. Aged Red Polled Bull Owned by J. Slimmer, Wausau, Wis. Prize Winner and Sire of First Prize Young Animals at Wisconsin State Fair, 1905.

ditions for live stock breeding. We have sent carloads of steers from Wisconsin, carloads of sheep that have topped the Chicago market. The conditions are right, but as a rule it is the men that are wrong.

Wisconsin Live Stock at the Shows.

There is another place where we can size up our live stock alongside of those of our neighbors, and this place is at the show. Now, Wisconsin for years as the Great International at Chicago, for the past four or five years, and the two World's Fairs held in this country, one in 1893 and the other just closed, in 1904, and go carefully over the records of those shows, you will find that Wisconsin, in proportion to the number of animals shown, has made a record equal to, and, at most of these shows, superior to the record made by any other state or district.



Champion Belgian Stallion, Wisconsin State Fair, 1905. Owned by H. A. Briggs, Elkhorn, Wis.

was not much of a pure bred, live stock breeding and showing state, but within the last 20 years we have developed gradually along the lines of establishing pure bred herds and flocks and for the last 10 years some of our leading breeders have been moving into the show rings in competition with the best breeders of other states and other lands, and here, I think, we have demonstrated to a certainty that Wisconsin can produce as good as any of them.

If you will go to the records of the leading state fairs, especially of the northwest, and the leading shows, such

Wisconsin's Record at St. Louis.

At the recent World's Fair, which closed in St. Louis, we made a very bright record for the live stock industry of Wisconsin.

The dairy cow that won as the best producer of butter and milk was raised in the state of Wisconsin and went from the herd of Mr. Scribner over here in Fond du Lac county. Back in 1893, Wisconsin had practically the same record, sending the best dairy cow from Rock county from the herd of Mr. Taylor to win out there as the best all-around producing cow.

So much as a starter for the record of our dairy herds.

I was at St. Louis, being Live Stock Commissioner from this state, the day the cattle show began, and I must say I was proud of Wisconsin and Wisconsin breeders when I saw after the awards were made in the aged bull class that in the Red Polled (dual-purpose) class, a bull bred in Wisconsin by Mr. J. W. Martin, of Richland City, received the blue ribbon, in a very large string of the best that England and America could produce.

Then when I walked along a little farther and came to the long string of Jerseys that had been gathered from all quarters of the globe by many wealthy breeders in the east and the best skill of the west, I saw standing at the head of the string a Jersey bull owned in Wisconsin by Mr. Taylor, of Rock county.

I went on down the ring a little farther and I came to the Guernseys, and along the string there I inquired as to who owned the first prize animal. An eastern man. Then I said, "Where was he bred?", and they said, "Up in Wisconsin by Geo. C. Hill & Son, of Rosendale." Then I looked at the second prize animal, and I said, "Where is he from?" "From Wisconsin," the animal that stands at the head of the Messrs. Hill's herd.

I went over to the Holstein string of aged bulls, and I said, "Where is this first prize animal from?" "He is owned in the east, but only a few months ago he was bought in Wisconsin of Mr. Gillett, of Rosendale."

This was a record that would make any man proud and should make any state proud, and it demonstrated this fact — you see I have mentioned all three leading dairy breeds and a double-purpose dairy breed—you see that in the dairy breeds Wisconsin was ahead, although Wisconsin representatives were there in very limited numbers, their animals were there. I believe Mr. Geo. C. Hill & Son and Mr. Taylor were the only men showing dairy bred animals, and Mr. Taylor only showed one, the Grand Champion of the class, and Hill & Son swept away a large number of the first prizes.

McKerrow's Prize Winning Oxford Rams, Iowa State Fair.

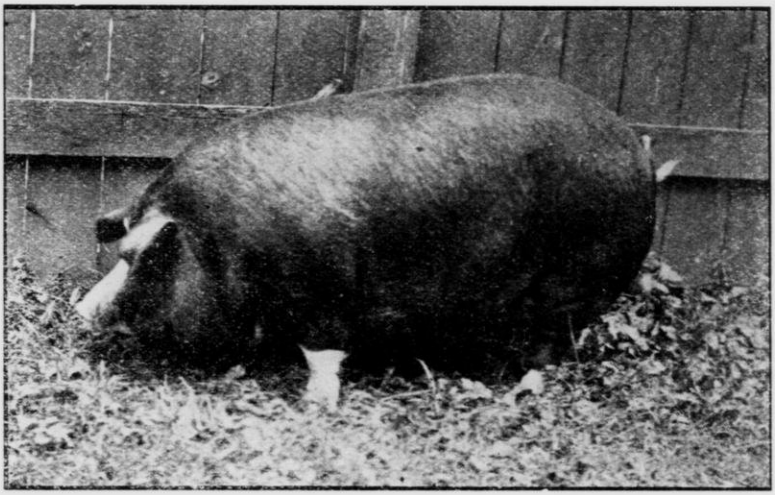
In Shorthorn cattle, Mr. F. W. Harding, of Waukesha, carried off a large number of prizes.

In the horse show, among the Clydesdales I was also made proud by the number of prizes in that breed that came to McLay Bros., of Janesville, Wisconsin. Both the champion prizes

for breeder's herd and exhibitor's herd for that breed came to McLay Bros.

When I was there at the sheep show, I was again made happy by seeing Wisconsin flocks win out to the top. I had been over in Canada previous to this time, and met some of their best breeders; I had been down at the quarantine station in Quebec, where they had very large importations of sheep brought over, and Canada had been very liberal with their stock appropriations in the way of encouragement, and they went to St. Louis expecting to win. The Canadian government had promised it would double every dollar they won, and these breeders had searched the world, and I had known from personal talks with them for two years that they were saving the best upon their farms to send to St. Louis to win, and I was really sorry for some of those breeders when they got there, because wherever they came up against Wisconsin their banners had to go down. Wisconsin won in two of the leading mutton breeds and won premier championship. But what I was really prouder of than anything else, in one breed where the National Association had put up $1,000.00 for animals bred and owned by the exhibitor and there were six exhibitors went into those rings with an equal number of animals, two each, it being all they were allowed to put in, when the record was written up, out of those exhibitors representing Canada and the leading states of the union, $555.00 of the $1,000.00 came to one lone exhibitor in Wisconsin, thus showing that Wisconsin can breed the best sheep as well as dairy cattle and draft horses.

But it was where the farmers brought the grades together in those classes that I was made specially proud. In the special classes, the different grades were shown separately for the benefit of the different breeds. Then grand sweepstakes were offered where all grades came together by ages in a sweepstakes competition. The first class, or yearling grades, were led out into the ring and when the awards were made, and made by three of the best mutton judges in America, Mr. Duncan, of New York, who for some four years has judged steadily at the Toronto Industrial Show and the Guelph Fat Stock Show in Canada, Prof. J. A. Craig, formerly of Canada but now of Texas, another recognized



Champion Poland China Sow, Wisconsin State Fair, 1905. Owned by Geo. Martin, Darlington, Wis.

authority, and the Hon. Alexander A. Arnold, of Galesville, Wisconsin, were those judges—I want to say I can only object to one of those men because he is a breeder of Lincoln sheep and must have the long wool hanging over his eyes — but, however, all the yearling winners came together and I am told that even Arnold had to brush the Lincoln wool out of his eyes and vote to award the championship to a grade middlewool from Wisconsin. When all the senior lambs came together, between six and 12 months, the award again came to Wisconsin. When all the junior lambs (which means early maturity) came together, lambs under six months, again the award came to Wisconsin, all three of those championships.

Senior Champion Rambouillet Ram at World's Fair, St. Louis. Owned by F. W. Harding, Waukesha, Wis.

Then there was a final grand championship, which came to the yearling from Wisconsin. These were grades, bred and fed upon Wisconsin farms, thus proving that for choice mutton Wisconsin leads the world.

Mr. Scott—Who got those prizes?

Supt. McKerrow—That cuts no figure.

Mr. Scott — For fear some of you might not know where these prizes went, I will tell you they went to the herd of Mr. McKerrow.

Supt. McKerrow—These grade sheep that won the championships were bred on farms in Waukesha county, but not on McKerrow's farm, with one exception. The senior lamb was bred on our own farm.

Mr. Goodrich—I would like to know

if that sympathy that you suffered so much from has seriously impaired your health?

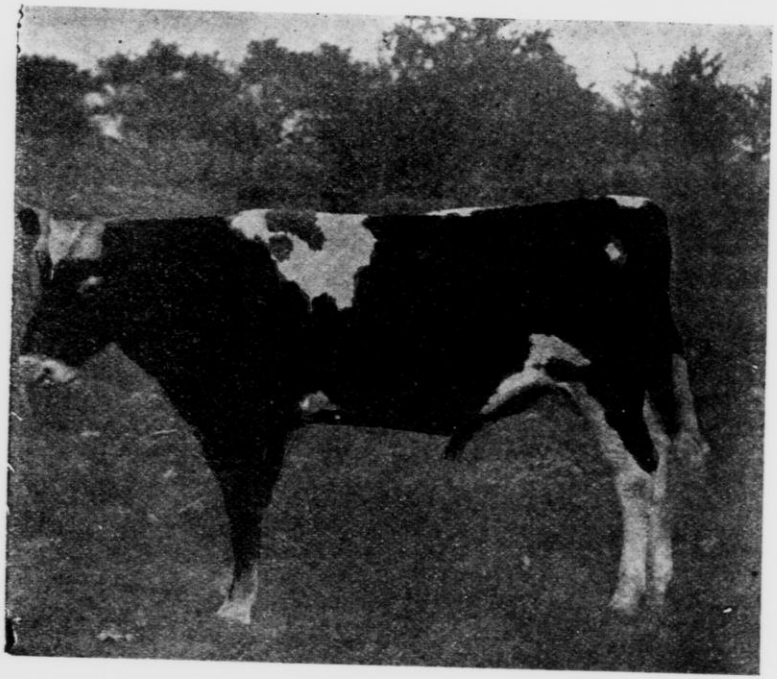
Supt. McKerrow — My health has been a little off since that time.

At the last Chicago show, Wisconsin again came well to the front—but I am getting ahead of my story.

As to swine at St. Louis, I will say our swine men have been a little backward, yet under the encouragement of the Wisconsin commission, which set aside a certain sum of money to pay the expenses of Wisconsin exhibitors at the World's Fair, a few of our swine men did get backbone enough to make a show of a few of their animals, and while they did not beat all the other swine exhibitors, they made a prize winning record well up in their classes that we certainly are proud of.

Then when we get down to the poultry department, we find Wisconsin again very much in evidence. The flock of poultry that won more prizes and more money by nearly $200.00 than any other exhibited at that great show went from Ft. Atkinson, Wisconsin, owned by E. G. Roberts & Company.

The pigeon exhibit that won more prizes and more money than any other pigeon exhibit at that great show was sent down by the Milwaukee Pigeon Fanciers' Association.

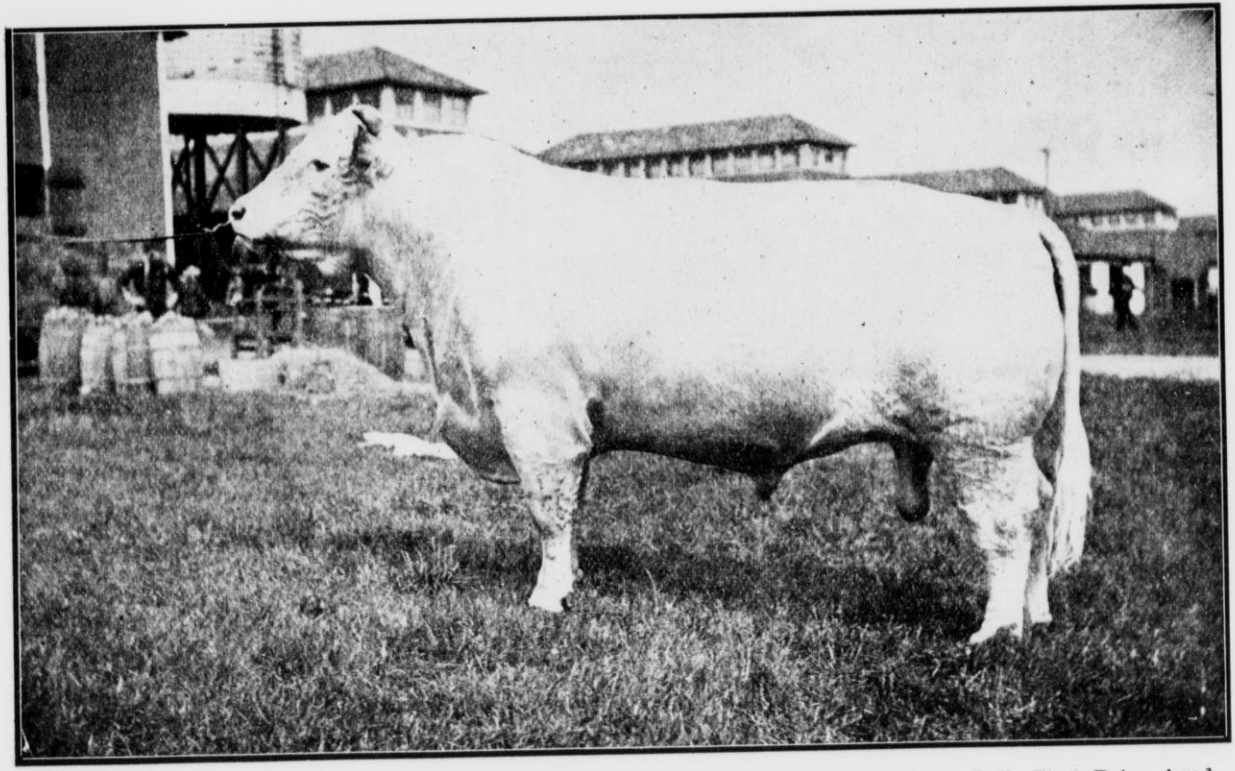


Golden Lad of Rosendale 9121. First Prize Guernsey Bull Calf, World's Fair, St. Louis, 1904. Owned by Geo. C. Hill & Son, Rosendale, Wis.

So all along this line of live stock, we had reason to be proud, and our record, when you come to size up the number of animals shown and the number of prizes awarded, stands out in front of the record of any other state or province in the world.

What Was Accomplished at the Chicago Show.

Coming down to the recent Chicago show, we do not show very heavily



Whitehall Sultan. Owned by F. W. Harding, Waukesha, Wis. Champion Shorthorn Bull, First Prize Aged Bull, Wisconsin State Fair, 1904 and 1905.

there as a state. It is a meat product show and a horse breeders' show, but we find that in the horse classes Wisconsin was well at the front. Mr. Briggs, of Elkhorn, Wisconsin, an importer, breeder and exhibitor of Percheron and Belgian horses, succeeded in capturing, in the Percheron class, several first prizes, and one championship, I believe in the American class, some first prizes in the Belgian class, including the grand championship. McLay Bros., of Janesville, were also there and won a large number of prizes with their World's Fair winners, making a better record than any other American bred herd.

In the sheep classes were prizes for pens of five grade wether lambs, and we were specially proud of winning the first two prizes on the five lambs. You see, a prize offered to five animals means more than a prize offered to one, there is no chance in producing five, while there might be in producing one. In the class for grade lambs, for the five best, Wisconsin won first and second prizes, and to my mind that is the important prize in the show, because it shows what can be done in the production of well matured lambs—Wisconsin takes first and second prizes, allowing Canada to come in for the third.

Wisconsin's Future as a Leader in Live Stock Breeding.

Now, if we are well forward in breeding live stock and if we have demonstrated that a few farmers and a few breeders and districts can breed as good as the best, that should be an encouragement to all to do better. We can do as well in Wisconsin as they can anywhere, if we will only breed well and feed well, which are the two essentials. Do not be afraid of Wisconsin's long winters or dry summers; do not be afraid because you lose your crop of clover sometimes, if you only will stick to it in the right way, you can produce as well balanced rations on your farms in Wisconsin for the production of any live stock such as they can produce anywhere. With a silo you hold the secret of feeding, and if we hold the secret of breeding we ought to keep right on.

We ought to be looked to in Wisconsin as a leading live stock state, and we are. It is only three months ago that I received a letter from a firm of brokers in New York City who do a great deal of business in South America, Brazil particularly. Two or three years ago, through one of these firms, I sent a few sheep to the West Indies. After the World's Fair they knew something of my business and they wrote me a letter saying they proposed to go into the live stock trade in Brazil and they noticed that live stock from Scotland had been selling for very high prices down in Brazil and Argentine, that the animals sent from Scotland had sold for higher prices than those from England, and they had sized up the situation and Wisconsin conditions as being much like the conditions in Scotland, and they thought we should breed a hardy, vigorous live stock, which is what they need for their trade in Brazil. They went on to ask me what Shorthorn cattle could be bought for in Wisconsin, also certain breeds of sheep, indicating that Wisconsin had prestige in their eyes.

It behooves the breeders of Wisconsin to breed more of this good stock, and in a community where you have started to breed, for instance, good Holstein cattle, stick to them; or if good Guernseys, breed more of them. And so with your horses and your sheep; if you have a large number of good ones in a community, that will be an inducement to a buyer from any country or district to come to you and buy. When I go to England to buy stock to import, the very first district I visit is the one where I can find the most, the larger number of herds of my class of stock, the kind I want to buy, and other buyers do the same, because they can have their wants more quickly and cheaply filled if they can find large numbers of animals in one locality. I also do the same in importing from Canada, and others looking for good stock do the same.

Wisconsin ought to take a lead in dairy breeds of cattle; we ought certainly to take the lead with different breeds of sheep. We ought certainly to take the lead in producing the best of the breeds of swine, and with our progressive breeders in horses, that will be taken care of, and such good breeds of cattle as Shorthorns and Red Polls, with others, are being produced as good as the best.

PLAIN FOODS AND PLAIN LIVING.

Mrs. Bertha Dahl Laws, Appleton, Minn.

Mrs. Laws.

In looking over your Institute program, I notice you have addresses on different animals, cows, chickens, horses, sheep, everything but what I consider the most important one—man; he is left out, apparently.

The dairyman takes great care of his dairy cow, he spends a great deal of time and considerable money in studying her wants, her ration, the comfort of her stable, and all that sort of thing, and he does it because he knows it pays. This dairy cow is possibly worth about $50.00. How much is a man worth? That, of course, depends on the man, but any way he ought to be worth as much as a cow. Then again, almost every dairyman and stockman knows that he can take pretty poor stock and by feeding it right, caring for it right, he can build it up and make it almost equal to pure bred stock. Now, I know you can do just the same thing with men, women and children, principally, of course, with children.

Some 15 years ago, I was working in an institution where we had anywhere from 700 to 800 children of all ages, from two months up to 16 years. They were not at all the kind of children you have in your farm homes, they were picked up from the streets and alleys of cities; they were filthy and ragged, and, worse than that, they had all kinds of diseases. That came very near being scrub stock. It was our business to build them up; first of all, to make them healthy physically. To a great many of them it seemed easier to steal and lie and almost commit murder than to do better things, but we couldn't do a thing with their minds and morals until we had cured their bodies.

Now, how did we do it? We hadn't very much money, we had to do it as cheaply and economically as possible, and we found that if we just let nature help us out we could get along with very little money and comparatively little work.

First of all, we realized that we were feeding children, not strong, healthy men and women. You hear a great deal about the difference in the proper feeding of a dairy cow and a fattening steer. You wouldn't feed a growing pig as you would a fattening hog, and we had to study how to make those children strong and healthy.

There are two great classes of food. One is body building, the other heat producing. I have here some government charts. Years ago Germany first began to study the question of food for animals, particularly cavalry horses. They succeeded so well that after awhile they thought it might be wise to study the food of the men who were to ride these horses. This question of the care and feeding of men is still studied very little, compared with that of caring for and feeding stock. If you think your cow has tuberculosis, you may write to Washington and get bul-

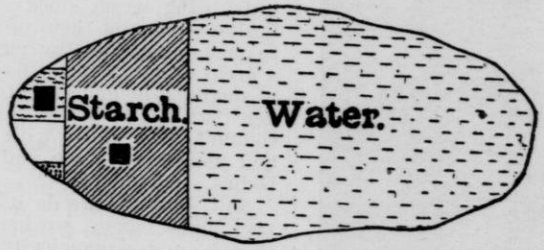
letins of all kinds telling you how to cure your cow. If your sheep or hogs get out of order, you look to Washington for help, but Washington will not help you much about curing your children's diseases. We still have very little to fall back on in this line.

Now, that part of the food that builds muscle, bone and blood in our bodies is the part the dairyman calls protein and it is the expensive part. In the slums of New York you will find children that are pale and sallow, their muscles are flabby, their bones are weak, their blood is thin; it is because they have not had enough protein. That costs too much for those poor people to buy.

they couldn't stand unless they were propped up by steel braces? Now, what was the matter? Simply that their bones did not have enough of this mineral matter in them, because the food they had had given them to eat lacked in that element. It is very important to know how to cook so as to retain this mineral matter in its proper condition.

What to Consider in Selecting Foods.

In selecting food, we have to consider many things. First, I want to get my money's worth. In choosing food, we cannot depend on weight, for although 10 pounds of lettuce weighs as much as 10 pounds of beans, there is



Protein. Fat. Indigestible.

Showing the Composition of the Potato.

Then we have the starches, sugars and fats; they are the fuel part of the food. You know a steam engine does not do you any good as long as it stands still, but you feed that engine something, it begins to work, and it pays for your investment. The engine eats your wood and coal and then it works; we get the power to work from starches, sugars and fats.

Now, it stands to reason that those sickly little orphans did not need so much starch, sugar and fat as you would if you were going out to chop wood. What we had to do was to see that they had plenty of protein, or body building foods.

Then there is the ash or mineral matter in our food. Do you know that quite a number of those children came to us with bones so weak and soft that

a big difference, because the lettuce is nearly all water and the beans nearly all nourishment. You should get 10 times as much food in a quart of oysters as in a quart of milk, because you pay 50 cents for the oysters and five cents for the milk, but you do not get the same amount of food and the same kind of food in a five-cent quart of milk as in a fifty-cent quart of oysters. When buying food, I wouldn't care what it weighed, nor very much how it tasted, because I could settle that by my cooking, but I would very much care how much protein and how much other nourishment it contains.

Everybody knows that beans are the cheapest food of all. For five cents I can get more food from beans than from anything else. The only objection to beans is that they are pretty

hard to digest, and here comes in the value of cooking. For instance, I will guarantee to cook oatmeal so poorly that it will give the strongest man here dyspepsia. I will also guarantee to take that same oatmeal and cook it so well that a baby six months old will grow strong and fat on the same food that would give you dyspepsia. It pays to let the stove do a good, thorough job; if the stove wears out, you can buy another one; if your stomach wears out, you cannot buy another one.

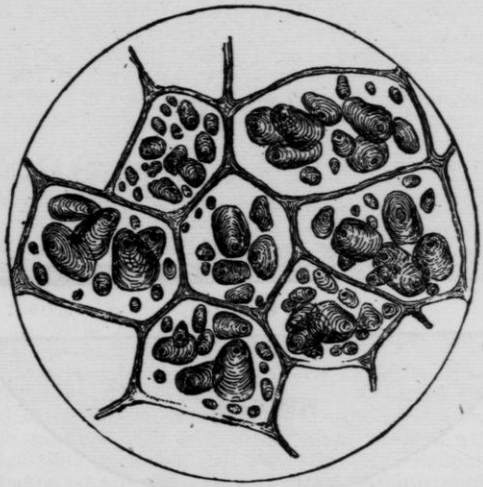
Oatmeal and all kinds of grain are very economical, but all grains require long cooking. I prefer the steel-cut oatmeal and always cook it 12 hours, a gentle and steady cooking. Rolled oats I cook for four hours. That is the kind of cooking our Pilgrim mothers understood so thoroughly. In those days people could digest their corn cake and peas and beans.

A great many people are surprised to find cheese on this chart with beans and grain, but when you are buying cheese you are buying something economical. There is very little waste, a great deal of nourishment, and no cooking is required. Of course, it must be well cured cheese, or it will not be easy to digest, and you see by this chart that there is a great deal of protein in it.

Here are butter, milk and eggs—the best foods of all. On the farm you can get them in their best condition and at first cost. Indeed, there is no place where people can live so well as they can on the farm. God has given them the very best of food at first hand and the trick is to keep it good, not spoil it, in the cooking.

Meat.

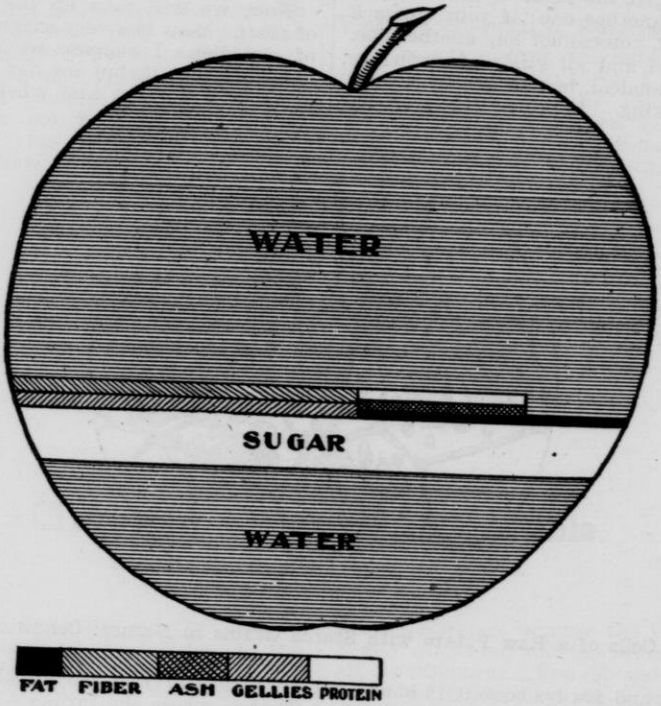
Now, we will take up the question of meat. Meat is a very expensive part of our diet. I suppose we could get along without it, but we like it and it gives us a variety, and when we like an article of food we digest it better. That is where the farmer's wife has a much harder job than the farmer. When he feeds his hogs and chickens and pigs, he gives them whatever he thinks they had better have and they have to take it, they cannot complain; but when the farmer's wife gives her family what she thinks is good for them, they often do complain very loudly. In buying a piece of meat for 20 cents, we pay 15 cents for water, for meat is three-fourths water, and with the bone and grizzle there is much waste, so I do not want to get an expensive piece of meat as a rule. I do sometimes buy a porterhouse steak,



Cells of a Raw Potato with Starch Grains in Natural Condition.

but I do not buy it thinking I am economical. You see for 10 cents in buying steak I would get 14 parts protein and 16 fat, but in buying a tough, cheap piece I would get 36 parts protein and instead of 16 parts fat, 28 for the same money. Oh, yes, you say, but that meat is tough, and you do not care to eat tough meat. But the fact that it is tough when you buy it is no reason why it should be tough when you eat it. The trick in cooking is not to take expensive things and mix them up, but it is to take cheap, economical things and cook them so that they taste just as good, look just as nice and are more nourishing than the expensive food.

Just the other day I went down town to get my meat for the next day's dinner. I got a piece that weighed a little over six pounds and only paid 30 cents for it. I knew it was tough. I also knew it was very nourishing. You all know that if the doctor tells you an invalid must have beef tea, you don't try to make it out of tenderloin steak, but you take a tough piece of soup meat and that makes the best beef tea, because there are a great many more juices in it. The thing we want to do is to make it tender, make it taste good and look nice. I make it tender by pouring over it about half a cup of vinegar and half a pint of water boiled together, let it stand all night long, and turn it once or twice, so that the vinegar is acting on the tissues of that meat. In the morning, take it out; wipe it dry and fry it very quickly in pork fat and drippings, so as to keep in the juices; just make a crust on it. Pour off the fat, add boiling water to half cover it and cook it very gently over a slow fire in a tightly covered heavy iron kettle. There are three things to be done:



Composition of the Apple.

First, to make a crust on it; second, to keep it cooking gently; and third, to keep it covered all the time. I cook it three or four hours, keep it simmering gently and it keeps nice and juicy. Our grandmothers understood the value of slow cooking, and I believe the secret of their success was the old-fashioned brick oven in which everything cooked gently, evenly and closely covered.

But, you say, this takes too much fuel; but by planning your work this objection is easily over-ruled. In the wintertime, I start cooking this meat at breakfast time, and when it has cooked up nicely I slip it in on my coal heater in the living room and it cooks there all forenoon without a cent extra spent for fuel. On wash days and ironing days, I have got to have a fire anyway, so I plan to cook this pot roast such days as these, or on baking days.

The Starches and Sugars.

If you will look at this chart, you will see that the potato contains almost nothing to build up the body, for it is composed principally of starch. You see here upon the second chart the pictures of a slice of the raw potato. Inside of these bags are little, hard, dry, wrinkled kernels of raw starch. You may eat those, of course you cannot digest them in this state. They must first be cooked; that is, the heat in cooking these little kernels will turn them into flaky, digestible particles, as you see them in a baked potato when it is baked right.

In this picture of an apple you see that it contains no starch, but sugar. A green apple would be like the potato, containing starch, not sugar, but in a ripe apple it is sugar. All summer long the heat of the sun is cooking the starch in that apple and turning it into sugar, because sugar is nothing except ripe starch, and starch is raw sugar. The sun cannot get at the potato and turn the starch into sugar, so we must do that by cooking. There doesn't seem to be much food in the apple, but there is something more necessary at times than food even—that is medicine. Nature did not know we were going to have so many doctors, druggists and so much patent medicine, so she gave us her medicine. We Americans use more patent medicine than any other people on the globe, and we buy it, not in the fall, but in the spring. In the fall you are healthy, you do not need medicine, and why? Because you have been living naturally; you have had fresh fruit and fresh vegetables, and so your digestive organs are in good condition. But in the spring we are all run down, we lose our appetites and we have spring fever, so we go and buy sarsaparillas, or such things, or perhaps 15 cents' worth of sulphur and molasses, something with which to have a great, big, spring housecleaning. We would not have to do that if we would keep up our summer conditions in the winter time, not eat so much heavy food, drink a great deal more pure water, and keep to the summer food as nearly as we can, eat all the fruit we can; it is better than any medicine. When I see a man who has a large family of children come into a drug store and buy a lot of such stuff, I wonder if he has any idea how much of that bill he could save if he had a good fruit or vegetable garden. That is the cheapest and best way to save medicine, it is nature's way.

Some Other Essential Foods.

Then there are other things that you must have besides these shown on the chart; you must have the three most important foods of all—sunlight, water and air. You cannot grow any kinds of crops without sunlight, neither can you grow strong, healthy children. Of course, on a farm they get a great deal more of it than most of our city children, but even on the farms, haven't you noticed that when the children come out in the spring, they do not look like the same children that went into the house in the fall, because they have not been having summer conditions? We have been paying quite a good deal of attention to Japan these last few months, we admire the strength she has shown, and have realized what a healthy, sturdy people they are. Do you know that in our war with Spain, 70 per cent of our soldiers who died, died in camp from diseases that could have been prevented? Do you know that in the war between Russia and Japan, not one single per cent

of the Japanese soldiers who have died have died by disease, and yet we call ourselves a civilized and advanced nation. They lay it to the fact that they are such a cleanly race of people, so attentive to hygiene, they use quantities and quantities of water. It is certainly a good thing to keep the body clean, inside and outside.

Then the air we breathe is the most important food of all. You can live quite a few days without anything to eat, and a number of hours without anything to drink, but you must have something to breathe many times a minute, and I believe your health depends more on good air than on any other one thing. There is nothing that will help so much to cure diseases as pure air. I have seen people with consumption so far gone that you would think nothing would help them. They have simply lived in the out-of-door air and built themselves right up. And still we go into some farm houses that are badly ventilated, even the kitchen and bedrooms, although the dairy barn and chicken house will have the latest ventilating apparatus.

Women Must Have Healthful Recreation.

I do not believe that woman was put into this world only to cook and scrub. I think there are other things just as important. Many women are so self-sacrificing that they have no time or thought for themselves, but really the most unselfish thing anybody can do is to take such good care of themselves that nobody else has to do it for them, and then we can take care of others, too. So many say they haven't time to rest and take life easy, that there are only a few years to work, and they must work hard and then drop out and die. Yes, you can do that, or you can live a little bit easier and work for many more years. Too many people work, and work, and never have a thought for anything but their work. Every farmer thinks that sometime the time may come when he will have a big enough farm, a big enough bank account, and he can afford to rest, but it generally comes too late and some one else has the benefit of it. It certainly does pay to rest a little, to live a little every day as we go along.

DISCUSSION.

Capt. Arnold — I was very much pleased with the lady's talk, but one thing she did not finish up. She talked about what a man was worth, but she didn't put a figure on the average man. Some one here suggested he was worth 30 cents.

Mrs. Laws—I do not often meet that kind of men.

Mr. Liebau—The lady made a very nice speech, and she is so young yet. I hope to see her here with the same speech when she is 30 years older.

Mr. Convey—How do you regard vinegar in household use? Do you think it is desirable to use vinegar in pickling?

Mrs. Laws—Vinegar by itself is not so bad, but as a mixture it is very bad. Ripe pickled olives are not nearly so bad as green pickled olives, and our pickles are generally made of unripe things and they are very bad for children. We often see at hotels, the mother will grab the pickle jar the first thing and take out a fat, green pickle to hand to the boy because he is crying. You do not need to look more than once at the boy to notice his yellow, sallow complexion to know that he is unhealthy.

Recess until 1:30 P. M.

AFTERNOON SESSION.

The Institute met at 1:30 o'clock. Conductor Delbert Utter in the Chair.

EARLY MATURITY OF HOGS FOR MARKET.

Geo. L. Howard, Durand, Wis.

Mr. Howard.

When I was a little fellow some ten years of age I used to catch pocket gophers on my father's farm, receiving from him 10 cents a piece for their tails. Taking money earned in this manner, I went one fine spring day to a neighbor's about a mile distant and purchased two pigs, a black one, and a white one with the prettiest pink skin you ever saw. They were only two weeks old and I carried them home in a sack and put them in a pen father told me I could use. The pigs had been there but a few minutes, however, when the white one found a hole in the fence and in a moment had wiggled through and was running squealing across the field toward a tract of timber some 40 rods distant. I turned to my father and older brother with the cry that my pig would get in the woods and be lost. They assured me that he would find his way home and I could go and get him the next day and bring him back. But to my mind that hundred-acre tract of timber with the big bluff rising out of the middle of it was a veritable wilderness from which no little pig would ever find his way out, so with fear in my heart I started after that pig as though my life depended upon it. At the far side of the old rail fence I captured the runaway and brought him safely back.

Through the summer I fed them skim milk and corn and pig-weeds and clover and tid-bits from the kitchen, and about Christmas time they were butchered along with the rest, and father hauled them by team some 30 miles to Eau Claire, where they brought seven cents a pound. When father came home and handed me two shining twenty-dollar gold pieces as the proceeds of the sale of my pigs I was the happiest boy in Wisconsin.

Thus early in life I was impressed with the fact that there was money in hogs, and since I have been farming for myself I have seldom found that they failed to yield a fair profit on the time and feed invested.

Building up a Herd.

As I have had no experience in raising bacon hogs, I will discuss the subject as relating to the production of what is commonly termed the lard hog. It has been my belief and practice that the greatest profit lay in getting a steady, continuous growth from birth to maturity, finishing at as early an

age as possible, but not putting them upon the market until they were in a condition to command the highest market price.

To make a good feeder, a pig must be well bred. Proper feeding can do much but not all. By "well bred" I do not mean that he must necessarily be a registered pure bred with a tabulated pedigree covering a sheet of legal cap paper, but I do mean that he must be descended from ancestry of good size, good form, and an inherited tendency to quick growth and the ability to make economical use of the foods given him.

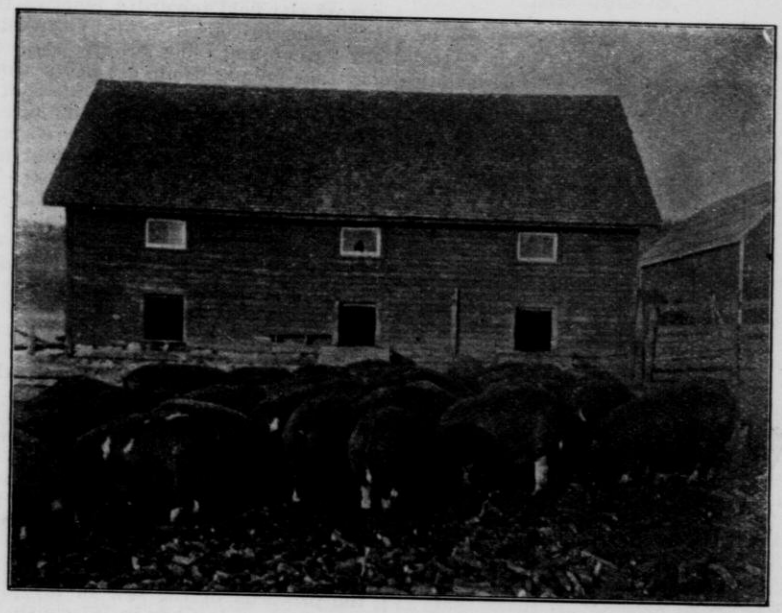
In selecting brood sows from a drove of pigs, the very thriftiest and best should be chosen. A brood sow should be long, with a wide, square back, straight hips, good strong bone, standing square and well apart on legs, small head and soft hair. If obliged to choose between too coarse and too fine, choose the coarser. The very fat, chunky sow is to be avoided as a breeder.

As a sire must usually be purchased from another herd, the farmer will usually find it easier to purchase what he desires from a breeder of pure bred hogs than elsewhere. The pure bred hog has been bred along certain lines for generations and is more prepotent in producing offspring of like form and character than is the hog of mixed or mongrel breeding.

The purchaser, however, must insist on individual merit as well as pedigree. The pure bred hog that is lacking in form and constitution is better than the scrub that is lacking in the same degree, but the offspring will be far from satisfactory.

In selecting a sire, great care should be taken to secure one especially strong in the points where the sows with which he is to be mated are inclined to be weak.

Pigs intended for breeding purposes should be separated from those intended for market and should be given a ration containing more protein. Such food as flour middlings, ground barley, peas, with clover pasture in summer



Howard's Pigs at 7½ Months.

and clover leaves in winter will build up a body strong in bone and muscle. Unquestionably the heaviest weights at a given age can be produced at the least cost per pound with pigs farrowed in the spring, but the difficulty of feeding a large drove so as to keep them of even size and quality, together with the higher prices often prevailing in April and May, has led us to adopt the following plan, which we have followed for some years. Young sows are bred to farrow in August. We allow them to run with the pigs until they wean them of their own accord. These sows are again bred to farrow about the first of April, are again allowed to run with the pigs until they wean them and are then fattened and sold.

Young sows from the August pigs are used to raise pigs the next August, and so on indefinitely, each sow raises two litters of pigs and is then marketed. As by far the larger portion of the pigs raised in Wisconsin are farrowed in the spring, I will only describe our method of feeding and handling the spring crop.

How the Spring Pigs are Fed and Cared For.

During the winter the sows are fed mostly on ground barley and flour middlings, occasionally a little corn, also clover leaves and chaff with a few pumpkins and a few small potatoes from the cellar for dessert. Their swill is always fed warm in winter and salt is kept in a trough where they have access to it. Hardwood ashes are also supplied. Three weeks before farrowing we begin to feed about two quarts of linseed oilmeal in the swill for 12 to 15 sows. This is continued until pigs are two or three weeks old.

At farrowing time each sow is given a pen by herself and for a day or two after giving birth is given plenty of water, but not very much grain. When the pigs are a few days old, we begin to add a little corn to her rations, gradually increasing the same until she receives about an ear of corn for every pig in the litter.

The bedding is changed often and the pens kept dry and clean. The pens are so arranged that as soon as the pigs are a few days old we can let them out for sunshine and exercise. Good, warm sunshine is the best tonic I know of for a little pig. When the pigs are about three weeks old the sows are turned into a lot together and a place fixed where the pigs can get through and the old ones cannot. Here we keep a little sweet skim milk in troughs. If it gets very sour before they eat it up, it is cleaned out and some fresh put in.

A little soaked corn is scattered around and they soon get so they will eat the corn dry and soon learn to shell it themselves. Flour middlings are apt to produce scours in young pigs and should be fed sparingly. As they get a little older, ground barley or middlings and a little oilmeal are fed with the skim milk from the creamery and corn is fed in the ear.

They have the run of four or five acres of clover pasture with a couple of acres of rape later in the season. I take great care not to overfeed them, always preferring to hear them squeal a little and come running when called. They will eat lots of the clover and rape and make good use of it.

We sow from six to 10 acres of Canada field peas, one patch of an early variety and another of a late variety. As soon as the early variety has most of the pods ripened, we fence off two or three acres with a woven wire fence and turn the pigs in. When they have cleaned these up we give them another patch.

I cannot speak too highly of field peas as a food for pigs. Not only do pigs make good gains on them, but they seem to put the pigs in such a physical condition that when we begin to feed corn again they make very rapid and very economical gains. While eating the peas they require and will eat but little other food.

During the hot, dry weather, we feed swill three times a day, at other seasons twice a day. We usually raise a few acres of Flint corn for early fall feeding. As it is a hard corn to husk we often turn the pigs into the field after they have become accustomed to eating it. I do not advocate turning hogs into a large field of corn, or the feeding of them in this manner for any great length of time.

Pumpkins planted with the corn and fed raw form a nice addition to the

ration and do not seem to materially lessen the yield of corn. The swill is always fed in troughs under shelter. In pleasant weather during the fall the corn is fed in the field on the ground—in stormy weather on a plank floor under shelter. As cold weather comes on, the pigs are given a good, warm sleeping place with plenty of dry bedding and their swill is warmed for them.

We continue the feeding of a liberal amount of ground barley, or middlings mixed with skim milk, and enough water to make all the slop they will clean up, until the hogs are ready for market. Salt is kept where they can get it and occasionally hardwood ashes or charcoal are fed. We have a bank of clay sandstone gravel and haul them a load of that once in a while, and it is surprising how much of it they will eat. They also relish a little slacked lime or mortar. With this system of feeding, we usually attain an average weight of 300 pounds or over in carload lots at eight and one-half to nine months of age, and are able to secure the highest market price when we place them on the market.

DISCUSSION.

Mr. Rietbrock—What do we understand by linseed oilmeal?

Mr. Howard—Flaxseed after the oil is pressed out, it is ground into meal.

Mr. Moore—Do you sow oats with your peas?

Mr. Howard—No, not now.

Mr. Moore—How much peas do you sow to the acre?

Mr. Howard—Three to four bushels, according to the size of the peas, with a drill. They are Canadian field peas.

Mr. Frisbie—At what age do you separate your breeding pigs from the others?

Mr. Howard—Oh, at about three months; we make the selection and separate them.

Question—Why do you give them Flint corn in preference to Dent corn?

Mr. Howard—That is for very early feeding, before the Dent corn is ripe.

Mr. Martiny—What kind of hog pens have you?

Mr. Howard—We have used several different kinds. For breeding purposes, we have used a small house with a roof sloping both ways, and one for each individual.

Mr. Martiny—Would you feed a little linseed meal any time?

Mr. Howard—Yes, it is good any time.

Question—How much linseed meal would you feed to an animal of about 100 pounds weight?

Mr. Howard—About a good handful once a day.

Capt. Arnold—Do you think it pays better to feed a hog so as to get him on the market when he is five months old than at seven months?

Mr. Howard—I think that the seven months old pig is preferable. At that time, he should weigh in the medium-sized breeds something over 200 pounds.

Capt. Arnold—You can get them up to 150 pounds at five months.

Mr. Howard—Yes, in small droves, but it is pretty difficult in carload lots.

Mr. Bradley—Haven't you found that it is better to market hogs, say, about the first of September rather than to wait until December and perhaps get a cent and a half or two cents less?

Mr. Howard—It depends a great deal upon the conditions a farmer has on his farm. I think you can make pork cheaper and faster from September to cold weather than any other time, they will put on more flesh for the same amount of food than almost any other time of year.

Question—Do you sow rape for your hogs for fall pasture?

Mr. Howard—Yes, and find it equally as good as clover.

Question—What breed of hogs do you breed?

Mr. Howard—Grade Poland China.

Question—What time do you turn the hogs in onto the peas?

Mr. Howard—The peas will usually be along about the last of July or the first of August, the early varieties.

Mr. Moore—Over in Door county, they sow from one bushel to a bushel and a half per acre of peas.

Mr. Howard—I never have had any success in sowing in light amounts on my soil. Mine is sandy loam; I don't know how it would be in Door county, or upon different soils.

Question—How much do your peas cost you?

Mr. Howard—About a dollar a bushel to buy.

Question — Couldn't you sow your peas earlier and turn your hogs in the first part of July?

Mr. Howard—I have never been able to, I usually sow them about the first thing I do.

Mr. Culbertson — We sow peas as soon as the land is fit and we never yet have been able to feed them until the last of July.

Mr. Rietbrock—What is your judgment as to the propriety of breeding from mature animals?

Mr. Howard — The pigs from the more mature animals are nearly always larger and make quicker growth while they are young; in fact, they continue to do better usually right through.

Mr. Rietbrock—Didn't I understand you to say that it is your practice to take only two litters?

Mr. Howard—Yes.

Mr. Rietbrock—And yet when they are older the litters do better, make stronger pigs, do they not?

Mr. Howard — Yes; it has simply been a matter of economy in carrying them over. In turning the sow off when they are two years old, we have raised two litters and we get the full growth of the sow and turn her off at about two years of age. We have found it impractical to raise late fall pigs with our conditions and we cannot raise very early spring pigs, so that if we carry her over we cannot very well raise more than one litter of pigs from her next year, because either we had to have the spring litter in February or March, or else the second litter would come in October or November, neither of which we are in shape to handle successfully.

Mr. Rietbrock—What would you consider a good sized litter from a sow that is coming in with a third or fourth litter?

Mr. Howard—Oh, eight or 10 pigs, and would expect to get just as many in the second litter.

Mr. Rietbrock—But not quite so vigorous?

Mr. Howard — I do not know but what we would.

Question — Can you make as good growth on fall pigs as on spring pigs?

Mr. Howard—No, not as rapid.

Question—How early do you have sows farrow in the spring?

Mr. Howard—About the first of April or the last of March; if you have good houses, they can come early.

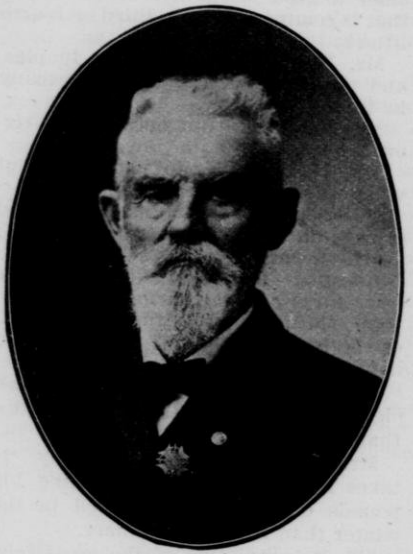
Mr. Convey—Do you sell these fall pigs on the market for a better price than the spring pigs?

Mr. Howard—I think so, usually. It takes a little more feed to make 100 pounds of gain on a pig fed in the winter than it does in summer.

Mr. Roberts—One of the great mistakes that swine breeders are making is that they are breeding from immature animals all the time, which weakens vitality, and they can carry an old breeding animal over more cheaply than they can carry a young gelt over and feed it.

EARLY MATURITY OF CATTLE FOR MARKET.

Alex. A. Arnold, Galesville, Wis.



Capt. Arnold.

The profits in beef production depend on the application of a large number of principles and practices. Among them and principally are, first, the vitality of the animal so as to properly digest and assimilate food so that there be little waste in the digestive tract; second, the quality of the animal as to breed and the proper development of the parts that produce the most valuable meats; third, the age of the animal when there is the most rapid growth in proportion to the food supplied; fourth, the quantity, quality and elements of the food, and fifth, the care and comfort of the animal. As this paper is only an opening for the purpose of bringing to the attention of the farmer the importance and profits of early maturity of cattle destined for the block, or what is called "Baby Beef," I must confine my remarks to the third principle heretofore named, to-wit, the age of the animal.

There is no use of my dwelling on the established fact that the young animal makes the most profitable feeder, provided the market demands that kind of beef and the price is sufficient. Fashions are fickle and are made somehow, sometimes the result of a whim, at others the result of utilized experience. In the case of beef there is a present fashion and I maintain it is the result of experience and the development of a proper taste for the more nutritious foods and therefore the demand for the same.

Twenty years ago the eighteen to twenty-two hundred steer brought the highest price in the market and captured the first prizes at the fat stock shows, whereas now the tidy, well-rounded, plump, even-fleshed steer, weighing twelve to fourteen hundred pounds, is the kind that commands first prices, while the nine to twelve hundred pound yearling is a close second. Those that can afford it, want nice, tender, juicy meats, not the hard, tallowy kind, the result of long feeding.

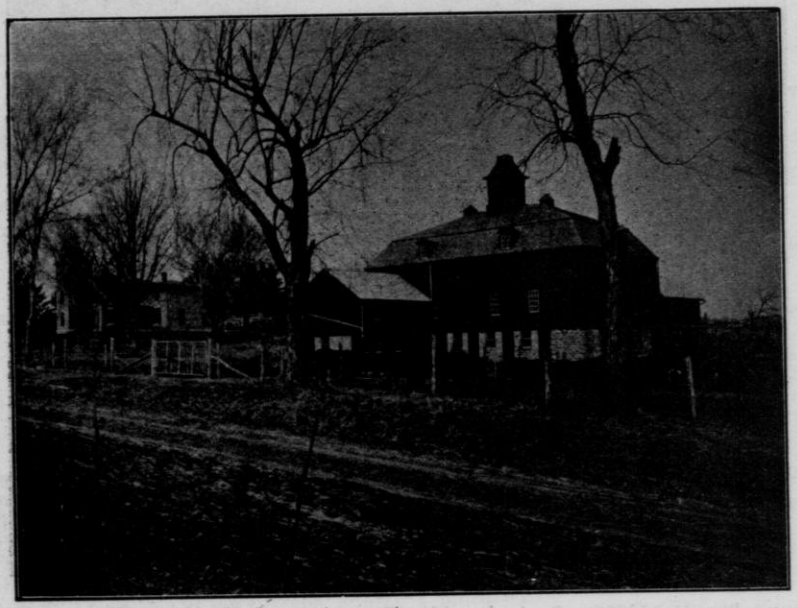
Now, if we can get a steer on the market when he is from 12 to 16 months old and will bring $5.50 per hundred when the fourteen to fifteen hundred pound steer from 24 to 36 months old brings six cents, the margin in price is so small that the profit on the yearling may be greater than on the two-year old. In the first place, a farmer that raises his calves, must get them on the market when they are yearlings, or what are called long yearlings, else he needs a ranch to carry all his cattle. If disposed of as yearlings, he has his cows and the same number of calves, whereas if he keeps them until two years old, he must keep one-third more stock on his farm. The yearling is disposed of and the money is in his pocket to be invested in whatever he likes. The older stock will eat more roughage, but it costs more to maintain them, as the larger and older the animal the more it costs for the food of support.

and it is self-evident that there is no profit, except that which is utilized by the animal above his food of support. Steers can be put on the market when they are 12 to 16 months old, if of the approved beef type, not finished, that will sell for feeders on present market for $4.50 per hundred. If they have made two pounds per day (a good gain) they will weigh 960 pounds and bring when 16 months old $43.20. So you see that even if not finished, the farmer realizes a nice little bunch of money for his calves, quick money and off his hands. If properly fed and well handled, they can be made to gain two and one-half pounds per day and will weigh 1200 pounds; will sell for "Baby Beef," $6.00 per hundred, or $72.00.

From experience, I have proved that I can make 960 pound steers in 16 months from a calf that will sell for a top notch feeder, with an average grain feed of four pounds per day, thus costing me for grain alone (grain at one cent per pound), $18.00. This steer brings $43.20 and leaves me a balance of $25.20 for milk and roughage. In case he is finished, he weighs 1200 pounds and brings me $72.00. He has cost me eight pounds of ground feed and oats per day, or $36.00, leaving me $36.00 for milk and roughage. This pays better than a gold mine—at least the average gold mine. Can this be kept up for another year? We will see.

Even supposing this two and a half pound daily gain can be kept up for another year, they would weigh 2100 pounds; this is too heavy for the market and will cost too much to feed. Steers of this weight would bring about five cents perhaps, or $105.00, at least $33.00 more than the 16 months steer. It takes a great stretch of the imagination for a man to think there is money in keeping a two-year old steer on full feed for a year for $33.00.

The 16 months old steer brings $43.60 not finished, $72.00 if finished, and the food of the smaller and younger steer has certainly cost less than the older and larger steer, for the reason that the animal is younger, develops

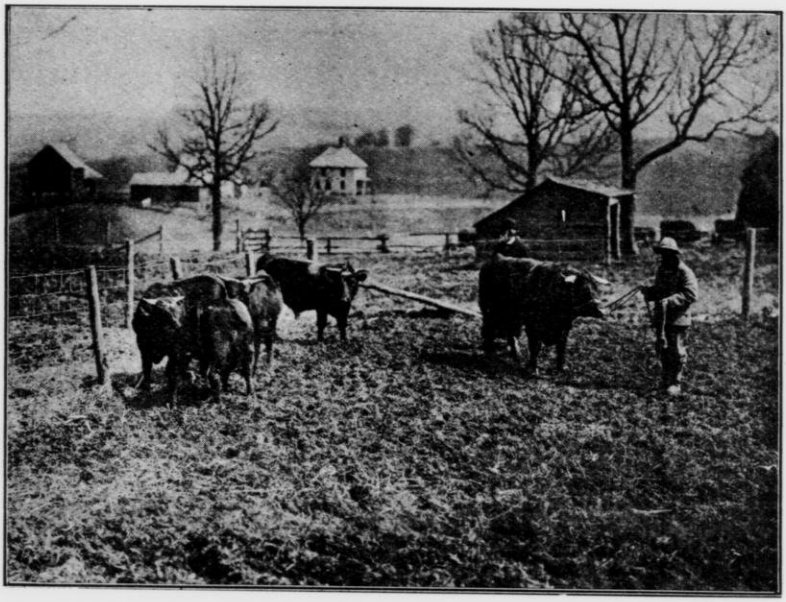


Alex. A. Arnold's Farm Buildings and Herd of Shorthorns.

more muscle, and its powers of digestion and assimilation are better.

Heavy feeding does not tend to longevity nor hardihood; on the contrary, the system is taxed to its utmost and its vitality must ultimately succumb, but in the mean time we have developed a nice piece of top notch, toothsome flesh fit for the epicure.

There should be no loss of time, no going back, no standing still to make baby beef. Every day that the animal does not gain is not only a loss of the food of support but a loss in quality, consequently a loss to the feeder. To feed a scrub is like throwing grain in a sack with the bottom out. The grain has gone in the sack, but we find no grain there. Calves of this sort should be disposed of to the butcher. This is a proper early maturity for this class of cattle.



"Proud Star," 158285. **Capt. Arnold's Property, and Choice of Shorthorns for Early Maturity and Four of his Calves.**

DISCUSSION.

Question—To what do you credit the increase of price between baby beef and prime steer? In the quality of the beef, or in the difference of the dressing, or both?

Capt. Arnold—There is but slight difference in the weight; of course it takes a very good steer to dress a percentage of 60 or 65 pounds net weight, but there is a difference in the quality. There is no longer a demand for the hard, tallowy steer which is the result of long feeding. If we expect to satisfy the demand of the market, we must get a steer on the market when he is grown, when his carcass is full of water, juicy, toothsome meat, and it ranges all the way from 1,000 to 1,400 pounds. Those are the steers that bring the biggest prices, the fashion is to have that kind of beef. They want it and we have got to raise it and satisfy that demand if we expect to get good prices.

Question — How long do you keep these calves on whole milk?

Capt. Arnold—Just as long as you think you can afford it.

Mr. Goodrich—As long as the mother gives milk?

Capt. Arnold — That depends altogether on where you live and the price of land. If I had a large tract of cheap lands in the northern part of this state as Mr. Rietbrock has, I would let them suckle their mothers and I would make some money on baby beef, and I would finish them up there, too. I would not send them down to Chicago to a lot of fellows where they would not bring me more than two and a half cents a pound.

Question—What is the most you ever realized for a steer and at what age?

Capt. Arnold—One hundred and ten dollars at three years old. The trouble is, we are attempting to make beef out of dairy bred stock and we never can do it, that is, to bring first prices; but if a man is situated so as to raise beef with the right kind of quality, that is, that are built right and have the right blood in them, we can make baby beef in Wisconsin just as well as anywhere. I do not see why we cannot; we have brains enough, but we aren't using them; that is all.

Question—Isn't it almost impossible to make this baby beef without giving the use of a cow for about three months?

Capt. Arnold — The best results I have had from making beef and in breeding thoroughbred stock, is to have the calves born in the fall of the year. They are fed through the winter on dry feed and you want to do that even if they are born in the spring. You couldn't turn them out in the winter anyway; then the next summer they do not need but a little milk and they go on flush feed. The main thing in raising good beef is to have good long grass, four to six inches long. Short grass never will fatten an animal. If you have that kind of grass for them to grow on in July, keep them there for three months without any grain whatever, then with an average of four pounds of grain at 16 months old, the animal would weigh about 950 pounds, and that is a very modest estimate. I would have done better than that. I can do better than that with a bull, and you know they do not fatten usually as well as a steer. Then the next winter you finish them up in the winter and get them on the market about March, and you can make them bring you $72.00, that is no big thing.

Mr. Linse—I know it is no place for a dairyman to get up here to talk early beef. Now, I understand that you beef breeders give a whole cow to a calf for one year pretty much.

Capt. Arnold—No, sir, I do not. That is the way to do it.

Mr. Linse—It is mostly done. We are really feeding two animals in place of one in order to raise that steer, but you have only given us the figures of raising one calf, but you have to feed the old cow, and I know something about that myself.

Supt. McKerrow—We do not want any dairy discussion in here; we are talking about the early maturity of beef.

A Member — I wish this gentleman would give us the profits out of this $110.00 steer.

Capt. Arnold — I would have made money to have sold that steer a year younger.

Question—What breed of cattle do you raise for beef?

Capt. Arnold — I keep Shorthorn cattle.

Question—Then it probably wouldn't be any use to ask you whether there is any other breed of beef cattle that will come into maturity quicker than Shorthorns?

Capt. Arnold—Oh, yes, there are others that do just as well.

A Member—How is a Black Polled as compared with Shorthorns for early maturity?

Capt. Arnold—I do not know.

Mr. Scribner—Be honest now.

Capt. Arnold—I think if I had a lot of grade Shorthorn cows, I would just as soon use a Polled Angus sire to raise steers as to keep the best kind of a beef type of Shorthorn bull. I do not know, but I might do something with a Galloway.

Question—How about Herefords?

Capt. Arnold—It is all right for one cross, but there is no breed of cattle that will nick in and give as good results as the Shorthorn.

Mr. Jacobs — Are you advocating cross breeds?

Capt. Arnold—I am advocating an animal that has sufficient vitality to as-

similate its food. Unfortunately, with breeders, the cross bred animal is ordinarily the best feeder. But we are not talking about breeding now, we are talking about animals we are going to shove on the market. A steer that can eat the most to the age of 16 months old and get him on the market is one of the best and ordinarily a cross-bred will do that better than a full blood.

Mr. Rietbrock—That will do for one cross, but not more.

Capt. Arnold—That is what I am talking about, I am not talking about breeding animals at all.

Question—What do you do with your heifers?

Capt. Arnold—Well, there isn't such a big difference between the price of good heifers and good steers. It pays pretty well to keep them.

Mr. Rietbrock—You would not feed her the same as the one you were going to make a cow of?

Capt. Arnold—Oh, not at all—yes, I would in some respects. It is all nonsense to starve a calf to death to make a dairy cow of it. In northern Wisconsin there is a possibility of a man making more money by keeping his steers another year, where land is very cheap, but I am talking about baby beef on land that is worth $100.00 an acre. A man cannot keep three lots of animals on his land, he must have the cows and the yearlings and the two-year olds, on the higher priced land it is just as well to sell them and get the money in his pocket at a year and a half; he will get just about as much for it. The trouble is, so many are making the mistake of sending scrubs and cattle that are half fed; they get down to market and won't sell for anything and feeders are losing money in Wisconsin just by this practice.

Mr. Moore—Wouldn't you have just as good yearlings or calves by feeding them whole milk for three or four weeks as if they ran with the cows?

Capt. Arnold—The trouble is, if I wanted to let the calf suck, I would have a cow that gave a small mess of milk, so that I wouldn't be bothered with her after the calf has got through sucking. Feed a calf four weeks with good, sweet milk and at the end of 16 months' time you will have about as good an animal as if you let it suck six weeks or more. Of course, after the four weeks, I would feed it skim milk, oats, bran and corn meal, equal parts. To make the feeder, I have it four pounds a day for 16 months. Three months of that time it is on grass in the summer time and when it is very young it doesn't take more than two quarts at a time. When it gets older, increase the milk and feed only twice a day, at 12 months you have more corn left and you finish it up with eight or 10 pounds. If you keep it another year and undertake to finish it up, you have got to give it eight pounds; it will cost you a little more and you get more money. There is a stoppage of growth at weaning time in any event, and when a man has good cows it don't pay to spoil them to make any kind of beef.

Mr. Bradley—If that is so, why do the showmen showing beef yearlings always take three or four cows along to let those calves suck?

Capt. Arnold—Because they want the prize money and the reputation. So far as profits in beef making goes, very likely they are out of pocket. A calf will grow to be a bigger calf on three cows than it will on one; you have heard about that.

Question—Don't you think that an animal will lay on beef a great deal faster on grass raised on rich limestone land, such as you have, for example, than it will on grass grown on our sandy land in this northern part of the state?

Capt. Arnold—Well, I think if a man has studied the geology of the state of Wisconsin, he will notice down in the southwestern part of the state, near Platteville, there is limestone land and they raise the best cattle in the state of Wisconsin, and they raise fine corn, too. The proof of the pudding is in eating it. We do not generally raise as good beef cattle in other parts of our state. Limestone land is considered the best land to give good development to animals and also for plant growth.

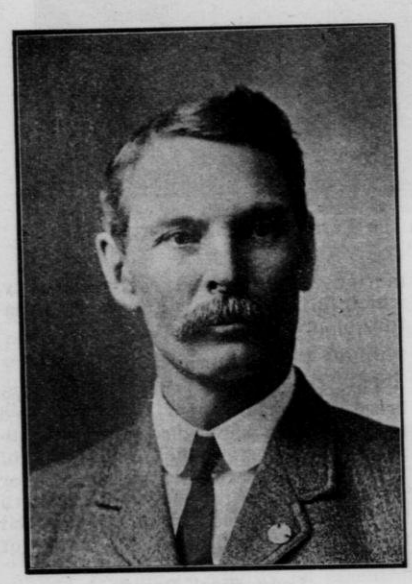
Question—In other words, don't you think that dairy cattle will do better on our sandy land than beef cattle?

Capt. Arnold—Why, yes, but that isn't the question at issue. The dairy is all right; if I did as well at it as you do I would stick to it. The question we are considering is whether it is best

and profitable as compared with other cattle with long feeding. I would not like to be considered so narrow as to not concede that under some conditions longer feeding might pay as well, where lands are cheap and hay and grass plentiful and cheap also. Neither does my paper contemplate proving that making baby beef pays better than dairying or raising horses for the market. It seems strange to me that so many farmers are so in love with themselves and their ways of making money that they are not satisfied to let a man make money in any other way than their way. Some men succeed best with the dairy, some with horses, sheep or hogs as the specialty. We are not all cast after the same pattern, but I would like to leave this impression, that liberal feeding to young stock ordinarily pays best and makes a man vastly more contented when his stock is thriving and doing their best for what they are fitted for.

EARLY MATURITY OF SHEEP FOR MARKET.

R. E. Roberts, Corliss, Wis.



Mr. Roberts.

From the earliest history sheep have been closely associated with mankind. At the time of the birth of our Savior "there were shepherds abiding in the field, keeping watch over their flocks by night, and lo! the angel of the Lord came upon them, and the glory of the Lord shone round about them," so you readily see in what high esteem the shepherds were held, that they were made the messengers of this wondrous tidings to man. I deem it is more honorable to be a good sheep grower than to be at the head of a corporation trust. A good sheep grower highly esteems his occupation and to be successful he must be faithful, honest, and careful for the well doing of every sheep in his flock.

The first record of sheep we have is of the fine wooled variety, the ancient merino of Spain, from whose wool the ancient Romans made their garments, even their imperial robes. At that early age the flocks supplied the people with food and raiment. Thus it is worthy to note the inseparable and necessary relation of sheep to mankind, as nothing can be effectually substituted to take the place of wool. These ancient sheep were the progenitors of the merinos of the present time, as the so-called Rambouillet, American Merino, and the various classes of sub-breeds of merinos. While possessing large, well developed bodies of fair mutton qualities to meet the demands of the butcher, their prominence is given to the quantity, quality and value of their fleece, which is their principal point of excellence, but confining myself to practical

sheep growing, the production of high-class mutton is the principal consideration. To excel in this, we must turn to the native breeds of Great Britain. In describing these various breeds grown by our breeders, they all have merit, and are noted for their excellent mutton qualities and producing a valuable fleece.

Southdowns.

The Southdown is accepted as the aristocrat of mutton sheep, not for its size, but for its smoothness and plumpness of body and sweet, tender and juicy meat. The quality of the lambs of this popular breed always command the highest price in the market.

Suffolks.

The Suffolks are similar to the Hampshires, of good type and conformation and size, of good mutton qualities, but as yet have not become very numerous.

Oxfords.

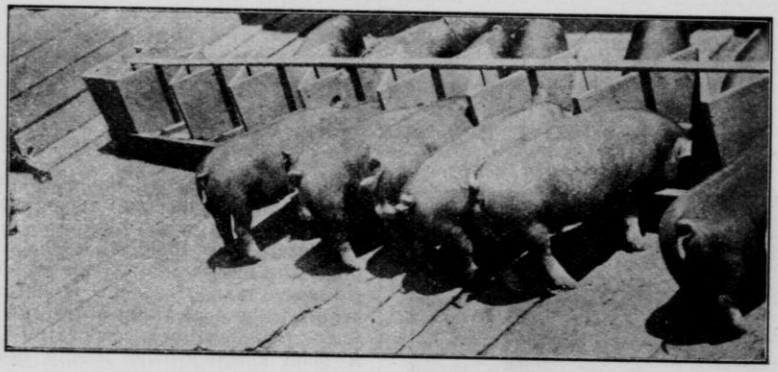
The Oxford Downs are the largest of the down breeds of sheep and are noted for their superior mutton qualities and excellent quality and wealth of flesh, being very popular, and for a profitable sheep are in great favor wherever grown.

Dorsets.

The Dorset Horned sheep is a white faced breed, a native of the mild climate of southern England. This breed has become exceedingly popular for its fecundity and with right management two lambing seasons a year are possible; no other breed of sheep is so prolific. It is thus a useful sheep for rearing lambs for the markets at the holiday season; however, to breed the ewes to a Southdown sire will greatly enhance the quality and value of the market lambs.

Shropshires.

The Shropshire Down shares in part the popularity of its chief progenitor, the Southdown, is a little larger in size, of good conformation and a hardy sheep. This breed is very numerous and in great favor for its excellent mutton qualities and early maturity, which in these days is an essential feature of profit.



Sanitary Pig Trough in Use on the Farm of R. E. Roberts.

Hampshires.

The Hampshire Down is a cross breed, its origin also being founded from the Southdown breed. Its hardiness is unquestionable. They are of large size and are held in great favor for their ability to make quick growth to a salable weight, and their good feeding habits and excellent quality of mutton.

Long Wool Breeds.

The Cotswold and Lincoln are the most recognized and are the largest breeds, full of quality when properly finished, when both flesh and fat are uniformly and evenly covered over the entire body, and their fleece is highly valued for its excellent quality and long fiber.

There are various other breeds and varieties of sheep, but the afore-mentioned are the most popular at present. As to breeds which are regarded as best, I cannot advise; however, can say the black faced breeds meet with most favor on the markets and are sought for by the buyers, but each stockman must decide for himself which class best suits his fancy and conditions. I would not advise the farmer intending to grow sheep for the market to buy pure bred ewes, but secure a flock of good grade ewes of uniform type and quality to build upon, then by securing a pure bred sire of one of the mutton breeds of his choice in a few crosses he has been supplied that goes to make growth, flesh and fat in any young animal. When the food supplied is only sufficient for maintenance in an animal, there is no gain in weight, simply for the reason that nothing to make growth or weight has been furnished. This explains why lambs, or any young animals, do not make proper growth, and, like lost time, the loss from this cause can never be regained, therefore it is an undisputed fact that judicious and generous feeding is the very foundation or basis for early maturity and profit in growing sheep, or any other class of live stock. With this fact always in view, there should be no necessity for

Part of R. E. Roberts' Ewes on Clover Pasture.

will have a flock for all practical purposes, if bred along one line, equally as good as pure breds, as great improvement and results can be accomplished by grading up our flock and herds.

Proper Feeding as Essential as Good Breeding.

While good breeding is of great importance in our sheep, as well as all other classes of live stock, to determine the profit or loss in growing them, proper feeding is equally as essential, from birth of lamb to market, or during the first year, as this is the important time to determine its value or future usefulness to its owner. However, all food does not go to growth, there must be the food of support, and it is only the surplus given that can be assimilated after this vital necessity complaints often heard that it does not pay to keep sheep.

A Good Ration.

As to the most desirable kinds of feed to be used for a grain ration, variety is the best. We know this from our own experience, as we soon tire of a sameness of diet, it is also true of our farm animals. When a variety is supplied, more food is consumed and the better the digestion. I have found that an equal amount of crushed corn, oats, wheat, bran and oil cake best suits the taste and requirements of the lambs and gives good results as to growth, gain in flesh and fat, as the latter quality is especially demanded in the early market lamb. I would then increase the crushed corn to the limit that it would be relished, for a handy, fat

lamb is far preferable to a lean one of much larger size. But where the lambs are to be carried through the summer for feeding the following winter, then good size, growth and stamina are desired. In that event, I would cut out the corn from their ration for best results. But they should be fed this grain ration, as there is no time in an animal's life when as great returns will be given for food consumed as when suckling its dam. It will pay the owner

ton for cash. Mutton as a human food has gained a high reputation. The demand for choice mutton and lamb is constantly increasing and there is no danger of an over-production of a choice article. The range countries of the west are being rapidly taken up by actual settlers and the time is not far distant when the farmers must supply the mutton that is now produced on the ranges. As Wisconsin stands at the head for the production of choice,

Two of R. E. Roberts' March Lambs. One on Left Weighed 79 lbs., on Right, 82 lbs., at Three Months.

50 per cent more profit on value of grain consumed during that time than later on when older.

Wisconsin as a Sheep Growing State.

There is profit in a flock of good sheep when the actual cost of feed consumed is charged. There is no animal that will give so great a profit, pound for pound, as sheep, and the farm will be better, cleaner and more fertile for their being upon it. They are also valuable to clean brush land. While not equal to the goat, much of the small undergrowth will be consumed with a relish and converted into choice mut-

high class sheep and mutton, and has all the natural resources for the production of all the varieties of feed necessary for their growth and development, I believe the markets will look to our great commonwealth for their supply of choice lambs and mutton.

The Principles Underlying Successful Sheep Growing.

In closing, the fundamental principles underlying successful sheep growing are a genuine liking for good sheep and a well defined knowledge of what constitutes a good sheep; care and good judgment in selecting the best

pure bred sires, and continually culling out from the flock all that are past profitable usefulness; a generous and economical system of feeding from birth to market, for it is the lambs that are properly grown and finished that top the market at all seasons of the year and are mostly sought for.

I deem this the proper course for successful sheep growing, or any other branch of live stock growing for the production of high class meat and financial success.

With the Poet Burns.

"O bid him save their harmless lives
Frae dogs, an' tods, an' butchers' knives;
But gie them guid cow milk their fill,
Till they be fit to fend themsel;
An' tent them duly, e'en an' morn,
Wi' teats o' hay an' rips o' corn."

DISCUSSION.

Mr. Christianson—What do you feed your ewes in the spring to give plenty of food for the little lambs?

Mr. Roberts—Oats, bran and a little oilmeal; clover and timothy hay and corn fodder; or roots, or silage are a good addition to the ration, from four to five pounds per day.

Supt. McKerrow — Isn't that pretty heavy feed for a fresh ewe?

Mr. Roberts—It is to start with, but gradually increase to this, with the roots or silage, and decrease the grain ration.

Question—Do you mean to say silage would be good for breeding ewes?

Mr. Roberts — Yes, sir, those who have silos contend silage is good for them. I intend to build a silo for this purpose.

Question—How young will lambs begin to eat grain?

Mr. Roberts—At about three weeks of age. At about four weeks of age they will be eating fairly well, but you must provide a creep where the lambs can get to the grain and the ewes cannot.

Capt. Arnold—Will a lamb do better upon ground oats and corn and linseed meal than upon oats alone?

Mr. Roberts—Yes, sir.

Mr. Goodrich—Are whole oats better than ground oats?

Mr. Roberts—No, sir, we crush them at first when we are teaching them to eat. Later on, they will eat whole oats.

Capt. Arnold—How is it to mix corn and bran and oats together with a little oilmeal?

Supt. McKerrow—That is pretty good feed?

Question — How about Christmas lambs?

Mr. Roberts — I never have raised lambs for the holiday market. The Dorset ewes are very good for that purpose, they will raise lambs at that season of the year. I have raised lambs for the Easter market. They are more profitable than later, because the early lamb commands a great deal higher price.

Mr. Bradley — You are on a small farm and perhaps could not carry along these lambs until they are a year old as a man might on a larger farm.

Mr. Roberts—A man must take into consideration the distance he is from market for raising early lambs.

Mr. Bradley—And whether or not he has other stock to use up his feed.

Capt. Arnold—Won't a lamb generally, to get him on the market early, bring more dollars at 40 pounds than he will in the fall at 80 pounds?

Mr. Roberts—Yes, sir.

Capt. Arnold—Then what is the use of keeping him?

Mr. Roberts—You can get twice the price if you only keep his baby fat on and finish him for an early market.

Question — What do you generally get for a lamb at 10 weeks or three months old?

Mr. Roberts—Those early lambs that are marketed when they are from 10 to 12 weeks of age will weigh at that time anywhere from 40 to 50, and sometimes 60 pounds. We get anywhere from 10 to 15 cents a pound for them, some years 18 cents on the Chicago market.

Capt. Arnold—Explain the difference why one lamb weighs 40 and another 50 or even 60 pounds.

Mr. Roberts—A ewe that has reached maturity, or three years of age, in case she has a single lamb, it will be much larger than in the case of twins, and this extra size will be maintained to market. In the event an ewe has not a sufficient supply of milk for

twins, they should be furnished some cow's milk, preferably from a new milch cow. The object is to keep them growing right along from birth.

Mr. Scribner—How many sheep do you keep?

Mr. Roberts—Fifty to 60; ewes, as a rule.

Question — How many per cent of your lambs do you raise—of the ewes?

Mr. Roberts—Last year I raised 173 per cent; a year ago, 175 per cent.

Question—Where is your farm?

Mr. Roberts—In Racine county, eight miles west of Racine.

Question—How do you feed this milk from the cow?

Mr. Roberts—From a bottle having on its nose a rubber lamb's nipple, made for the express purpose.

Question — How much to a lamb where you have twins?

Mr. Roberts—What the lamb should have, not all he will take; you have to use a little judgment. With young lambs, an over-supply is hurtful and dangerous.

The Chairman—Mix a little brains with the milk.

Question — What breed are your sheep?

Mr. Roberts—Shropshires. But I do not claim that they are better than Southdowns or other mutton breeds.

Question—Do you ever feed separator skim milk?

Mr. Roberts—No, sir, whole milk.

Supt. McKerrow — There are some things that have to be taken into consideration, to my mind, in this matter of early maturity. The average size of the lambs at birth cuts some figure, because I find the largest lambs at birth are apt to be the largest lambs later on for some time. Then again there may be a difference in these breeds in their growth and development. The man who wants a lamb to put on the market at six weeks, weighing 35 or 40 pounds, in many cases does not want the same breed as the man who wants to put his lambs on the market at 10 or 12 months old. I hold in my hand a few figures that I compiled while in Colorado this winter from one of the English journals, when we were discussing this very question of early maturity as related to breeds. It is not all in the breed, by any means, but I will give you these as I have them. The Ontario Agricultural College for some years kept the weight of the lambs dropped there of the different breeds. Now, understand, they did not have a very large number of breeds, and a very small number of some of them, so that these figures may not be just as good as they should be, but they are figures. I read you the figures from the weights of 1885. In that year at birth the Cheviots averaged 12 pounds; the Oxfords, 11 pounds; the Shropshire lambs, 9½ pounds. One thing I wish to note right there is that these lambs did not weigh in proportion to the size of these breeds, the Cheviots being rather a small breed topping the list; the Oxfords, a large breed, being next. Then dropping down to the comparatively small breed, then up to the Leicestershire with 9¼ pounds. Then the Lincoln, said to be one of the largest breeds, with lambs nine pounds at birth; the Hampshire, nine pounds; the Southdowns, 7½; the Highland or Scotch Blackface, 7¼ pounds; the Cotswold, a large breed, yet the smallest lamb, 7 pounds.

Then another set of figures are those that I compiled from the list of the Birmingham Fat Stock Show, giving weights of the lambs of the different breeds with their age as shown by the records of that show. Taking them in the order of their weights or early maturity at these ages, we find the South Devonshire, long wooled, white-faced sheep, much like the Cotswold and Lincolnshire, or much like a cross between those two in general conformation, at 282 days old, an average weight of 244 pounds, that is less than a pound per day, you see. The next in the list are the Lincolns, at the average of 277 days, 226 pounds, average weight. Third on this list, another large breed, Oxford, at an average of 281 days, 219 pounds weight. Next another dark-faced breed, the Suffolk, average age 284 days, and average weight 220 pounds, and fifth on the list, the Hampshire, said to be a large, and by breeders of England claimed to be the most rapid growers, yet by these figures we find, 307 days, and 219 pounds average weight. Sixth in the list is the Romney Marsh at 240 days making 165 pounds, average weight.

You see the variety in the days, so

this cannot be taken as a positive determination of early maturity of these breeds, because these very old lambs could not keep up their gain as some of the younger ones, but it may be said to be a fair average along this line, and that is why I present the figures.

Mr. Roberts—It is quite true that those smaller breeds mature earlier and could be gotten on the market earlier, in better condition than those larger breeds.

Supt. McKerrow—That is not always true. It depends upon the individuality of that particular flock, but, as a rule, you might say that the coarser breeds on the same class of feed do not grow as much flesh young as the finer ones.

THE HORSE'S FEET AND LEGS.

L. P. Martiny, North Freedom, Wis.

Mr. Martiny.

Since the value of a horse depends largely, or even entirely, upon his ability to labor, be it light, speedy work or heavy, draft work, it is well that we devote a little thought to his organs of locomotion.

Every horseman knows too well the truth there is in the adage: "No hoof, no horse," and this may well include the legs. There are different reasons why we should give attention to and study the feet and legs of our horses. In the first place, the very nature of the use we make of our horses brings their feet and legs into action a great deal more than nature intended, thus causing a susceptibility to disease and derangement. Putting our heavy horses at draft work, or our light horses at light work, necessitates an over exertion of the feet and legs as compared with the demands we make on any of our other farm animals, and very naturally may we expect to see them giving out in one way or another as duty demands, or as their feet and legs are weak and deficient, and weakness that may have developed from one cause or another if perpetuated in our breeding operations will, if followed and supplemented by work which still further tends to develop that weakness, soon result in a fixed weakness or defect in our animals. We should bear this in mind and in the selection of our horses, either for work or breeding purposes, select those of that type, quality and conformation that have by many years and generations of experience given the best results without any detrimental effects to the animals. It is especially important that our breeding stock should be free from blemishes and defects.

The Legs.

In general shape we want our horses' legs straight. In the case of the front legs, if we were to drop an imaginary plumb line from the front of the horse where the leg is attached

to the body, we would like to see that line pass down the center of the arm, center of the knee, center of the cannon, center of the ankle joint, and through the center of the foot. Passing around to the side, we would like to see this plumb line, starting from the center of the shoulder, pass down the center of the leg, knee and ankle joint, but would like enough length and slope to the pastern so the line would fall at the rear or heel of the foot. Passing behind the horse and viewing the hind legs, we would like to see an imaginary plumb line pass down the center of the hind quarter, through the center of the gaskin, center of the hock, center of the cannon, center of the pastern and center of the foot, the same as in the front legs. Viewing this hind leg from the side, an imaginary straight line should pass from the rear point of the hip to the point of the hock and thence down the rear part of the leg.

We have, however, learned to observe our horses' feet and legs more minutely than this. In the first place we would like a different conformation of leg in a horse intended for speed than we would in a horse intended for draft purposes. In our lighter horses we should not care to have them show as much indication of great strength as in the draft horse, nor would we expect the heavy, strong leg of the draft horse to show much indication of speed.

We have learned in the study of simple machines that with levers we can lift different weights with a given power in just the proportion that the power arm is greater than the weight arm, but at a sacrifice of speed. We gain speed in just the proportion that the power arm is shorter than the weight arm and the power is lessened in the same proportion. Now we have in our horses' legs, so to speak, a set of levers; the tendons exerting the power and the resistance to the horse's body the weight to be overcome. In the case of the trotting or running horse, where we want speed without much regard for strength, we like to see a good length of cannon bone and not too much width of joint, while in the draft horse we like short cannons, comparatively short pasterns, with a good width of hock joint from before back. We say a wide hock from before back indicates a strong puller, while the opposite denotes more speed and action. This, however, is theory, for while the different structure of legs as I have mentioned is indicative of strength or speed, we cannot take a tape string and measure a horse's leg and say he can pull a given amount, or go at a given rate of speed.

Other Things to be Noted.

Build of horse, muscular development, training, temperament, heredity and disposition of animal have a greater influence, but there are other qualities that we should note in our horses' feet and legs.

Commencing at the bottom of the foot, I like to see a concave shape, strong, thick walls to the foot, a good development of frog to act as a cushion and to give spring to the animal, well-developed bars to act as braces to the foot. In general shape, the fore feet should be nearly circular, with the hind feet a trifle elongated. The toe should be about twice the height of the heel. The pasterns should not be too short and should stand at an angle of about 45 degrees. The reason we like to see them sloping is because it gives the horse more spring to its action, he will not tire out as easily, and is less liable to blemish. In the case of a straight pastern behind, the horse is inclined to knuckle over when at heavy pulling, and this is liable to develop into a cocked ankle. Cannons should be short in the draft and heavy coach horse, with tendons set well back, giving the leg a flat appearance. The knee and hock joints should be of good size, but free from any coarseness. They should be smooth and standing square, neither turned in nor out, and not too much of an angle in the hock joint. The fore arm and gaskin should be of fair width from before back and very muscular.

After noting all this, there is one more essential thing and that is quality. We like to see these legs covered with a fine growth of hair and the legs free from all meatiness or coarseness, indicating a strong, flinty bone and a good quality of tendons without much liability to blemish. Horses with a coarse growth of hair on their legs are usually associated with more or less

Good Type of Draft Horse Pasterns.
"Moderately Sloping."

Sound, "Open" Hoof, Showing Wide Heels, Prominent Frog and Strong "Bars."

x A Prominent Sidebone.

xx Splints.
Bad "quarter crack" on right foot.

Photos from Bulletin 127, Wis. Exp. Sta.

meatiness and coarseness. Such horses are liable to scratches, stalked legs, poor quality of feet, and more liable to blemishes.

Care of the Feet and Legs.

In the care of our horses' feet and legs, we should see that they are kept cleanly enough to not admit of any disease, such as thrush, grease heel, etc., which are often caused by allowing the horse to stand on an accumulation of fermenting manure, or wallow in a muddy yard that contains more or less manure.

The feet of the growing colt should be watched and if they do not wear evenly the elongated portions should be pinched off. Allowing the feet to grow out of shape causes an uneven pressure on the joints and parts above and has a tendency to develop ring-bone, spavins and sidebones.

Shoeing the Horse.

As the horse grows to maturity and is put to work, it often becomes necessary to shoe him. There is, however, a very large proportion of our farm horses to which shoes are by no means an habitual necessity. The nature of the work, the pace at which they are required to perform it, and the character of the ground over which they ordinarily move, all unite to render artificial protection of the feet, save in exceptional cases, altogether unnecessary. When this is true and when it is conceded that shoeing is, even under the most favorable circumstances, an evil, a frequent cause of disease, and therefore a direct source of loss, it is a matter of deep regret that such a large majority of our farm horses should be needlessly subjected to a mutilation which shortens the period of their efficiency and too often renders their life thus shortened one long continued agony, for it must be borne in mind that our ordinary village blacksmith is not always the most competent of workmen. Without wishing to do any injustice to our knights of the anvil, it is, nevertheless, a lamentable truth that these wielders of the rasp and knife are so wedded to a number of traditionary practices so heinous, so irrational, so prejudicial to the interests of the horse, that one might wonder whether their mission were not to mar instead of protect the foot. Ignorant alike of the anatomy, physiology and relations of the different parts, they mutilate, they cut and carve as whim, prejudice or time-honored custom indicates.

Some Things to be Remedied in Shoeing the Horse.

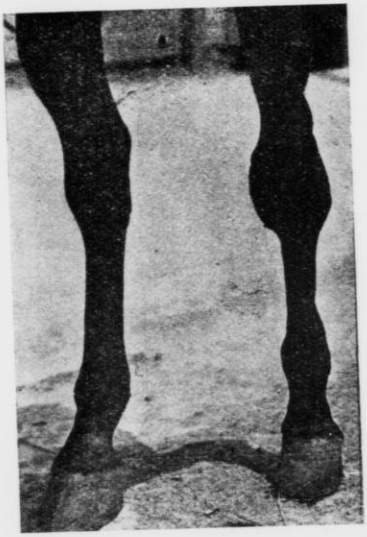
Foremost among them is the insane habit of trimming the frog and thinning out the sole till it visibly yields to the pressure of the operator's thumbs. The frog is nature's cushion; by its elasticity it wards off concussion from the less elastic portions of the foot. Only the ragged portions of the frog should be trimmed out. The frog should be left in such shape that it will fulfill the mission which nature intended for it. The farrier, having destroyed the frog, next turns his attention to the sole, which, by all tradition of his craft, must be pared down until only a thin film of soft, partially formed hoof is left to protect the living structure within against bruises and injury. Nor does the mischief stop here. The sole itself, or what is left of it, consists of soft, moist, half-formed horn which dries and shrinks on exposure to the air, and thereby entails a further and a still more serious injury to the foot. Only the loose portions of the sole should be removed. The horse grows new soles to his feet just the same as he grows new hair and when portions of this sole become loosened and ragged they should be removed, but the new firm sole should not be pared down. After the shoe is nailed on, the ordinary farrier has enough pride in his work to want to make his job look neat, so he rasps down the foot, and to give it a few finishing touches he rasps off the outer hard, smooth layer of natural varnish which is intended to retain the moisture in the foot. There are other specific objects in shoeing than to protect the foot, but it is not my purpose to discuss them, as they belong more properly to the veterinarian.

I believe farmers should give the matter of the shoeing of their horses more thought and dictate to their blacksmith how they want their work done. I believe, however, that great good

Prominent Ringbone on Pastern.

Unsound Hock Joint Showing Large Curb.

Crooked or "Sickle" Hock.



Unsound Hock Joint Showing Bog Spavin, Etc.

Photos from Bulletin 127, Wis. Exp. Sta.

would come in the protection of our horses if such legislation could be enacted as would require the ordinary blacksmith to know and understand something of the structure, anatomy, physiology and function of the different parts of our horses' feet and legs.

In the meantime, let us look well to the quality of feet and legs we are breeding on our horses and the care we give them, that we may not have ourselves to blame for any shortcomings in our horses and the profit we gain in the rearing of our horses.

DISCUSSION.

Question — Please explain the location of the different levers.

Mr. Martiny—When a horse is pulling very hard, the strain is nearly all on the hind legs. You have all noticed that when a horse gets down to pulling very hard, he will stand with the knees bent, with simply the toes touching the ground, showing there is very little pressure on the front feet. The strain is nearly all on the hind legs. Now, we like to have a wide hock, because it gives a stronger formation. The joint is a case of the lever and fulcrum. We have a greater distance from the fulcrum to the power than from here to where the weight comes, which is the friction of the horse's foot on the ground. If we have a narrow hock and a long cannon, that horse hasn't as great power as if he had a wider hock and a short cannon.

Mr. Goodrich — Do you care about the color of the hoof, whether dark or light? I have heard a great many say they would not have a horse that had a light colored hoof.

Mr. Martiny—I have heard that remark made, but I never saw any difference.

Mr. Goodrich — Why is it that a horse's front feet wear out before the hind feet?

Mr. Martiny — You see nearly two-thirds of the heft is on the front feet and the greater amount of concussion comes on the front feet.

Mr. Goodrich—How did you ascertain that the front part is a good deal heavier than the hind part?

Mr. Martiny—Anybody can see that by looking at the horse. Even without the head and neck, he would be as heavy before as behind.

Mr. Goodrich—Did you ever weigh one?

Mr. Martiny—No, I never did. Did you?

Mr. Goodrich—I have, sir, and my experience is it is pretty near equal in weight. Now, can you tell us why you claim that when the horse is pulling the heft is mostly on the hind part?

Mr. Martiny — Because right down here, when this horse's feet are on the ground, is where he is exercising the power, but the tugs are attached way up here, and that has a tendency to pull him off his front feet. The draft he exercises in pulling throws the heft off his front feet.

Mr. Goodrich—How is it, then, that the horse's fore feet get broken up more than the hind feet?

Mr. Martiny—It is not done in the pulling; it is because there is more concussion on the front feet than on the hind ones, he is more heavy in front. If he was pulling all the time, of course the hind feet would get out of condition quickest.

Mr. Goodrich—Won't a horse's front feet contract more standing on the ground than his hind feet?

Mr. Martiny—I never noticed that.

Supt. McKerrow—It is a fact that we have trouble from contraction more in the front feet than the hind feet.

Mr. Martiny — Perhaps the reason for that is that the front feet are usually standing where it is dry, while the hind feet stand where it is more moist.

Mr. Rietbrock—Don't you give some consideration also to the fact that the front leg is straight up and down in the knee joint, as against the hind leg which is angular? I should give a good deal of weight to that. I do not agree with you that the front part is heavier than the hind part, because there is more weight in the hams than in the shoulders.

Mr. Convey—Referring to this matter of the contracting of the front feet, I think that is largely where the shoeing is not done right. You do not find contracted feet in horses that are not shod.

A Member — I have seen contracted feet on horses that had never had a blacksmith touch their feet.

Unsound Knees.

Unsound, Crooked Fore Legs.

"Wind-Galls" and Thickened Back Tendons.

Unsound "Cocked Ankles" Causing "Knuckling."

Photos from Bulletin 127, Wis. Exp. Sta.

Mr. Scribner—I think it is a fact that the knee action is harder than the hock action, and they strike harder with the front feet.

A Member — What is the cause of sidebone, and how is it cured?

Mr. Martiny—Sidebone is a disease that comes on a horse on the outside of the front foot just above the hoof. There is a cartilage there, probably used to give somewhat of a spring to the heel. In a healthy horse, you place your finger there and you can spring that cartilage, but sometimes that turns into sidebone. In young growing colts, if the feet turn on the outside, it causes inflammation, a bony growth is thrown out, and we have sidebone. Then again, a horse may become bruised there by another horse stepping on him, or something, in the field, and it causes sidebone. The sidebone may not do any particular harm where it is soft, around on your farm, but when you get that horse on frozen ground or in the city, he gets lame. We cannot treat it any more than any other bone disease. All we can do, is to put on some kind of irritating liniment and irritate it and bring the blood there. It is like bone spavin.

Question — Cannot you cure bone spavin?

Mr. Martiny—No, all you can do is to put on some irritating liniment and get those bones grown together and your horse goes without laming. He goes with a little jerk, but not lame. You can take it off so it gets smooth to the outside, but if you will dissect it you will find they have grown together, I think.

Supt. McKerrow — You know it is only a few years ago that we began to discuss this question of sidebone in the United States. Those foreign people that came across the water to buy our draft horses about 1891, 1892 or 1893, were the fellows that brought out this sidebone, because they were buying for the pavements of the great cities, and they did not want horses that had that sidebone, because they would get lame. About that time, or a year later, out at the Nebraska State Fair, a friend of mine was doing the judging, but he was too far from Chicago, he had not been dealing with these fellows, had not got onto the sidebone idea. He placed a horse in the draft ring that had a sidebone and the exhibitor whose horse was second put in that objection, and the judge said: "You must be mistaken, there is no sidebone on that horse," and he walked back to the horse in question and began to feel along his ribs and he said: "You are wrong, there is no sidebone there." We are now getting to know where the sidebone is,—down on the heel.

HORSE BREEDING ON THE FARM.

David Imrie, Roberts, Wis.

In rearing live stock, we should always look to see whether our farm is suited to the class of stock which we prefer to breed and raise, and the market demands, if we are to make money in stock breeding. The United States government report a few years ago classed Wisconsin horses as 24 per cent higher than those of Iowa and Illinois, and 56 per cent higher than those of Kentucky. Dr. A. S. Alexander, whom most of you know, says: "Wisconsin, as a state, offers an unexcelled breeding and rearing place for the production of active, sound, healthy and hardy horses. The soil being rich in mineral matters, produces foods endowed with the constituents necessary for the perfect development of strong bones, tough hoofs, dense tendons and powerful muscles. The drinking water is plentiful, pure, cold and full of wholesome mineral salts. The atmosphere is bright, bracing, pure with the oxygen requisites for lung-developing and blood-building, while abundant sunshine benefits plants and animals alike. Feeding materials are everywhere grown in abuundance and, being rich in protein and earthy materials, are especially fitted for perfect frame development. In short, we possess in Wisconsin every necessary factor for successful horse-breeding and intelligent, concerted action on the part of our farmers toward the general production of animals of uniform type and quality would soon give us a leading position in the industry."

Three Farm Chunks.

There were more three and four-year olds, broken to harness, sold on the Chicago horse market last year than any year in its history, showing the demand was greater than the supply of good work horses, as the market wants those older than four-year olds, so there is a good prospect for good prices for some time to come. Having these things settled, we will turn our attention to the breeding and rearing of horses on the farm for a few minutes.

The Most Profitable Type for the Farmer.

Very few farmers ever make a success of breeding and rearing trotting horses, that is, they never get the big money that such horses occasionally bring. It is the trainer or the man that develops them that makes the money, and most farmers have neither the time nor skill to train such horses. And again, there is only one in a great many that bring the big prices. If they haven't the speed, they sell comparatively cheap.

Then there is the coach or heavy harness horse that sells very well, providing he has quality with style and action. These horses will sell in pairs, so they must be well matched and nicely trained, accustomed to the sights and sounds of the city, such as steam cars, street cars, automobiles, etc., so that they are perfectly safe when hitched to the family carriage. On the farm they do not see such things and therefore will not bring the big prices until they are educated.

Taking all in all, I think the draft horse is the most profitable one for the farmer to raise. The term draft applies to horses weighing 1600 pounds or more, but a good many horses that are put on the market in working order, or in thin condition weighing 1500 pounds, or even 1450 pounds, could be made to weigh 1600 pounds or more if properly fitted for market, so have them fat when they are ready to sell. The larger the horse, if he has quality, the more he will bring. Those weighing from 1300 pounds up to draft weight are called chunks and sell fairly well, but not with the draft class. So in breeding, we should select our best mares, of good weight and quality, having feet and legs such as Mr. Martiny has described to you, and breed them to a good horse.

Farm Horses at "Bonnie View," Farm Home of D. Imrie, Roberts, Wis.

When you find a horse that breeds well with your mares, use him right along as long as you get good colts, and you will have a lot of colts of the same disposition, conformation and color, so that you can match up teams, for it takes all three of these to make a perfectly matched team. You can sometimes put a three-year old and a four-year old, or a four and five, or a five and six-year old together and mate them up better, as a nicely matched team always brings a little more money than if not matched, but the least de-

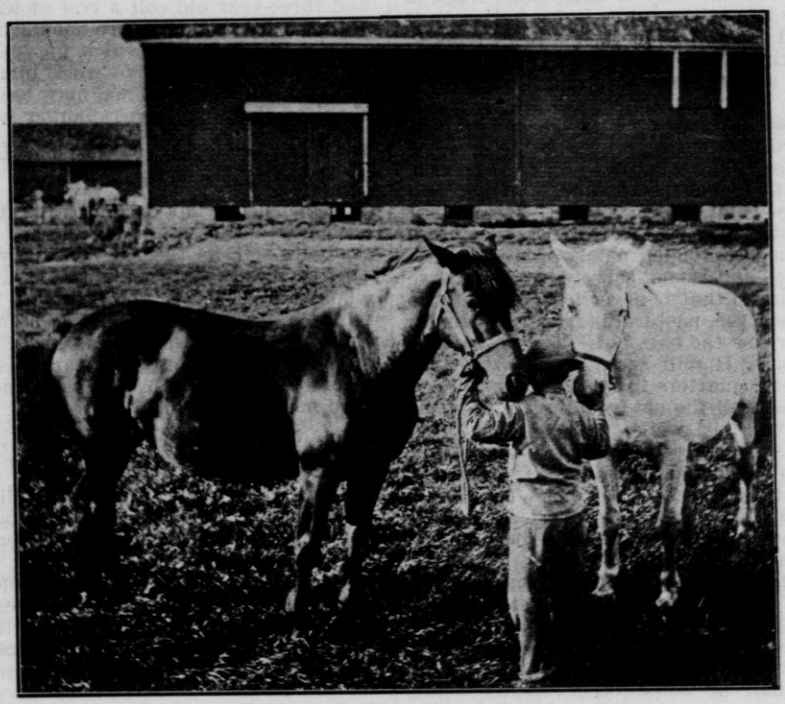
fect in a matched team is color. After all, there is no bad color for a good horse.

Caring for the Brood Mares.

The brood mares, in fact all horses and colts that are not at work in the winter, should be turned in a good-sized yard every day, unless it is stormy. This yard should not be icy, as there is danger of them falling and getting hurt. We stable all our horses and colts nights and feed them twice a day oats and clover hay with some bran.

When spring comes, be careful with the brood mares and any other horses that may have been idle during the winter. Work them lightly at first, taking some time to get them used to the work. In this way you can do more work and have your horses in better condition when you are through with the spring work.

I prefer to have the colts come about the first of June, as by that time we have our spring work done and can give the mares a better chance. Have a clean, roomy, box stall—it is well to whitewash it every year and disinfect it with zenoleum, or some other good disinfectant. Be on hand when the little fellow appears. Feed the mare lightly for a few days, increasing her feed gradually. If you have to work the mare, never let the colt follow her. Keep it in the stable and bring the mother in in the middle of the forenoon and afternoon to let the colt suck. The colt will soon learn to eat oats with his mother. Give him all he will eat twice a day, or leave the lid of the oat box open and let him help himself. If the mare and colt are on pasture, feed her night and morning, so the colt will learn to eat oats. When we want to wean them they are eating oats and



There is no Bad Color for a Horse.

hay and they do not get a backset. I have seen farmers let their mares and colts run on pasture alone and when they wanted to work the mares would shut the colts up in the barn, where they would worry and fret, and not knowing how to eat oats would get a backset that they would never get over.

Training the Colt.

Weaning time is a critical period in the life of the colt. Put a halter on it and tie it beside its mother at night, letting it run with her in the day time for a few days, then wean it altogether, but do not keep it tied in the stable all of the time. Give it a box stall or yard, or better, a pasture with some other colts, yearlings or two-year olds, that it is acquainted with, and it will grow right along. Feed it well the first winter, give it the best hay you have, some corn fodder, plenty of oats, a little bran and some carrots, if you have them, so that it never loses its colt fat. After the pasture is good, gradually decrease the oats until it is on pasture alone. It will grow fast and go into winter quarters in fine condition. Feed them well the next winter; in fact, we always feed well.

I have heard farmers say that if you wanted a good, tough horse you should let them rough it out doors in storms, with little or no grain. I have seen some of these colts and the only toughness I could see about them was their looks; they did look pretty tough.

I like to break these colts to harness in the winter or spring before they are three years old. Hitch them up with their mother, if she is a good, steady animal, or some other steady horse that they are acquainted with; work them lightly until they become accustomed to the work. Never work a colt until it is very tired. Some seem to think you should tire them out the first time you hitch them up. Do not do it, you may spoil them altogether. Do not break them, but educate them, and do not try to educate them all at once as the old Dutchman did. He had his colt broken to ride and he wanted to get it accustomed to sights and sounds, so he told his son Hans to go behind the straw stack and when he rode by to jump out and say "boof," so Hans went behind the straw stack and when the old man and colt came along did as he was told. The colt gave one bound and left the old fellow on the ground. He got up, rubbed his shins and said: "Mein Gott, Hans, you make too big a boof!"

Most of us are trying to do the work on our farms without enough horses; we had better have an extra horse, or three-year old colt. In this way we can change horses and give the brood mare and three-year old colt a rest at times, and if a horse gets a sore shoulder we can let him rest and heal it up, whereas, if we are obliged to work him all through spring work, we may have a shoulder that will always bother us.

The Main Essentials of Profitable Horse Breeding.

Remember what I told you about having your horses fat when they are ready to sell, as the fat horse always sells the best. Feed them good, healthy, wholesome food, but no drugs. In fattening a good deal of corn can be used with oats, oilmeal and some roots.

By following these rules and breeding good horses, we have always found good money in them.

DISCUSSION.

Question—How would it do to have the colts come from the 15th of March to the 15th of April, before the spring work commences?

Mr. Imrie—I have always found I could do more work with the mares to have them foal after spring work than before. September colts are very good.

Question—Have you fed skim milk to colts?

Supt. McKerrow—Skim milk is one of the best things to keep a colt growing the first two months after weaning.

Mr. Convey — Do you mean sheep's milk?

Supt. McKerrow — No, sir, I mean cow's milk. Keep that man Convey down, Mr. Chairman.

Question—Can you grow a colt too fast?

Mr. Imrie—I never have. I want to grow them as fast as I can on good, wholesome food with plenty of exercise.

A Member—We have never had better colts than those fed on skim milk

up to eight months old. Of course, we don't want to over feed them any more than you do a calf.

Question — At what age would you wean colts?

Mr. Imrie—We wean our colts in the fall when they are dropped the first of June; we wean them about the time we commence plowing. I let them run with the mares until we need the mares, along about the middle of September.

Question — How do you dry the mare?

Mr. Imrie—We let the colt suck occasionally, just to finish up, after we milk out what we can.

A Member—Supposing you haven't any box stall and have a mare coming in, would you rather have her in the pasture or in the barnyard?

Mr. Imrie—In the pasture, if it is warm enough.

Question—Where you have two colts in the same stable and feeding them the same food, what is the cause of their not keeping in equally good condition?

Mr. Imrie—Oh, there's some difference in the digestive apparatus.

Question — Is silage injurious to brood mares?

Mr. Imrie—A little won't hurt, we don't feed much. I think a little is pretty good before the colt is born.

Mr. Goodrich — Silage has proved good for brood mares before they had the colts and after they had the colts, no better food for brood mares. I found it so on my farm and other people have found it so.

Question — Are potatoes good for brood mares?

Mr. Imrie—Potatoes are good for all horses, a little. I couldn't tell you just the number of pounds, but a good, big, double handful, after they are cut up, two or three times a week.

A Member—Ten pounds a day won't hurt them.

Mr. Rietbrock—About silage, while we find it good, I wouldn't like to see any man feed his horse as much silage as you would a heavy milking, dairy cow. A limited quantity is good.

Mr. Goodrich—Twenty pounds a day for a good-sized mare is all right and good for her to have.

Mr. Imrie — About half what you would feed a cow.

A Member—Do you like timothy hay for working horses better than clover?

Mr. Imrie—No, we never feed timothy hay. We have clover hay and feed horses and all our stock. We have a mixture of alsike, red clover and timothy.

Mr. Convey — Do you say timothy hay is not good for horses?

Mr. Imrie—It is all right if you cut it early and it is dry and clean.

Mr. Rietbrock — The less you feed your horses of it, the better, is my experience.

A Member—Will early cut timothy give your horses heaves?

Mr. Imrie—No, not unless you give them too much.

Question—What is the objection to timothy?

Mr. Imrie—No objection, if it is cut early; if it is cut late, it is woody and hard to digest. It is constipating in its nature and there is small feeding value in it.

The Chairman—Why do some folks pay three or four dollars more for it than for clover hay?

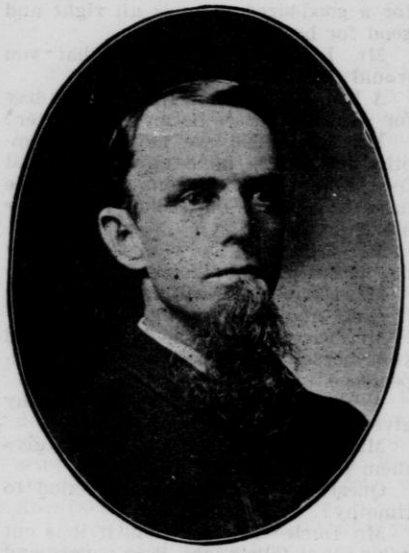
Mr. Rietbrock—They do it because they are in the habit of doing it.

Mr. Matteson—What do you think of corn for brood mares?

Mr. Imrie—I think they are better without corn. If they are working hard, you can feed quite a little corn in the winter, if they have clover hay and bran.

FARMERS' ORGANIZATIONS.

Geo. B. McGilvra, Baraboo, Wis.



Mr. McGilvra.

When I speak of farmers' organizations, I do not necessarily mean those of a fraternal nature, but any kind that is intended to benefit the farmer or better his condition. Generally they are some kind of a society with some form of initiation ceremony wherein certain signs, signals and salutations are used by which members may know each other. I have been a member of two such. The Grange, one of the best organizations ever in existence, flourished for a time, then dwindled and now in the so-called west we hear but little of it. In the east it is still in a very healthy condition and growing in membership and influence. Then the Farmers' Alliance sprang up and swept over the land like wild fire. This for a time promised relief to the farmer and in many instances much good came of it, but finally some of its members had a vision or revelation that they were born to lead their fellowmen to happiness and prosperity by way of our legislative halls, and the Populist party was born. Soon the F. M. B. A. was offered as a cure-all for every ill with which the farmer had to contend. That seemed to have been the best of all, for it died young. In the south, they had the Agricultural Wheel. So far as I know, it was confined to a few states and I should judge was not built for rough roads, for it did not last long. There are and have been others, but they were of a local nature. Though these all did much good, yet they were in a large measure disappointments. They started at the wrong end of the proposition. Instead of attempting to raise its members to the higher level of other lines of business, they in many cases attempted to pull the others down to their level. That is, in the matter of buying and selling, instead of setting a price on their products, which, by the way, are the life of the people, (food and clothing) they attempted to tell the other fellow what prices he must accept for his commodities. In a measure they for a time succeeded. Now, what happened? The manufacturers and dealers in farm products and supplies organized, and through various forms of combines and trusts they today practically dictate and control prices of nearly every commodity. What is the remedy?

There is an old saying that to "fight fire, we must use fire"; in fact, we must combine and work together in such a manner and in such numbers that we can control our income, that is, the price we are to receive for our labor in the form of the products of our farms.

Do I believe in these organizations? Yes. I was a charter member of the first Grange in Sauk county and retained a membership so long as there was a Grange in our vicinity. While living in the Dakotas, I was a member of the Alliance. Now I am an active member of still another. I deplore the need of them, but such are the condi-

tions of the times, I feel that as matters are now conducted, it is only a question of time when a mere handful of men will control all lines of business. Some say we must seek relief through legislation. That has been tried with poor success. A beneficial law may be passed, but so well laid are the plans of the combine that in many cases, I may say in most cases, the laws are rendered inoperative. I represent an organization that I believe offers more relief than any, or all with which I have any acquaintance.

The American Society of Equity.

The American Society of Equity was organized in December, 1902. It has several hundred thousand members; has local and county unions in every state, also Canada and Argentine Republic. It has three great aims and objects:

1st. To determine a profitable minimum price for all farm products. This will be done by having reports from the local unions sent to the national union during the growing season, giving the acreage, condition and prospect for all crops growing in that vicinity. Experts at the proper time will pass on these reports and compare them with previous years, and it can be readily determined what price we ought to receive for our products. This price is for the year, so there will be no advantage gained by selling early or holding late. But, says some one, this will cost a lot of money. True, it will cost something, but not so much as is now paid for securing such data. The farmer will do the reporting, and not the man who rides through the country in the palace car taking observations from the car window, with an occasional stop at some of the large places where he may consult with some one who is anxious to draw people's attention to his particular locality by reporting bumper crops, no failures, cheap lands.

2d. To not sell products of standard quality below such established price. You will notice I emphasize the word standard. Our farmers need much educating along that line. The temptation is great to try and work off some of the inferior by mixing with the superior, hoping thus to obtain an advantage. The expert's conclusions will be published in the official paper, also the price which it is thought we should receive. No one has pledged himself not to sell below such established price, but we think if we can get our farmers' attention turned in this direction, we can assure them that they are entitled to, and if rightly managed, they will receive such price, and there will be little trouble about cutting prices.

3d. To sell all the buyer will take at the established price, and stop selling the moment he refuses to pay this price.

There is the whole secret exposed to the public. Can this be done? Yes, it can. In localities where some special crop is grown, it has been done, and I know of no reason why, if the farmers will come in and join us, that it cannot be done everywhere and with all our products.

Some of the Benefits of This Organization.

Now, what benefit can be derived from this movement during the formative period? This is not a secret society, all are welcome and are urged to attend our meetings. One of the benefits is in the matter of advertising. One of the orders of business comes under this head, Has any member anything he wishes to sell? In our Union I recall numerous instances where it has been worth much more to members than the cost for several years. But, says some one, you interfere with the business of your local papers. No more than we would if we stood on the street corner and asked those passing if they did not wish to purchase. Then it is easier to sit in a comfortable hall and do this business than to get a lean on some building or telephone pole and do it. Further, so far as my knowledge extends, there is but one paper in the world, and that is our official paper, that has printed one word in our favor, and some have refused to do so when asked, even when an article was prepared.

Another order of business is just the opposite: Does any member wish to purchase anything that might be had from another member? In the matter of securing hired help, seeds, trees or plants, or in the purchase of feed, etc.,

by clubbing orders, better rates and terms can be secured. In fact, there is no end to the benefits to be secured through some kind of an organization.

Then there is the social feature, which I consider by no means the least important. Here we meet regularly, and if no business of importance is at hand, or if such has been disposed of, we can spend a time in social chat or discussions of various subjects pertaining to our business—in fact, a miniature Farmers' Institute.

That reminds me that some of our people are in a measure opposed to the work of our Institutes, claiming what is only true in part, that through their teachings the amount of farm products will be increased, rendering competition greater, thus having a tendency to cut prices. I have no great fears from that source. Our population is increasing faster than the increased production caused by the teachings of the Institute workers. More than that, the population of the cities and manufacturing centers is increasing, while the population of the rural districts, or the producers, is decreasing. At the beginning of the 19th century, the rural population was about 95 per cent of the whole; now it is about 65 per cent, and at the present rate of decrease it will soon be but 50 per cent of the population of this country. Anything that the Institute people can say or do that will make life on the farm less cheerless, less a life of drudge and grind, more social, more helpful, more elevating, will be welcomed by all progressive and thinking people, for without hope we would all cease to be farmers.

How the Movement is Being Received.

Now, if the press of the country will not endorse this movement, who does? Hon. James Wilson, Secretary of Agriculture, endorses the movement; Dean Henry bids us "God Speed"; Supt. Geo. McKerrow endorses it to the extent of asking me to present the subject at this time, and I am sure that this audience and the people of this state will offer no criticism on his action. Wherever it has been explained, the very best, most intelligent and progressive farmers are the first to join. In my own county, our superintendent of schools, having his attention called to the move by some resolutions we had adopted and had published, signified a desire to become one of us, saying he was willing and anxious to work with any organization that stood for such principles. Nearly every business man in our city is a member. What, you say, do you take in your business men? Yes, we do, and bid them welcome. They are far-sighted and long-headed enough to see that it is in the right direction, that on our success hinges their prosperity, and they are willing to help us bear the expense of getting it started.

But there is another class of organizations to which I think our farmers ought to give more attention. These are their creameries, cheese factories and telephone companies, and they might well add cold storage and meat curing plants and in some places cooperative stores and lumber yards. Before this is done, they must be sure there is need of such, and must rid themselves of the petty jealousies usually clinging to our class, be very careful in selecting their manager, but, when once chosen, stand by him, back him with a good salary, and in cases where the results of his labor must be put in the market where it is brought into competition with goods of like character, see to it that the raw material which he is expected to use is of the very best.

In an adjoining county, there is a farmers' company, doing a general merchandising business, operating three stores, three creameries, and a skimming station. They have been doing business since 1891. Authorized capital, $100,000.00, paid up, $80,000.00, yielding a net profit on investment of stockholders of about 23 per cent. All, or nearly all of their business managers came from farms in the immediate vicinity. In the village of White, Brookings county, S. D., in 1886, the members of the local Farmers' Alliance organized a stock company and commenced business buying grain and handling fuel and such supplies as their capital would permit. They have now an elevator, general store and a half interest in a 150-barrel per day flouring mill, also a stone front store 25x110 feet, with a capital of $24,000.00 and an indebtedness of $4,000.00. I

am personally acquainted with the officers of this company and they reside on and operate large farms.

Near my home city, about a year ago the farmers formed a stock company and started a creamery. In six months and two weeks they made 136,915 pounds of butter, which sold for $25,000.00. They estimate they have saved about $3,000.00 in that time to their patrons. This is a small creamery and just commencing business. Such instances might be multiplied almost indefinitely.

Do I advise these ventures? In the case of creameries, telephone lines, etc., yes, but, except in certain localities, I would most emphatically say no, as to engaging in the mercantile business. I think that most of our merchants are satisfied with reasonable profits; if they are not, we need not patronize them. Every man to his own business. Let each tub stand on its own bottom, but remember that in union there is strength; united we stand, divided we fall.

DISCUSSION.

Capt. Arnold—We have 7,000,000 of farmers in the United States. How are we going to control the prices of farm products when we cannot get the farmers to co-operate? Suppose we should get 1,000,000 of these 7,000,000 to co-operate and to agree not to sell our products below a minimum price, an equitable price, will that one-seventh control the price of commodities?

Mr. McGilvra—I think they will to a certain extent.

Capt. Arnold—You are aware that if we stop the trains of cars from going into Chicago one week, there would be a great deal of suffering there.

Mr. McGilvra — Yes, that is our stronghold, but we do not want to stop them, that is where we want to go.

Capt. Arnold—Won't you get like some other institutions, wanting more than the product is worth?

Mr. McGilvra—I think not. If we did, we would lose in the end.

Capt. Arnold — You mean prices would be so high that it would cut off the demand?

Mr. McGilvra—No, sir. Why, bless your heart, what is the use of asking such a question as that? We have to have the product right in our control. We produce it and the price we get is the price of our labor, our wages.

Capt. Arnold — You do not understand me. In the United States and in the world, we have never produced more than is necessary for consumption. Now, the idea is to hold these products until the demand comes up to the supply. Now, if that is true, the only question is whether the farmers have brains enough to hold these products until they can at least get what it costs to produce them. We fix the price on our products, but it certainly is wrong to undertake to fix the price on anybody else's products, and if they have a right to fix the price on their product, we have the right to fix the price of ours, you say. Now, is that practical?

Mr. McGilvra—Yes, it is practical.

Capt. Arnold — We have attempted heretofore to fix the price upon the other fellow's product, all kinds of other fellows' products, and we have no business to do that. We have trusts and all these things, and we get excited about it; we are talking about railroads now, getting crazy about them, when they are the greatest benefactors we have and 45 per cent. of them have proved failures, have gone into the hands of receivers. Now, we will take care of our own stuff and let them go.

A Member—I would like to suggest as a common sense proposition that in all cases where a law of nature will operate, it is injudicious to bring in artificial efforts or legislation, and those laws of nature will produce equity in all cases. Now, it occurs to me that if we undertake to fix prices for the farmer's products, we will interfere, not only with the interests of the great public, and there has come to be recognized everywhere the absolute solidarity of human interests, the interests of all mankind; we will not only interfere with that principle, but we will interfere with the interests of the farmers themselves, for consider this: It is a very easy proposition to fix what we may call an equitable price upon our corn, oats, such articles as are not perishable, and are capable of being held, but how are you going to fix a price and prevent the shipping and the sale and demand for eggs, for instance?

They must be sold, as must all perishable products, the dairyman's milk must be sold, and you bring in this element of interference with the operation of the natural law, which is the occasion of the great bulk of human ills.

Mr. Hotchkiss—What are cold storage establishments doing? Can't they keep the eggs?

The Member—You are a strawberry man. What will you do with your strawberries when they are ripe?

Mr. Liebau—Eat them.

Mr. Hotchiss—I am a strawberry man, and if my strawberries are properly canned they will keep all right.

Capt. Arnold—There are certain products that are perishable and you cannot hold them, we have to grant that, but there are plenty—grain, tobacco, cotton and various articles—that can be kept an indefinite period. I will not sell my tobacco until I can get what I think it is worth. I can hold it four years and double my money. I will keep it at least till I get what it cost to raise it, and every producer should do the same thing, and the time will come when he will receive an equitable price. I don't sell my pork until I think I have pretty near the top of the market; sometimes I make a mistake. We are all speculators, more or less, and why not use a little more sense and hold our products until we get at least what it costs to produce them. If you have 1,000 pounds of tobacco, or 1,000 pounds of cotton, or 1,000 bushels of wheat, can't you borrow money and hold it? Why not? Why should not the farmer speculate to the extent of holding his goods until he gets an equitable price? Isn't it better to have the money distributed about the community rather than to have all the money right in the hands of a single individual in New Orleans or Chicago?

Mr. Hill—I am a little interested in this strawberry business, and I am trying to figure out if we can up one crop, what we are going to do when we have two crops on hand?

Mr. Linse—We farmers have been kicking a good deal about trusts. Doesn't this look as if we were trying to form another trust right now?

Mr. McGilvra—No, sir, we are not trying to form any trust at all. A trust, as I understand it, attempts to make a corner and to hold complete control.

Mr. Scribner—It is a difference without a distinction.

Mr. McGilvra—We do not ask exorbitant prices. We want even prices for our products throughout the year. You never know when to sell. You stand and study the thing a long time before you are willing to sell, because you are in hopes the prices will be a little better in the future. If we put our product onto the market as it is demanded, I think we can hold prices just about level.

This gentleman over here says the Almighty regulates these things, and I do believe that the Almighty regulates these things to this extent, that we do not produce a surplus of anything. If so, what is done with that portion in excess of annual consumption? There is occasionally a local surplus, but if all were properly fed and clothed no portion need be wasted or go begging a market at unrenumerative prices.

Supt. McKerrow—I guess we are like the dog that gets hold of the big end of the bone, this subject is so big we cannot get our mouths around it. Farmers' organizations are good things where they are carried on in such a manner that all farmers may meet upon a level plane and they are still better where your business men come in and all take an interest in the general education that takes place. I think we ought to have started at the other end, and ask, What can the local organization do in the way of education? Part of it was outlined in this paper. We can meet together and discuss the business problems in this immediate vicinity. Second, the advantage of getting accurate crop reports, and I do not know of any better than the one devised by this organization if it becomes a large organization representing all districts of the country. The last consideration to my mind is this one of controlling the prices, or rather, not controlling prices, because I doubt if the farmers will ever practically control prices, but the matter of finding some system by which farmers can have a little show, at

least, in deciding what these prices may be by determining, first, the cost of production, and the different qualities of goods. I am in favor of this farm organization, or any other farm organization that is as broad as this is, and for that reason Mr. McGilvra, as a representative of that organization, has been given the privilege of speaking here. As he says, this organization seems to be drawing the thinking farmers into it very rapidly. I have talked with a good many of these, and I find that most of these farmers have the correct idea of beginning their education at the bottom; getting together locally, educating themselves there, and then when they are educated up to the standard, if there is any hope of having a say in the formation of prices, they are educated up to the right point to consider that. I think Mr. McGilvra's paper started at the wrong end, and the audience took it up the same way.

Adjourned to 7:30 p. m.

EVENING SESSION.

The Institute met at 7:30 P. M. Supt. Geo. McKerrow in the Chair. Music, High School Girls' Glee Club.

THE AMERICAN GIRL IN THE HOME.

Mrs. Bertha Dahl Laws, Appleton, Minn.

It certainly would be a great pleasure to talk to such an audience as this upon any subject, but I consider myself particularly fortunate in having a subject in which you are all interested. Every man, woman and child here is interested in a home of some kind and most of us are working, economizing and planning—either for the home which we already have, or for the one which we hope the happy future will bring. We all know that it takes a woman to make a home, that the American girl of today is the home-builder of tomorrow. It doesn't make much difference how successful a woman is in other walks of life—she may be a splendid teacher, business woman or lawyer, but if she does not know how to make a home, she does not really seem to be quite a success—as a woman.

Now, taking this for granted, does it not seem a pity that the training and education, both at home and in school, instead of fitting the girl for that work which she is almost certain to have to do when she becomes a woman; instead of inclining her interests, ambitions and plans toward that future work, that future home, nearly all of it tends away from the home and out into the busy, overcrowded marts of man. It is true, and pity 'tis, 'tis true, that a girl can go through the common school, the high school, and the university and in all those years scarcely hear mentioned the three most important periods of her life—her womanhood, wifehood and motherhood. She studies literature, languages and mathematics and philosophy, but she learns scarcely anything about the care of her own body and absolutely nothing about the care of her own home.

College Courses One-Sided.

While in St. Louis, at the World's Fair, I spent much of my time in the educational building, and was particularly interested, naturally, in the work of the women's colleges. In looking over the catalogues, photographs, statistics and other exhibits from the

higher women's colleges, such as Vassar, Wellesley, Smith and Bryn Mawr, I was painfully surprised to note how invariably the curriculum avoided anything which might in any way assist its students in their future work as home builders, wives and mothers. While the course contained years and years of Latin and Greek, Higher Mathematics and Exact Sciences, there would be out of the entire years of work possibly 15 to 30 hours devoted to Physiology and Hygiene, while the home and its care was conspicuous by its absence. This fact might be explainable and excusable if we could prove that these girls, after leaving college, lived a life and occupied positions in which the things which the colleges do teach would likely be of service to them, but as a rule the young women teach a few years, one to five at the most, many of them never teach at all, and the great majority marry and fill that most important position for all women—the home-makers of the nation. Home-making is going to be their life work—now, what have they learned in school that will help them in planning that home, furnishing it, caring for it, choosing the food which is to provide strength and keep up the health of the family, arrange the ventilation and sanitation of their homes, so that the dreadful scourge of typhoid, tuberculosis, etc., shall find no foothold in their homes. How gladly many a one of these young women, proficient in dead languages and higher mathematics, would exchange all her expensive culture for a little knowledge of home nursing, hygiene and sanitary arrangements.

Such a change in the curriculum of our schools, both public and private, would not necessarily result, either, in lowering the standard of culture and refinement in our homes. In fact, I think it would be more likely to raise it. The present education seems to have a tendency to develop a false value of show and pretense, so many women over estimate the importance of showy furniture and clothing, of fancy foods and elaborate entertaining, and strain every nerve to outdo their neighbors. I have traveled a great deal in Canada, Alaska, Europe, and in our own country from coast to coast, I have been in a great many homes, both of the rich and the poor, and I have come more and more, as the years go by, to respect the people who dare to live plainly, who live to suit themselves and their own incomes, and do not worry much over what the rest of the world thinks about it; who build and furnish their houses for comfort and not for show, who dress as seems to them most suitable and becoming, who furnish their tables with plain, wholesome, nourishing foods most carefully prepared, and thus have time and money to spend on books, magazines, music and even on travel. It seems to me it could not help but be more beneficial for our girls and our future citizens if our schools taught the coming home-maker some things which would help her in her life's work, show her how they can be made interesting and fascinating, too, instead of being mere drudgery, which home work is so apt to become to those who do not know how to do it in the easiest, pleasantest and most successful way. When I say that girls are naturally interested in home work, I know the truth of my statement, for I have taught this work to hundreds, almost thousands of them, and it has been a rare experience to find a girl who did not take up the work with enthusiasm, when properly presented.

My firm belief is that we make or mar our own future and it seems such a pity to start these girls on their none too easy path through life so handicapped. Experience is such an expensive and wearisome teacher; why not make our girls' future easier, our homes happier, and our children healthier by educating for life instead of away from all practical life and work?

THE BOY AND THE LAND.

Hon. M. F. Greeley, Gary, S. D.

When I see how the splendid address we have just listened to is received by so large and representative a body of people, I think more of the human race—more of my home, and more of my country. It shows that deep down in us all we appreciate the true and the beautiful, the lowly and the common of life, as Mrs. Laws has so ably discussed it.

a spot of earth he can back up on and defy the world from. A piece of land where he can create his own living independent of others, where he need not intercept any man's money, but produce the dollars he spends—and then hand them over for the benefit and enrichment of others. It seems to me that this is a sufficient ambition for any young man, and that whatever a boy

Greeley's Farm Home and Flock of Sheep.

But I am to talk a little while tonight with the boys. The older ones may listen and the girls may too—I hope they will—but it is to the boys, the boys on the land and those away from the land, whose attention I especially wish to have the short time I am to occupy.

As a rule, the average American boy, it seems to me, thinks too little of the importance of owning a piece of land and of knowing how to handle it. He has not as yet come to appreciate what it may sometime mean to him to have

hoped to make himself in the trade and professional world his first great achievement should be the possession of at least a small piece of land, and the knowledge of how to make a living for himself and for those who must look to him for a living, out of it.

A Critical Time in Land History.

Land has so long been almost free in this country, and when a man failed at everything else he could so easily go onto a piece of land somewhere and make his bread, we have come to not

only underestimate the value of land, but also to rather look down upon the man who makes the business of handling land and stock his life profession. It is not so in the overcrowded countries of Europe—there the land owner is a lord — and all professions and trades look up, not down, to him. I fear that many of our young men are not aware of the fact that old country conditions are close upon our own very heels, and that almost before they know it, we shall find ourselves divided into two distinct classes in this country too—the independent land owner and the overcrowded trades or professions. Population has about caught up with our land now, and while it will continue to increase as never before, the land cannot increase. It will soon, very soon, mean something to own a piece of land in this country and it is going to mean more, as it does now in the old country, to be caught without it. A few years ago we were giving away the great states of Minnesota, the Dakotas, Kansas and Nebraska, and while land hungry foreigners, and the surplus of our own central and eastern states are still flocking westward in increasing numbers, these great western states need every spare acre they have, and more too, for their own landless children. Under these circumstances, the safety as well as the need of owning a piece of land, if one would be truly independent in the great competition of the near future, cannot be questioned.

Home Office of M. F. Greeley, Gary, S. D.

Land is the one thing that cannot fail either a man or a nation. The richest mines may be exhausted and, as many of you here have known, the

greatest forests, too, disappear, but the harvests of agriculture are everlasting harvests. Sooner or later every country must turn to agriculture to support its people; more than this, land properly handled will increase, not only in value, but in producing power. Lands in England, cropped for 300 years, are today producing greater yields per acre than our boasted Red River Valley lands that have been run—not farmed—but little more than 25 years.

Difference Between Farm and City Home.

There is another thought I wish to leave with the boys tonight and that is the great, the vital difference between the landed home and the city home. I do not wish to reflect upon any home, but, have you ever thought of it, boys, one of these homes has to be supported by its owner, while the other supports the one who owns it. It matters not how costly the city home is, nor how beautiful its lawns and surroundings, when the hand that has made it ceases for any reason to bring money from the outside to support it, it no longer affords shelter for those who trust it. I have seen it, you have seen it, just when the widow and her children most needed its protection, they had to go out from under its helpless roof, because it could not feed them, it could not clothe them, it could not pay its own taxes. Will a landed home do this? Never. If properly handled and those living there are taught that farming is a profession, a trade, one to be mastered and one to be proud of, it will continue to provide, not only for itself, but for them; yes, it will feed and clothe the widow and the fatherless and it will pay its own taxes. And I want to say to you, young ladies, if I were you, I don't care how bright or learned a minister, doctor, lawyer or merchant is, if he asked me to marry him and did not own a little piece of land somewhere and know how to handle it, I would never have him in the world.

Where to Get It.

Almost invariably, the best place to buy the land is right where you are. Horace Greeley's advice was very good in his day, but were that good man living now, I believe he would say, "Go east, young man, or stay where you are." Going west is all right, but many are going too far west. They are settling upon over-boomed, dry sections, never meant for general agriculture, and the money they must spend in traveling and the losses and hardships they must meet with, would make them a good home almost anywhere among friends, fruits, old associations and good markets. Get after a little land right where you are. You may have to go a little way off, but don't spend money going far. Nine times out of ten the one who goes to digging right where he is will come out ahead.

Some years ago we opened a Reservation just north of where I live in Dakota. At just noon, a certain day, at a certain signal, all who cared to were allowed to rush out onto this land and select their claims. There was but one condition for holding a claim—they must at once begin improvements, cellar, well, or something. Many rushed out on horseback, some on foot, others in buggies, wagons, or on wheels. Among them were two school teachers with an old white mare hitched to a "buckboard." Each of them had a spade under her arm, with which to begin "improvements." So much unusual racket soon put the old mare beyond control, and for miles, with the bits in her teeth, she tore across the prairies. At last, one of the wheels struck a big stone and out went one of the school-ma'ams. Several gallant horsemen closed around quickly to offer assistance, but before they could and before the unhorsed teacher even tried to get to her feet, she began digging with all her might, and it proved an excellent claim. She had plenty of witnesses, too. That's the way, young man, begin to dig right where you are, and stick to it.

A Large Farm Not Necessary.

When I say there is not a young man or boy in this room who cannot own a self-supporting landed home, I mean it. One reason why so many fail to do this and think they cannot, is they imagine a farm must be a great, big piece of land from one to five hundred acres. This is not at all so. The fact is, the greatest drawback to western farming today is too many acres. Ten or 20 acres, made to do its best, will keep any man busy and make any man a

sure living. Forty acres is a great, big farm, and but few men can make 80 acres begin to do what it is capable of doing. Prof. F. L. Cook, out in the western part of my state, took over six thousand dollars' worth of vegetables and small fruit off from just nine acres. This was almost desert land at that, but it was irrigated, and every inch of it handled right.

If I lived in one of your villages, I should want to live out on the edge of it, two or three miles out would suit me best, out where I could at least have a building lot of five or 10 acres. Then I would be independent, whatever my trade or profession, and whatever became of it.

Few farmers know what they really do get, even out of their small garden. A few days ago a city friend surprised me by saying that it took about fifteen hundred dollars for rent and living for her small family. I began to figure, to show her that this amount was not necessary; but when I put down rent, water, wood, milk, butter, eggs, chickens, vegetables and forty and one other things that my farm afforded, and I, like many farmers, made no count of, I saw where I was wrong.

No Need of Drudgery.

The right kind of farming to a large extent eliminates drudgery. It is the long hours and the longer chores that drive many a boy from land forever, and neither are any more necessary to a properly managed farm than to any other business. We are learning to simplify our chores, and to specialize our farming in such a way that reasonable hours and plenty of time to live and enjoy life in are to be found on a well regulated farm as surely as elsewhere. An intelligent, up-to-date farmer will study as hard to get unnecessary drudgery off his farm as he will to get a good crop off of it. When a man's land is paid for and fair buildings up and painted, and he still gets his boys and girls out of bed at four o'clock in the morning to begin doing chores, he ought to be ashamed of it, and not proud of it, as some farmers are. He either does not know how to farm properly, or he is inexcusably over-greedy and is liable to commit the unpardonable sin of driving his children from the soil. The time has gone by, if there ever was such a time, when a boy should be ashamed of coming from the farm, or of being a farmer. Intelligent farming not only turns out good crops, but it turns out good boys and girls, grand men and women, and the most beautiful and independent homes on earth. To me it is a sufficient ambition for the brightest boy to own a good farm and to know how to handle it. Formerly only the dull boys were encouraged to stay on the farm, but today, if I had a dull boy, one who did not seem to be over-bright, I would make a lawyer of him, or something of that kind. The bright boy I would do all in my power to keep on the land.

The great men of history have almost invariably spent much of their early life on land, and the greatest men of our greatest cities never tire of telling how they learned their first lessons in economizing, overcoming and doing things, when they were boys on the farm.

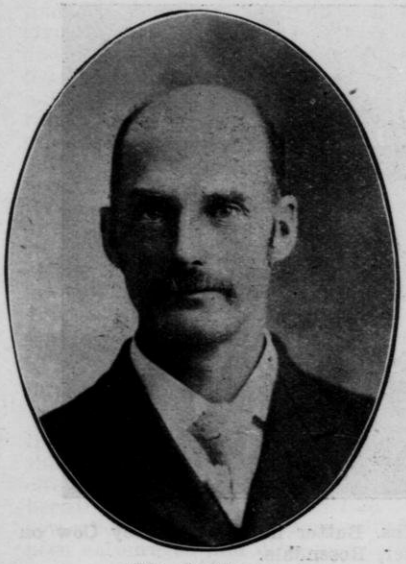
Now, as never before, everything seems to be coming to the man who owns the soil. The centralized school is bringing a sufficient education to his very door, the rural delivery his mail, and the telephone his neighbors. The fast express and freight are putting Main street alongside the road by his farm, and moving the great markets of the east and his once distant acres steadily nearer to each other. The Experiment Stations, Agricultural Schools and such meetings as this are helping him with the very latest and best that is known or can be discovered for his special benefit. Invention, which has taken labor and support from so many, only eliminates drudgery from his business, and is powerless to create substitutes for what he has to sell. He has nothing to fear from higher civilization, increasing population, and keener competition. They only raise the value of his acres and the price of what he produces, at the same time cheapening the cost of his labor and of what he requires from the outside world. The best and worst the world can do seems only to make the up-to-date farm home richer and the most startling inventions and evolutions add only to its desirability and independence. There never was a time in the history of the world when properly conducted farming held out the inducements to young men that it does today.

THIRD DAY.

The Institute met at 9:00 o'clock A. M., March 9, 1905. Mr. D. B. Foster in the Chair. Prayer by Rev. Mr. Lund, of Eau Claire. Music. Supt. McKerrow appointed the following committee on resolutions: E. L. Aderhold, Neenah; N. E. France, Platteville; John Hardy, Wauwatosa.

MILKING.

F. H. Scribner, Rosendale, Wis.



Mr. Scribner.

The subject of milking to me is a very important feature of the dairy work, and the cry is going out all over the country, Where can I get good milkers? It is a subject that well may be considered, for by the securing of good milkers depends in a large degree the success in the dairy business, or failure to secure such the best of work cannot be accomplished.

Some of the Essentials for a Successful Milker.

I think one of the essentials for a successful milker is a large amount of patience. We must realize that we are dealing with dumb animals, and an impatient, ill-tempered milker's work soon shows very emphatically on the milk sheet. This, of course, is more perceptible in some cows than others; the highly bred cow, with lots of nerve force and consequently the best milker, is one most easily affected by such disturbances. If the owner milks some of the cows himself, all the better, he has a chance to show by his personal conduct how he regards the work of milking. A good example is worth a whole lot more than preaching, and when they read the milk sheet and notice the better results that you are getting, think that perhaps there is something after all in being kind, careful and patient.

Excitement Should Be Avoided.

Anything unusual at time of milking should be avoided as much as possible, as excitement has not only a tendency to decrease the flow of milk, but when the milk is tested shows a decided decrease in the butter fat.

The Dairy Barn.

I think the work of the milker can be made more interesting by making the stable more attractive, and partly for this reason should be well lighted and ventilated, and made cleanly by dusting and whitewashing, also the use of land plaster and some absorbent in the trenches, like cut or shredded corn fodder, for the purpose of keeping the stable sweet and pure, some pictures hung on the walls of some prominent cows of the breed you are keeping.

A milk sheet should be in every barn, and the cows tested regularly

and the milkers made known of the results. All these things have a tendency towards interesting them in their work and I firmly believe are productive of better results.

Some Things the Cows Should Learn.

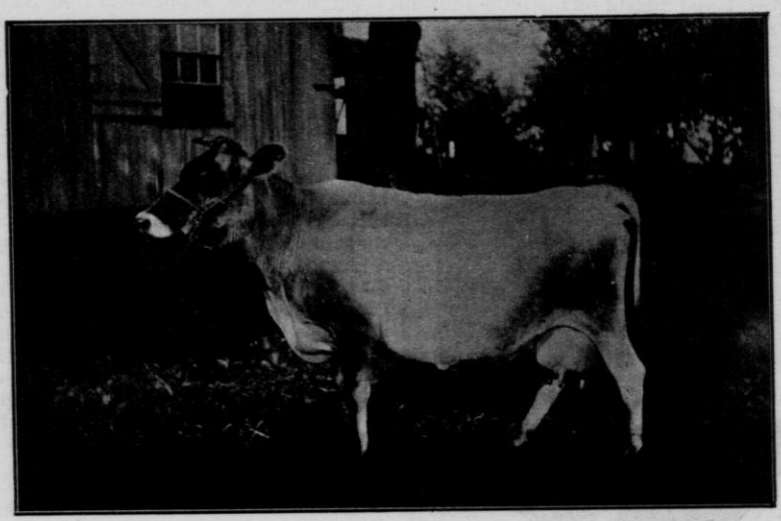
Cows should take the same place in the stable each time, and then the milker will know just where to find them, and they do better to be milked by the same one as far as possible in the same order each time.

Some cows that are easy milkers when giving a large flow, we find it best to milk first, for as soon as they are in the stable they begin to let down the milk and some leaks away, causing a bad odor in the stable and losing some milk besides.

Heifers should be taught to "hoist" the first thing, as it puts the udder in a better position to be handled. Cows that have not been taught this, when they come to develop large udders and are heavy milkers, are quite an annoyance to the milker, especially with cows that do not carry the udder well forward.

How to Milk.

As a rule, we find it most convenient to milk the fore teats together and the back ones together. Some claim that by milking crosswise, one hind teat and one forward one, that it has a tendency to throw the udder out of balance. I never noticed any bad results from so doing, but, as a rule, most cows give the most milk from the rear quarters, and if they are milked crosswise, the work does not come out even and it requires more changing around, but whichever way you start, continue that way, as they get accustomed to it and do much better. In case the front quarters are shy milkers, especial pains should be taken to thoroughly empty these quarters, so as to encourage a larger flow and to get and keep a more perfectly balanced udder.



Like Begets Like. Mabel's Surprise. 528 lbs. Butter in Year. Jersey Cow on Farm of F. H. Scribner, Rosendale.

The care of the teats should always be observed by the milker and when they get hard and rough should be anointed with vaseline, as cracked teats are an annoyance to the milker, hurtful to the cow and have a tendency to lessen the flow of the milk. Long finger nails are also a discomfiture to the cow, and the milker should keep them well pared to avoid trouble.

Some cows will not give down their milk for some milkers as readily as to others, and we often find it necessary to change milkers, and try to find one whom the cow takes a liking to and for whom she will give it down. The holding up of the milk has a tendency to lessen the secretion and consequently the flow.

Clean milking is positively necessary if the cow is to keep up a good flow of milk through the lactation period. The milk glands, like the muscles and other organs of the body, are developed by practice, and if the entire secretion of the udder of the cow at the time of milking is not removed, the glands will soon become less active and will lessen the flow. Clean milking has a tendency to make persistent milkers, and this is the kind that as a rule are the most profitable. This is especially true in regard to heifers with first calf. By thorough milking, accompanied with proper and liberal feeding, the milk glands are stimulated to greater activity and she will reach a much higher degree of profitableness, and it is not an unusual thing now to find a heifer that can produce 400 pounds of butter in a year, and in some cases even 500 pounds and better.

Effect of Careful Milking on Offspring.

Another advantage that comes through careful and thorough work of this kind, is the effect it has on the offspring. A well recognized law of heredity is that "like begets like." A cow whose milk-producing capacity has been encouraged and developed in this way, will be likely to transmit this quality to her progeny; thus we see how the work of the milker becomes a very important factor, not only in the productiveness of the cow, but in the encouragement of those faculties that she may transmit them to her offspring.

I know a man who bought a herd of well bred animals, bred especially along dairy lines, from which we might expect from their offspring excellent results, that by improper feeding never has produced a heifer that has been able to make a test of two pounds of butter a day, and it seems to me this shows explicitly that the man behind the gun is quite an important factor, not only in the productiveness of the cow, but also in her powers of transmission of her qualities to her offspring.

Proper Feeding an Important Adjunct.

A liberal system of feeding is especially important at times of greatest production, and the feed should be of easily digested material that will not tax the digestive organs too heavily. An animal fed on exclusively dry feeds, becomes in a constipated condition; the blood is thicker and does not circulate as freely, and consequently has a bad effect on the udder, so we must look well to the feed end of the question to help secure best results. So we will see that the work of milking will call for an intelligent exercise of faculties with which all men are not endowed, and unless a man is naturally to some extent gentle, conscientious and observing, the chances are he never will be a good milker and never will develop his stock to nearly their possibilities.

DISCUSSION.

A Member — Do you milk heifers with their first calves until they freshen the second time?

Mr. Scribner — No, we do not. I would milk a heifer a little longer the first year than any other time, not that I would expect to get any more milk from her, but to encourage the habit of giving milk a long time. The persistent cow is the most profitable cow. It is not always the big milker that gives the most butter in the year, but it is the cow that gives a good average flow a long time, and we can encourage this by careful milking, by getting all the milk out of the udder. I find there is a great difference in the quality of the udder. I want an udder that milks out clean and feels soft and pliable; if it feels thick and heavy, it is hard work to get the last milk out.

Mr. Foster—How long do you milk a heifer with her first calf?

Mr. Scribner—I would say 11 or 12 months. I would carry the time over a couple of months for her to freshen the next time. There should be the same time between her drying up and freshening as with any other cow. I want her thoroughly dry six weeks; she will make a better udder and give more milk the next year.

Mr. Emery—Do you succeed in getting all your cows to go dry six weeks?

Mr. Scribner — We do. Now, you want to know how I do it, that is the Yankee of it. If they are hard to dry, we simply take away all milk-producing foods from them, ensilage or anything else; in fact, some of our cows are pinned down to dry corn stalks or marsh hay or straw. They will dry off all right. We find no evil effects from our system.

Question — Won't they reduce in flesh too much?

Mr. Scribner—No, sir.

Mr. Martiny—Have you any particular way of taking hold of a cow's teat in milking?

Mr. Scribner — I guess everybody milks differently. I milk one way with one hand and another with the other. I was brought up to milk with my thumbs doubled under, I found I could get a little more strength in that way. One day I knocked one thumb nail off and I had to learn to milk the other way, with one hand.

Mr. Emery—Do you adopt any particular system of manipulation of the udder?

Mr. Scribner — You will notice in taking hold of the udder the quarters are all separate from each other, and if you will take hold of each quarter and work your hands down it has a tendency to empty out the milk from each little cell, and work it down that way much quicker and more effectively than by depending entirely upon stripping.

Mr. Jacobs—Isn't it a fact that different cows have to be milked differently?

Mr. Scribner—Yes, we find that out. When I sit down to a cow to milk, it depends a good deal on the cow how I get hold. Usually I milk the fore quarters first and I have more room to get hold of the others, the hind quarters are always the heaviest and they are back in behind the leg more or less and that method gives me more room for milking.

Mr. Jacobs — Do you think there should be importance attached to the time of milking?

Mr. Scribner—I should divide the time up as near alike as I could, and, above all things, be regular.

Mr. Goodrich—Do you think milking machines are practical?

Mr. Scribner—I never had anything to do with milking machines, only these (his hands).

Mr. Emery — Do you milk three times a day?

Mr. Scribner—Not ordinarily. It is bad enough to have to milk twice, but where a cow is giving a large flow of milk, I think it is a good thing to milk her out three times a day. I know where they have tried that in the old country, it is an encouragement to a greater secretion of the milk material and they really get more milk. Sometimes when we are testing cows, trying to get them to give as much milk as possible, we milk them three times a day, and we find they give more milk as a rule and they give a little bit richer milk.

Supt. McKerrow—Did you practice milking three times a day on Loretta D., the champion cow at St. Louis?

Mr. Scribner—Yes, we did. I milked her myself most of the time. She was a peculiar cow, of nervous disposition, and it was not everybody that could milk her. When I sent her down to St. Louis I was disappointed in the work she did there. That is one reason I sold her. She was irregular; she would vary from 40 pounds one day to 50 another, and it hurts a cow to do that way, and that was one reason why I was a little fearful of her. We had always fed her before we milked. Down at St. Louis they tried to milk her without giving her food. It was a matter of habit with her of being milked at the time she was eating.

A Member—Do you finish milking by stripping with the thumb and fingers?

Mr. Scribner—I do not like to do that; I do not believe it is a good thing, because I think it has a tendency to hurt the fine muscles of the teat. You should get it all with the drawing motion as far as possible.

Mr. Utter—Do you favor rapid milking?

Mr. Scribner—Yes and no. Cows get used to a milker. The milker that I have on the farm is a young short course graduate, and he was a rather slow milker when he came, but the cows got used to him and it didn't

make so much difference, they kept up the flow just as well. I can tell by the milk sheet. Milk as rapidly as possible, but not to hurt the cow.

Mr. Martiny—Some people have a jerking motion in milking and others milk with their hands perfectly still. Which do you prefer?

Mr. Scribner—Just the happy medium. I have seen people jerk to beat the band. I do not believe that is a good thing. We should not rack and shock the udder too much. Even if the calf bunts it too hard, the cow objects to it. In my Farmers' Institute work once, we were talking about cows holding up milk, and Mr. Aderhold said he had a way of making them give it down. He said you should put a big bag of sand on her back and she can't hold up the sand and the milk at the same time. I asked him how much sand he would put into the bag, and he said not over 300 pounds. A man came to me afterwards and said, "Is there anything in that?" I said, "No that is one of Aderhold's jokes." He said, "When I want to get a cow to give down milk, I punch her in the ribs," but that isn't much better. I have found sometimes when a cow gets a little stubborn in giving down her milk, if I quietly touch her rear hind foot she would begin to think about what was going on and would give down her milk.

Mr. Foster—I think the whole secret of milking successfully depends upon milking in a manner pleasant to the cow.

Mrs. Howie—Will you give us your method of drying a cow in the most approved way?

Mr. Scribner — Yes, madam. Quit milking. We take away her feed so as not to encourage the milk flow at all. Of course, we want to keep her alive, but not give her any food that will produce milk. Then we start and milk once a day for a little while and then we drop off the other milking. It takes about two weeks to get through the process. You cannot stop all at once, or when she freshens again there will be one quarter gone, or something the matter. You must use your judgment; you can tell by the amount of milk you are getting whether you dare to drop a milking or not. If a cow is giving 20 pounds of milk a day, that is a good deal to leave in; by dropping off once a day they will drop off three or four or five pounds in a day, and in two or three days they will be down half the amount. Then we drop off another milking and they will go down more.

Mr. Aderhold—Do you empty the udder thoroughly every time you do milk?

Mr. Scribner—Yes, I think that is a good plan.

Supt. McKerrow—How can you milk that cow so she won't dry up six weeks before she freshens; that is the most important point.

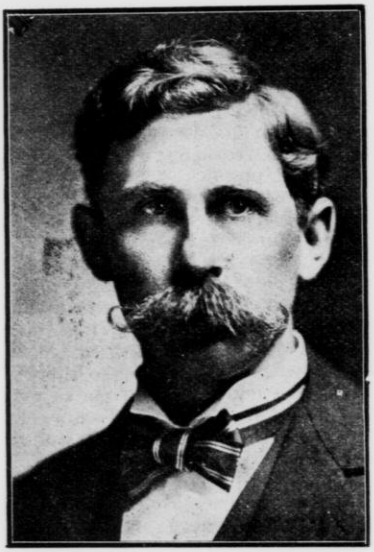
Mr. Foster—And another thing, I do not think it is necessary to tell an Eau Claire county farmer how to dry up a cow that is giving 20 pounds of milk a day.

Mr. Scribner—I have given you my plan; encourage their giving milk by carefully milking, kind treatment and good feeding. You have to thoroughly empty the udder every time to get the best results. I milk all I can get conveniently, though perhaps I would not strip the teats out clean when I first commence to strip. I would change back half a dozen times before I quit.

Mr. Imrie—There are such persistent milkers that a great many people think they cannot dry them up, that if they undertake to do it by reducing the feed they reduce the strength and flesh of the cow, but such cows are so very rare that it is hardly necessary to explain how it can be done, but it can be done with any cow. It is the nature of the cow that she should dry up before she freshens, for a few weeks, but we have bred nature almost out of her, but still you will find with the most persistent cow that something like six or eight weeks before she is to freshen, even if she is giving 20 pounds of milk in a day, some morning you will find that the milk is reluctant to come down, nature is making an effort, although a very feeble one, to dry her up, and then is the time to commence the system that Mr. Scribner has given us and she will dry up all right; but if you persist in taking all the milk and keep her giving a full flow of milk, it is dangerous then to try to dry her off, and you better keep on milking her till she freshens.

MILK TESTING.

E. L. Aderhold, Neenah, Wis.



Mr. Aderhold.

No matter in what form it is marketed, the value of milk is almost exactly in proportion to its butter fat contents, so it is quite essential that all milk producers be familiar with testing and with the method of figuring dividends on the fat basis.

The testing apparatus should be up-to-date and accurate, the testing should be done by some person who has received proper instructions in that work and who has had some experience therein; in the performance of that duty he should be particular and honest. Under those conditions, the per cent of fat in the different milks will be correctly determined.

A Method of Figuring Dividends on Fat Basis.

The following figures, which were taken from Prof. Michel's book on "Creamery Buttermaking," illustrate the most direct method of dividing money on the fat basis at factories:

	Per cent of butter fat.		
Date.	A	B	C
August 7	3.3	4.2	3.6
August 15	3.4	4.3	3.6
August 23	3.4	4.2	3.7
August 31	3.3	4.0	3.6
	4)13.4	)16.7	)14.5
Average test	3.35	4.17	3.62

Net proceeds due patrons, $191.63÷805.42=$.2379, which is the average price per pound of butter fat.

The second column indicates the number pounds of milk delivered per month by each patron. The third column shows the average test for the month. The fourth column shows the number pounds of fat contained in each patron's milk, which is found by multiplying the weight of milk by the average per cent of fat in it. It is like figuring interest on money, with the exception of dealing in pounds instead of dollars. For instance, if milk tests 4.0 per cent, it means there are four pounds of fat in each hundred pounds of it.

	Total milk.	Ave. test.	Lbs. butter fat.	Price per lb.	Money.
A	8.091 X	3.35	271.05 X	$.2379	$64.48
B	4.650 X	4.17	193.91 X	.2379	46.13
C	9.405 X	3.62	340.46 X	.2379	81.00
Total butter fat			805.42		

At the end of each month we determine the number pounds fat delivered by each patron and add the sums, which result shows the total number pounds fat delivered for the month by all patrons.

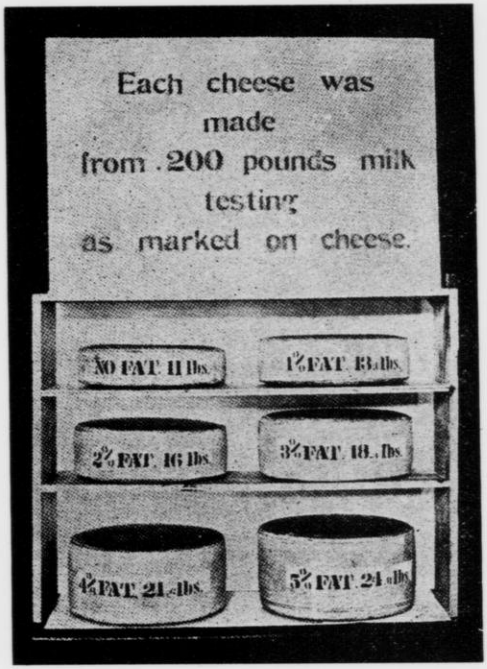
After the month's product has been shipped and remitted for, the cost of operating is deducted from the receipts, the balance being the net proceeds due the patrons.

It is now necessary to find the average net price per pound of fat, which is done by dividing the net amount of money by the total number pounds of fat per month. In this case it figures out .2379 cents. This, then, is the value of each pound of fat, so we multiply the number pounds fat delivered by each patron by that average price, which result indicates the amount of money due each one.

In this manner the money is divided in the proportion in which the fat is contributed. This method is known to give the greatest justice, because the value of milk is indicated more fairly by its fat content than by its weight.

	Average milk	Rich milk	Poor milk
Per cent water....	87	85	89
Per cent solids.....	13	15	11
	100	100	100

With the above figures I wish to draw attention to a feature that has been generally ignored. Each column represents 100 pounds of milk of the quality indicated, giving the per cent of water and of total solids. In 100 pounds of average milk, we find 87 pounds of water and 13 pounds of solids. The water costs nothing and is worth nothing. The solids are made from food the cow eats and constitute the expensive portion of the milk; the richer the milk, the higher the solid content; consequently more food is used in making 100 pounds of rich milk as compared with making an equal amount of poor milk, and we



know the rich milk is more valuable, so we can never afford to pool it with the neighbor's thin milk and accept the same price by weight.

Where dividends are made on the fat basis, the poor milk will bring a lower price per 100 pounds than the rich milk will, but, inasmuch as it can be made at a less cost, the producer of it can afford to accept a lower price and perhaps make as big a profit as the other fellow.

A PRACTICAL MILK TESTING OUTFIT SUCH AS SHOULD BE IN USE ON EVERY DAIRY FARM.

1, Spring balance for weighing milk; 2, Milk pail; 3, Galvanized iron box for keeping samples of milk; 4, Sulphuric acid; 5, Babcock hand tester; 6, Composite sample jar; 7, Beaker for adding acid; 8, Babcock test bottles; 9, Acid measure; 10, 25 c. c. pipette; 11, 17.6 c. c. pipette; 12, Clinical thermometer; 13, Hydrometer for determining strength of sulphuric acid; 14, Note book.

Some Queer Ideas About Testing.

Wherever I go, I find farmers who have queer ideas about testing. Some claim that there is not much difference in unadulterated milk from different herds, yet, if they will go to those factories where for years they have paid for fat and tested correctly, they will find a big difference, and that is the best evidence that can be had.

I have often heard this remark: "My milk is equally as good as my neighbor's milk, because my cows are in good condition and get good food." Sometimes a farmer determines to his own satisfaction the richness of his milk by weighing it, allowing the cream to rise, skimming and churning it and weighing the finished butter.

This method is fallacious, because there would be no account of the fat left in the skim milk and buttermilk, nor would it be known what amount of fat would be contained in the butter, inasmuch as 100 pounds of butter only contains some 80 odd pounds of fat.

The question, "How much does a hundred pounds of milk bring?" is rather impertinent and should be substituted by "How many dollars does the cow earn?", which can only be determined by ascertaining her yearly fat production.

Relation of Food to Fat in the Milk.

Some farmers have an idea that milk can be made much richer by certain methods of feeding, and I would suggest that if it were possible to do that, one might purchase one of those Holstein cows that give about 80 pounds of thin milk daily and apply that method of feeding for several years; perhaps by that time the cow would give 8.0 per cent milk, which would make her monthly fat production nearly 200 pounds. That would solve the question of cheap production, but the cow refuses to make that change, as the character of the food really has but little bearing on the per cent of fat in the milk. If the cow that had been receiving a perfect ration were fed straw only, her milk would probably be as rich as before, but she would give a very small quantity and it would figure out but very little fat. The quality of the milk is influenced by the individuality of the cows, some naturally giving rich milk, while others give comparatively poor milk. It is also influenced by the stage of lactation. When the flow of milk shrinks rapidly, the watery portion thereof shrinks quickest, leaving a higher per cent of solids. That explains why cows in the stripper stage give richer milk than when fresh.

While we cannot, as a rule, feed fat into milk, I do not wish to infer that it does not pay to feed liberally. For instance, if a true dairy cow (a big eater that never grows fat) has been indifferently fed, it would be possible to increase her fat production by more liberal feeding, and, perhaps, by increasing the grain ration. Such a change should result in a greater milk flow, not in a higher test. If cow B could, by better feeding, be made to give 700 pounds of milk instead of 600 pounds per month, her yield of fat would be 28 pounds instead of 24.

Individual Cow Records Should Be Kept.

If a dairyman desires to make a handsome profit, he must keep an account of the individual production of each cow, not by guessing at it, but by weighing and testing. Some Irishman said: "Many a man would enjoy a high standing amongst his fellowmen if it wasn't for getting acquainted with him"; likewise some cows in nearly every herd enjoy a high standing until their keeper gets acquainted with them. The average herd is composed of some fairly good cows and some poor ones, and they are improperly housed and fed. There are thousands of herds whose average yearly earnings do not exceed $35.00 per cow. With such a herd, it is easily possible, by selling from one-fourth to one-third of the poorest end of it and handling and feeding the remainder better, to increase the average production in one year from $10.00 to $20.00.

Mr. H. Whittemore, of Brandon, writes me that the first year he tested and became acquainted with his cows, the yearly receipts averaged $34.00 per cow. He sold the poorest ones and the next year the receipts were $51.00 per cow. He made two cows do what three had been doing. Mr. M. Michels, a creamery man in Fond du Lac county, has been doing some good missionary work with some of his patrons along the same line. Under his direction the earnings per cow in one herd were raised from $19.00 to $63.00. In another herd the earnings were increased (with butter 1.2 cents lower) from $40.00 to $49.00, simply by feeding less corn and substituting gluten feed. Mr. A. J. Glover, who has worked several years among dairies in Illinois, reports the following results with one herd:

Average Yearly Record for Three Years.

Year's Work.	Lbs. Milk.	Lbs. Butter.
First	5,846	227
Second	7,171	275
Third	8,635	337

When milking a cow, we get very thin milk in the start, the first few ounces perhaps testing less than two per cent. As we proceed, the milk grows richer and the last few ounces of strippings are liable to test 10 per cent or more. For the good of the cow, as well as for the sake of obtaining more butter fat, the udder should be well emptied at each milking.

DISCUSSION.

A Member—Where did this man get his good cows to replace the poor ones?

Mr. Aderhold — In this herd mentioned by Glover some cows were purchased after the poor ones had been sold, and they proved to be fairly good cows, better than the ones that they had sold.

Question—Have you any process of testing the acid that you test with?

Mr. Aderhold—Yes, it can be tested with a sort of lactometer, but it is not necessary to have that.

Mr. Foster—You can buy acid that is all right.

Mr. Convey — Is it fair to sell the cream on the same basis as butter fat, and the skim milk?

Mr. Aderhold — Where they take both milk and cream at a creamery, they should make a difference. A man furnishes, for instance, 400 pounds of cream, testing 25 per cent, that will figure out 100 pounds of fat, all that fat goes into the churn. Another man brings 2,500 pounds of milk, testing four per cent, that figures out 100 pounds of fat also, but it does not all go into the churn, there is a loss in the skim milk. The separator doesn't take quite all the fat out. The cream patron has sustained that loss at home. The other fellow takes back that amount in his skim milk, and it amounts to from two to three per cent of the total fat there is in it. For instance, for every 100 pounds of fat the milk patron brings he takes back from two to three pounds in the skim milk. So for each 100 pounds of fat the cream patron delivers, they add from two to three pounds; it makes up for the amount of fat that the other fellow takes home in the skim milk.

Mr. Scribner—I think it is possible to do your own testing. You can tell by the looks of your acid whether it is too strong or too weak; if it is very dark, it is too strong, you should use less of it. If it is too light a color, you should use a little more. A bright chocolate color is about right.

Mr. Aderhold — When you get through testing, the color of the fat should be yellow, it should be neither white nor black. Now, the temperature of the acid and the milk as you pour them together, is just as important as the strength of the acid, because the warmer they are, the stronger the acid action will be. You may have the acid just exactly the right strength, but if both the acid and the milk have been standing in a warm room, there will be too much acid action and it will be black. On the other hand, if the room is cold, there will not be acid action enough. The right temperature is somewhere from 60 to 70 degrees.

Question—How long should the acid be poured into the cream before it is tested?

Mr. Aderhold—It should be mixed at once and tested. I think it is possible to let it stand after mixing and then warm it up.

A Member — In our factory, they have a habit of leaving it 12 to 24 hours.

Mr. Aderhold—Then they will have to warm it up again.

Mr. Imrie — That won't hurt it. You can let it stand as long as you have a mind to. It is good practice with some factories to do that after you have added your acid, it won't hurt it to let it stand. The fact of the matter is the tests are too hot in most factories. At what temperature should the test be read?

Mr. Aderhold—I should say about 120.

A Member — Between 120 and 140. The difference will not be so great as to interfere with the reading.

Mr. Aderhold—You should have the bottle so you can hold the bulb in your hand while reading it without being too hot. If the temperature of the water that you add to the bottle is anywhere from 120 to 140 it is all right.

Mr. Convey — In regard to the amount of butter fat per cow for the quantity of milk produced, you said

that the cow producing the largest amount of butter fat would be the most profitable cow to have. Now, tests would not seem to indicate that that is the case. I scarcely know of any test where the food is taken into consideration where the low-testing cow will at all compare with the cow that would make a fair and high test. For instance, at the World's Fair, Mr. Scribner's cow was not the cow that produced the largest amount of butter fat. Another cow produced one-third more of a pound of butter fat than his cow did, but his cow produced butter fat at a cost for the 120 days of about $10.00 less, so that the tests would all seem to indicate that the low-producing cow is not an economical producer of butter fat.

Mr. Aderhold — If you owned that other cow that made just a little bit more fat than Scribner's cow did, you would not sell her because she used a little more feed.

A Member—Farmers, very frequently, in testing milk, have the temperature of the room below what it should be and it becomes so expanded in the bottle neck that the reading is not perfect. Explain what they should do in that case.

Mr. Aderhold — Suppose you have finished your last whirling and have a correct test in there. Now, if you allow that bottle to cool, the contents of the bulb will contract and the column will settle, and of course it will leave a string of fat along where it has been, so you should keep that warm until you read it. If it is already cool, you should warm it up again.

Mr. Convey—I do not consider Mr. Aderhold has answered the question at all. If I have two cows and one will produce one-third of a pound more butter fat for 10 cents and the other will produce one-third of a pound of fat at 9½ cents, it is of some importance; the amount of feed the cow gets should be taken into consideration.

Mr. Aderhold—I want a big production to start with. When we have that, we can consider other matters.

A Member—Have you any way of telling us how to mix our milk on the farm so that we can stand by it when the creamery man kicks and says we took the test too high?

Mr. Aderhold—If you will take care of the milk according to the old established rules, not let it become sour, or let the cream dry in any way, they can get a perfectly accurate sample at the creamery which may test one-tenth lower at the factory than at the home.

Question — Would you prefer testing your milk as soon after milking as possible?

Mr. Aderhold—I do not think that makes any difference, if you do not let the cream get dry or lumpy.

A Member—What effect will it have on the reading of the test if the acid is too strong?

Mr. Aderhold—If it burns the fat, you would have to throw it out entirely.

Mr. Moore—Farmers in testing on the farm, frequently use a hand machine, while the creamery man uses the steam machine, and there will be a difference of two-tenths.

Supt. McKerrow—Then the farmer's test would be lower than the creamery man's, but it is generally the other way.

NECESSITY OF CLEAN MILK.

U. S. Baer, Madison, Wis.

Mr. Baer.

Wisconsin takes a high rank among the foremost dairy states of the union. She is conspicuous for the production of both butter and cheese. She contains the greatest number of creameries and cheese factories combined of any state in the union, has the largest number of cheese factories, ranks second in the number of creameries and second in the quantity of cheese produced. Wisconsin today produces more than one-fourth of all the cheese made in the United States. Our nearly 1800 cheese factories made over 100,000,000 pounds of cheese last year, of which about 70,000,000 was American Cheddar and 30,000,000 of the Swiss, brick, Limburger and other varieties.

The total butter production of our nearly 1200 creameries, together with the farm dairy butter, has been estimated to be 125,000,000 pounds for the season of 1904. Including the value of the by-products returned to the farms, the total revenue from the dairy industry of the state must be estimated at not less than $55,000,000 annually.

A very large proportion of our factory make of butter and cheese is not of a true clean flavor and it is safe to assert that over 75 per cent of all the imperfections in our dairy products are caused by bacterial ferments, the source of which is traceable directly to carelessness and unclean practices in the stabling, handling and milking of the cows and in using unclean milking utensils.

A large proportion of the faulty milk is mixed with the better milk at the factory and thereby all of it is contaminated, making it impossible to turn out a perfect product. It is clear that the patron who delivers clean milk needs protection against his neighbors whose dirty milk goes into the same cream or cheese vat, and the consuming public needs protection against contaminated dairy products.

The Financial Side of the Question.

The patrons of the factories of this state have a direct financial interest in supplying only good, pure milk, free from taints or bad flavors. The greatest amount of care and skill with which the factory operator may do his work will not enable him to make a superior quality of butter or cheese, or to secure the largest yield of it from milk which is not in good condition. Whenever a patron delivers tainted or sour milk to the factory, it means a direct loss of dollars and cents to him and his neighbors associated with him, and is an imposition upon the consuming public. If a factory of 10,000 pounds of milk per day accepts three or four cans of sour, tainted or gassy milk, at the very lowest estimate it will take one pound more milk to make a pound of cheese than if all the milk had been sweet, clean and well flavored. Suppose cheese to be worth 10 cents per pound, the loss to the patrons in this case would be $8.00. In 30 days the loss

sustained would reach the sum of $240.00. Not only is the quantity affected, but the quality of our butter and cheese is impaired and its market value diminished by every can of tainted or defective milk accepted at the factory intake. That butter maker or cheese maker does not exist who can make a first-class product from unclean milk. If extra or even good dairy products are to be made, the milk supply of our factories must be obtained from healthy cows, fed on pure food and kept in clean stables. It must not readily undergo fermentation and it must be clean.

In butter and cheese, flavor is the quality most noticed by the consumer and hence is of first importance in market demands. Good flavor in milk, cream, butter and cheese insures a ready market at remunerative prices; poor flavor condemns them and no one seeks them at any price.

There is no question but that the value of our dairy products would be enhanced to the extent of many thousands of dollars a year if all of the milk delivered to our creameries and cheese factories was uniformly clean and sanitary. The value of milk when it is delivered to the factory depends largely upon the care it has received previous to delivery and its condition with reference to cleanliness, as well as its fat content, influences the quality and quantity of the products made from it. Cleaner methods in our dairies are of the greatest importance to the success and reputation of Wisconsin dairying.

It is to the financial interests of every patron of a creamery or cheese factory that the milk delivered shall be the best and purest that can be produced. The man who increases his monthly check by skimming or watering his milk, is stealing that amount from others to whom it belongs, but that man who delivers contaminated milk to a factory does infinitely worse, as his milk will injuriously affect the entire production of the day and thus decrease the returns to every patron and rob the consuming public of a clean and wholesome product.

The losses in this state caused by taints or changes in the milk due to the lack of proper knowledge or neglect and carelessness are enormous as compared with the losses caused by skimming or watering. Butter and cheese makers should absolutely refuse to accept milk that is tainted or unfit for use; they should do this in justice to themselves and to patrons who deliver good milk and in obedience to the laws of the state.

Need of Skilled Inspectors.

Great good could be accomplished if there was a sufficient force of skilled inspectors to inspect every factory and factory milk supply in the state frequently, and suggest through instruction the best possible management, and compel the observance of due sanitary regulations. If this work could be adequately done, it would mean better equipped factories, better instruction and education in dairying, better butter and cheese, more remunerative prices, and an enviable reputation for the quality of Wisconsin dairy products.

MEANS FOR PRODUCING CLEAN MILK.

James G. Moore, Madison, Wis.

Mr. Moore.

The subject assigned me is "Means for Producing Clean Milk." One would naturally think that every one would in the production of a food product, try to make it, and keep it, in as cleanly a manner as possible. It may be and no doubt is a greater task to produce milk in a clean manner than most other articles of food, but that is no reason for our giving up all efforts in this direction.

In traveling up and down the state, visiting the creameries and other places where milk is handled, we can but be impressed with the lack of cleanliness in the handling of this important article of food. I am asked to tell you what is necessary in order to produce a clean milk, suitable for making first-class butter or cheese, or if used for direct consumption will prove palatable and wholesome.

The Dairyman.

First of all is the man who owns or manages the cows. I want him to be clean in his person and one who keeps up with the times in reading dairy papers and attending gatherings such as this, where he can come in contact with and learn from those interested in the same business as himself.

A man of the kind I have here indicated would seek to provide his cows with well-lighted, well-ventilated and roomy quarters, kept in a clean manner, and supply them with abundance of clean and wholesome food. Too many places where cows are kept are dark, ill-smelling and crowded; when the door is opened in the morning after the cows are kept in all night, the atmosphere that greets you is so foul that one is almost overcome and the wonder is that the poor cows are able to thrive as well as they do.

A system of ventilation should be installed that will cause the atmosphere to change continuously and yet not subject the animals to any drafts. Such a system is illustrated and well described in the last Institute Bulletin that has been distributed, and which you will find on page 34. This Bulletin is No. 18.

Care of the Cows.

In order to obtain the desired results from cows, they should be kept clean, and this cannot be accomplished nearly as well where kept in stanchions as in some of the modern stalls now on the market. By their use the cows can be kept as clean when stabled during the winter as when on grass in summer. I will not attempt to describe any of them, as Mrs. Howie is to talk to you on that subject, but means should be adopted to keep not only the animal clean, but also her surroundings.

At a banquet given at the Illinois College of Agriculture, the tables were placed in the cow barn and in Denmark and Holland the cow stable is at times used as part of the house. Such a use

would indicate a condition of cleanliness that the customary odors of a cow stable were not present, and indicated that such a place was a suitable one to produce a human food.

Clean milk cannot be produced from cows which are themselves plastered with their own filth, and where proper arrangements are provided, they will not be in that condition. The hairs should be kept clipped from and near the udder; before milking the animal should be brushed off, especially her flanks and udder. If these precautions are not taken, fine dirt will be dislodged from the cow during the process of milking and fall into the milk pail. When a ray of sunshine streams into a window, you can see the minute particles of dust floating therein, but if the ray of light is shut out they are no longer visible, yet you know they are still there, so the particles of dust and dirt dislodged during the process of milking are falling into the milk. Especially is this true if hay, fodder or straw have been brought in and distributed just previous to milking. Work of this kind should be done long enough in advance of the time of milking that the dust may get settled, as the dust particles are laden with germs which, finding their way into the milk, have the two requisite conditions for their rapid growth, namely, heat and moisture. Permit me at this time to show you some of the dirt filtered out of milk delivered at a milk shipping depot in the southern part of the state. Each glass shows the filth from a single patron's milk.

Things to Be Observed in Milking.

The milker should not turn from cleaning horses, or other dusty, dirty work, to milk the cows without first washing his hands, and for this purpose the necessary articles should be kept in the barn. He should also be provided with a suit or apron to milk in, which needs to be washed frequently, so that when he gets out of it, it will not stand alone and resemble a suit of armor more than anything else. A very convenient and cheap method is to have a large pair of bib-overalls and slit the legs up the back, having strings sowed on at convenient places to tie around the legs. This will protect the clothes from the spattering of the milk and a man need not go round advertising to all he meets that he has been milking cows.

The common milk pail is the largest at the top and seemingly invites everything to drop into it that can. A better style, and one that costs but a trifle more than the one in common use, has the opening considerably reduced, and that provided with a ring, so that cloth can be spread over the opening and the milking done through that. The spout where the milk is poured out is also provided with a cover, so that the risk of infection from dirt getting in from the outside is reduced to a minimum.

Care of the Milk.

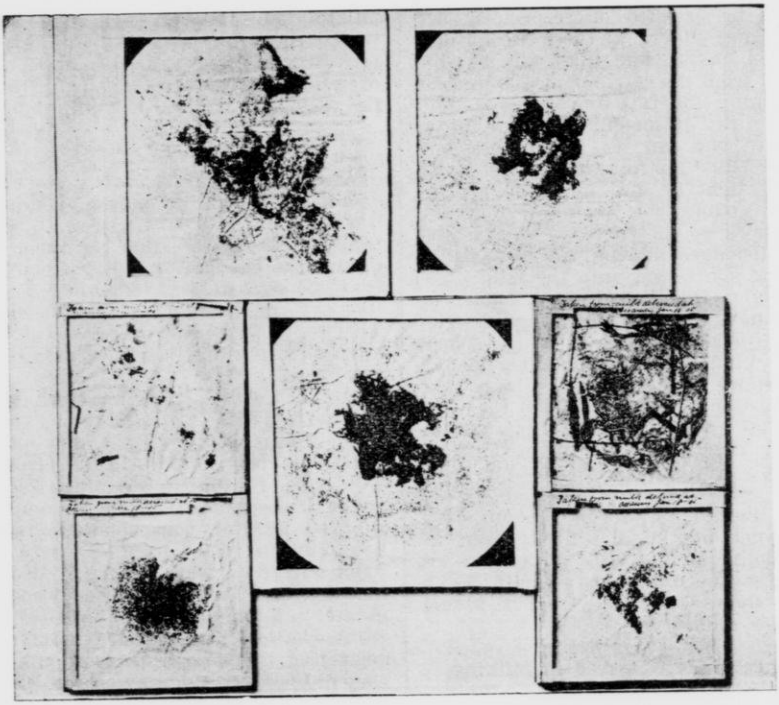
After it is drawn from the cow, milk should be at once removed outside of the barn, to a place where contamination is least likely, and strained. It used to be thought that when warmer than the surrounding air and giving off its heat, milk would not absorb odors. This is not true, however, as when in a warm condition it will absorb them the quickest.

Aeration as a means of bettering the keeping qualities of milk has been much discussed, and like many other questions has two sides to it. If properly done, that is to say, in a clean, sweet atmosphere, I am of the opinion that it is helpful. Care should be taken not to aerate in the barn or where the wind will blow from the barn yard or hog sty, as it will then be exposed to greater contamination. I have had patrons who had more tainted milk from neglecting this simple precaution than they did before using an aerator. However, if properly done, the milk will be cooled somewhat from the air passing through it and any objectionable odors allowed to escape.

The main thing is to cool the milk quickly to a temperature of 50 degrees or less, and it would pay the dairyman to provide ice for this purpose. In the absence of ice, an abundance of well water will enable the patron to quickly cool the milk to a temperature of 50 degrees or below. If the cans are placed in cold water and the milk is stirred until cooled to the temperature of the water, which is usually about 50 degrees, well and good; but the average

milker, after performing a long day's work in the field and then another half day's work, called for variety's sake chores, will not stand over the milk long enough to accomplish this.

In driving through the country in the early morning, I have observed a can of milk placed in a half barrel near the well at different farms, where there was not room for more than a couple of pails of water, which would not be sufficient to properly cool the milk. And unless quickly done, the germs that may have gotten into it will have a chance to develop before it gets cooled to that point where their growth is retarded.



Seven Samples of Dirt Taken from Seven Cans of Milk from Different Factories in Wisconsin During the Institute Season of 1904-5.

The Milking Utensils.

The pails, strainers and cans, and, in fact, every utensil used in handling milk, should be kept scrupulously clean. I do not stretch the truth any when I make the statement that, judging from appearances, a good many people who wash the cans and other utensils do not know how to do it properly.

First of all, in buying tin-ware, see that all seams are flushed full and smoothly with solder. They will then be much more easily cleaned and have less place for germs to grow in. It is a fact that a large amount of the tin-ware used for this purpose is not well made and consequently is hard to keep clean. And again the methods used in cleaning these utensils are not the best; the cans are usually the worst off, and some of this may be due to the fact that they are not always emptied as soon as returned from the factory, and the albuminous part of the milk gets dried on, and when hot water is used first, sticks all the tighter.

Where creameries send their skimmed milk home pasteurized, it is a great

help in keeping cans clean, as I have never found dirty cans at factories where this has been practiced. Have you ever watched the lady of the house poaching eggs? She will have a frying pan with hot water in it and, after cracking the shell, drop its contents into the pan. What happens? As soon as the white or albuminous part of the egg touches the hot water, it coagulates and becomes white and thick. Now the albumen in the egg and the albumen in milk are similar, and when hot water is used first in washing the cans the same thing happens that was observed in poaching the egg.

The better way is to rinse the cans and other utensils with cold water first and the use of a brush at the same time will not do any damage. Next use warm water in which a good washing powder has been dissolved and scrub thoroughly with a brush. Never use a dish cloth, or cloth of any kind, or soap either, as their use is very liable to leave a characteristic odor on the tin. Finish by scalding with hot water —the hotter the better—and turn over in a slanting position to drain and where the sun and wind can get to them. Do not wipe dry with a cloth; if the water last used was as hot as it should be, they would dry themselves.

Handling the Milk After Milking.

A suitable place should be provided to keep the milk until delivered or used as your market requires. It should not require any argument to prove that the barn, kitchen or cellar is no place to keep milk or cream in; yet it appears to require enormous effort to prevent milk from being kept in unfit places.

A milk house would seem to be a profitable thing to have on a farm, but where the expense is considered too great, the tank arrangement used by a leading dairyman of another state is both practicable and inexpensive, and amply meets the necessities of the case. A galvanized iron tank is provided large enough for the necessary number of cans and at least twice as much water as there is milk. All the water used for the stock goes through this tank and the outlet is a trifle higher than the milk in the cans, so that in case the cover is not closed tightly during the winter the water will freeze and not the milk, as its level in the can will be lower than the surface of the water in the tank. This galvanized tank is placed inside a wooden tank six or eight inches larger in every way and the space between filled with some good, clean, non-conducting material, and thus obviate the necessity of banking with manure, or anything else that will contaminate the milk. The milk from which the butter was made that took the gold medal at the World's Fair last year, was largely kept in tanks as above described.

Effect of Food on Flavor.

Some feeds will produce bad flavors in milk if fed before milking, or the cows allowed to run in the fields where grown. Such feeds should be fed after milking and not in excess, so that the characteristic flavor will have passed out of the animal's system before the next milking. Some feeds, such as rape, cannot be fed for the production of milk for some purposes, such as cheese-making, without tainting the product, no matter how it is fed. More detailed statements along this line can be secured from the Wisconsin Experiment Station Bulletin, No. 115.

Care should also be taken that the air in the barn does not become laden with the odors from silage or other feeds, and that the corners of the mangers are not allowed to become sour with the remains of such feeds. Our largest creamery in the state sustained a loss of over two thousand dollars per week a year ago last fall from careless methods in this regard.

Water.

Pure water should be provided for the cows at all times and in sufficient quantities, as milk has a large percentage of water in its composition, and it is well known that where cows are allowed to drink water from stagnant pools or ponds, the quality of the product suffers.

Hauling the Milk.

In hauling milk to market, it should always be kept protected with a cover of some kind; in summer to keep it from the dust and heat of the sun, and in winter to keep it from freezing.

To sum it all up in a few words, cleanliness and cold are the two most essential requisites in the production of and keeping of milk.

DISCUSSION.

Mr. Goodrich—This is the most important subject that we have had to consider at this meeting. It means thousands and thousands of dollars to the dairymen of Wisconsin and of Eau Claire county. I want to tell you some undeniable facts. Minnesota is making better butter than Wisconsin, she is winning prizes everywhere and has been for some years; she is getting more money for her butter, and that is what we are all after. She is getting from one to two cents a pound above the Elgin price and the buyers go there after it; they do not have to hunt for a market.

Denmark is making better butter than Wisconsin and getting a good deal better price for it. Now, what is the reason? Why cannot Wisconsin make just as good butter as Minnesota or Denmark? It is because there is so much unsanitary milk goes into the creameries, and so many of the creameries are unsanitary themselves, that is the reason. Now, why cannot we prevent it? We have got just as good laws as they have in any country, but they are not enforced and we cannot enforce them as the Constitution is now. We can all talk as these gentlemen have talked, and they can talk till they are gray, and still unsanitary milk will be brought to the creameries.

In Minnesota there are 14 inspectors; in Denmark there are a great many more. We have a bill before the Legislature providing for 15 inspectors for this state. That is not enough, but even that number would do a world of good. It would be the business of the inspector to go to the creamery and inspect that and see if that was all sanitary and right; to go to the weigh can and examine the milk as it comes in; then go to the farm, where the unsanitary milk is produced, and warn the man, give him notice that he must not bring such milk to the creamery, and that if he does not reform his methods he cannot take it to any creamery, and if he does that he will be prosecuted. You will say that the creamery man should do all this, but he won't, because he does not want to lose a patron, he doesn't dare speak right out for fear of losing the patron, and he keeps on taking the milk.

I have visited a great many creameries and studied this question. In one creamery that I was in for several days successively, the butter-maker complained bitterly because they brought bad milk to him, and he couldn't make good butter of it and it was selling down too low. He was afraid to talk to the patrons, but I urged him to, and he said at last, "Well, I will try it tomorrow morning." I was there in the morning, and he spoke to several different ones, asked them to take a little better care of their milk, cool it a little better and keep it a little cleaner. Most of them said nothing, but pretty soon he came to Canute's milk, and he said the same thing, and Canute answered, "Say, that milk is all right; if you don't want it, I know who does." And he just as soon carry it to another creamery and the creamery man shuts up just like a clam. Now, it is that kind of thing we have to combat. If we can only get that bill through and get 15 inspectors to work and 15 more another year, by and by we may get 50 and we need 50 to look after all the patrons and creameries.

Mr. Moore—I do not want the impression to go out in our report that Wisconsin is so far behind our sister state Minnesota. I will admit that Minnesota took the prize at the World's Fair, and maybe some of you believe that it is because they had better milk, better butter-makers and better appliances, but I do not admit that the natural conditions of Minnesota are any better than they are in Wisconsin, or that they have any better men there, or men who have a better knowledge or grasp of their business. The question is, how did they make this butter that took the prize? The fact is, the Dairy and Food Commissioner of the state of Minnesota, the inspector and the butter-maker all work together in this matter; the inspector went to the creamery; he took in the milk, divided it into two different lots, and of course it was butter made from the best cream that went to St. Louis. They have just as bad butter and milk in Minnesota as

we do, but they have it in less degree because they have more inspectors. We have 1200 creameries and 1800 cheese factories and just one man to go around to all those places.

Mr. Aderhold—That is the solution of this question, to not mix the dirty milk with the clean milk. It is one of the saddest features in the history of Wisconsin dairying that the man at the factory will take dirty milk day after day, knowing it to be such, and mix it with the other fellow's clean milk.

Now, a word about gassy curds. I have made curd tests of different farmers' milk at over 200 factories in the last six years, that covers more than 6,000 patrons, and during the summer time I find that more than one-quarter of the farmers at the cheese factories bring in milk that makes a bad curd. I know that the conditions are worse at creameries, because they are more careless and sloppy there. Now, you take an amount of dirty, gassy milk and mix it with the rest and it makes it impossible to make decent cheese or butter, and the fact is that we very seldom make cheese or butter in any of our factories that has a strictly clean flavor.

Mr. Linse—I want to warn farmers who are laboring under the false impression that they can improve their milk, take the bad taste out of it, by aeration. It is a wrong idea altogether. I have tried it, I can take milk tainted or untainted, and take one bottle of the aerated milk and another bottle right from the cow, seal them both up and put them in ice water and I challenge any one to take up that milk the next morning and tell me which was the aerated milk and which was not.

Mr. Moore—I have made butter for a number of years and had a large number of patrons and sold them a large number of aerators, and I know that those men that had aerators, if they used them properly and kept them in proper condition, their milk made better butter than those that did not. Mr. Baer will tell you the same thing and he has studied the effects of aeration down in Richland county amongst the cheese factories, and I have known of cheesemakers getting up in Farmers' Institutes and telling us the same thing. I do not say that if you go to work and contaminate a can of milk that you can remove it by aeration, but I do say this, that if the milk has been milked in a cleanly manner, removed from the barn that aeration will help to cool it. I also say that if you will stand over a can of milk and stir up and down in ice water until it is cool, that is good enough, but you won't do that, and that is the reason why I want some mechanical method of aerating the milk and getting out of it that natural heat. Cow's milk all has a characteristic odor from the cow and we must remove that characteristic odor and you can do it to some extent by aeration.

Mr. Scott—To make a better grade of butter, what, in your judgment, is it that is beneficial about aeration?

Mr. Moore—It is the cooling that we want. There is no time in the morning or late in the evening when the atmosphere is not cooler than the animal heat in that milk, and it is this cooling that we want. Down at Mr. Gurler's, where they have made milk under the best sanitary conditions and sent it across the ocean and kept it on exhibition several days before it turned sour at all, they did not aerate the milk, but cooled it just as quickly as possible from the cow.

A Member — Then why not give the cooling the credit of it?

Mr. Moore—Call it what you like; it is cooling.

Mr. Rietbrock—How about that cowy taste?

Mr. Moore—That will be removed by aeration.

Mr. Scott—Also by cooling.

Mr. Linse—You are talking all the time about this animal odor. I claim that where a cow is kept in a clean stable and the atmosphere is clean and the food is good, there is no such thing as animal odor. If you take milk from such an animal, put it immediately in a sterilized bottle and cover it up tight and put it in ice water at once, you cannot detect anything of this animal odor any more than you can from milk you have been aerating for hours.

Mr. Scribner—I was talking to some farmers once at an Institute about aerating milk, and one of my good German friends jumped up, and he said, "I always irrigate my milk."

Mr. Scott—We heard day before yesterday that La Crosse has the best milk in the state, and that Mr. Linse's milk is the best milk in La Crosse, so he is an authority on milk and he doesn't aerate. Now, I am positive that the healthy cow, fed upon good, wholesome food, puts nothing into her milk but what should be retained.

Mr. Scribner—Mr. Linse has conditions that are right for producing the right kind of milk and keeping it right.

Mr. Scott—Let us all have those conditions then.

Mr. Moore—It is not a theory that confronts us, but it is a condition. Granted perfect conditions and you do not need anything else, but how many farmers who are taking their milk to factories, whether it is in La Crosse county or any other county, or to the bottling establishments down near the southern line of the state, have perfect conditions?

Mr. Liebau — We are told we must only aerate where no smells can strike the aerator. How is a man going to do that unless he changes his position with every wind? We all keep hogs and there are always some smells on the farm. I have tested and I find that the smell of the hog pen is easily carried 30 rods.

Mr. Moore—In all localities there are prevailing winds from certain quarters of the compass, and it is easy to calculate for them.

Mr. Scott—We may talk about this until we are black in the face and we shall never settle it. Why cannot we have some experiments that will settle this thing definitely? I have asked our professors over in the Dairy School at Madison to try some experiments as between cooling down without aerating and aerating. We would like to see this thing settled.

Mr. Moore—Professor Farrington advocates aeration of milk. I have had patrons who brought me milk in the hottest part of the summer, who had no water whatever, and whose milk came in better condition because of the aeration than was that of some who put it in water without, and I will tell you why. In the older parts of the state, the 30 gallon cans are used a great deal. They put them in water and if they do not stand there and stir the milk, what happens? The heat and the animal odors are crowded towards the center and come up. By that time the cream has risen and we have what is called smothered milk, and it is sure to have a characteristic flavor in butter and cheese. If everybody used the small cans it might be all right, but people are not going to throw away the cans that they have that cost six or eight dollars just because you want them to.

Mr. Foster—This thing is going so far that a man who just came in might think we are discussing now whether to aerate or not to aerate. The question before us is as to the means of producing clean milk. There is not one person in 25 who will practice the aeration, and we better stick to the question about taking care of the milk.

Mr. Convey—Do you find conditions much worse in the southern part of the state than farther north, the climatic conditions?

Mr. Moore—That is very true. There are some conditions that are not climatic, but they come from the fact that it is older country and the old countries get dirty.

Mr. Foster—You laugh at that, but that is all right. Eau Claire county could show something like that.

Mr. Moore—That is a fact; it used to be that Herkimer county, New York, was a great place for cheese, and then it was Ohio, then it was Wisconsin, and now it is Canada. The country gets full of old bacteria and it is the newer country where the best cheese is made, although they may not take as good care of their milk in the newer country.

Mr. Jacobs—People often think they are doing all right if they can only keep straw and hairs out of the milk, they have accomplished all that is necessary, but it isn't quite enough, as these samples show.

Mr. Moore—This sample was taken from the milk of a patron who delivered milk to a bottling station in southern Wisconsin, and this milk went through the separator and was strained through four thicknesses of cloth. It was then forced by a pump through four thicknesses again, but the flavor was still off and this was left in the milk, as you see. I want to quote a

few words from Prof. Russell on this subject: "The bacterial life that finds its way into milk while it is yet on the dairy farm may be traced to several sources, unclean dairy utensils, fore milk, the coat of the animal and general atmospheric surroundings." Now, I want to tell you about an experiment out in Iowa. Prof. Keith was out in Iowa four years ago conducting this experiment at the Experiment Station before the Agricultural School. We will naturally expect that the state will have better cows and better barns, kept in a better way, than the average farmer; they brought a cow in on the barn floor in the early part of the afternoon and they enveloped her in a sheet. They took a knife and cut some holes in this sheet and pulled her teats through and the professor had a sterilized vessel into which he milked some of the milk from that cow. Then they took the sheet off the cow and the regular milker sat down and finished the milking. Some of that milk was put into a sterilized vessel, they were placed side by side at a temperature of 90. The next morning the milk regularly drawn was sour, while the milk drawn by the professor under these extra precautions remained sweet for one week. There was also an examination for bacteria and the milk regularly drawn contained several thousand germs to the cubic centimetre, while the milk that the professor had drawn was approximately sterile.

Mr. Foster — You have told us we ought to keep the cow clean, but you didn't say a word about cleaning the cow.

Mr. Moore — Yes, clean the cows; they will not only appreciate it and be in better health and therefore better able to produce better milk, but it will, of course, help to keep the milk clean. First of all, I would try to keep the cows clean. Mr. Gurler takes a damp cloth, or a brush, and passes it over the animal's side where the skin would be agitated during the process of milking. Of course it is all right to clean the cow all over, but for the average man, if he cleans a special part of her, the part that is likely to be agitated during the process of milking will be as much as we can expect at this time. I went out to a farm to test some cows. The man and his wife brought the cows in from the pasture and put them in the barn and I stood at the door watching them do the milking. When the woman sat down to milk, she ran her hand over the side of the cow and you could see the dirt falling down in clouds. She milked with a jerk and you could see a steady stream of that kind floating down in the air, and when she would bring her pail of milk over to be strained, the milk was covered with fine particles of dust. I did not observe whether the man cleaned the cow or not, but he milked in a quiet, steady way and hardly stirred up a particle of dirt.

Mr. Jacobs—In this section we are making butter and we are fast turning to the process of gathering cream, and I would like some way that we can carry out this principle that we are talking about, so that the cream may be paid for at the factory, not only on the amount of butter fat, but on the quality, which is the same as we would sell anything else.

Mr. Moore—That is a question that we are all trying to figure out, how we are going to make sure of having this cream delivered in good shape at the creameries and cheese factories; if we could only get the market to pay us a just price for the different grades of products, I think we soon could educate the farmers and ourselves to produce milk and cream that would make first-class butter and first-class cheese and would stimulate butter and cheesemakers to put forth their best efforts to make the right grade of dairy products. I do not know how we are going to get at this, but it is something that we must come to. This ought to be the leading butter district of America. The way they got their reputation in Minnesota is by making butter from clean milk, that is what won the grand sweepstakes down at the St. Louis Exposition.

Mr. Linse — Perhaps if Mr. Moore could solve the labor question he could come nearer answering this gentleman's question. The Chairman has spoken about cleaning the cow; the whole cow should be cleaned, and I would be very glad to do it. Mr. Gurler has a man that does that, but he is getting a shilling a quart for his milk, and I

would be more willing to do it if I got a shilling a quart. The labor question is a serious question in all these matters.

Mr. Foster—I am afraid if the regular price of milk was a shilling a quart we should be just as much averse to cleaning the cows as we are now, unless you raise the price on milk of the cows that were cleaned and dropped it on the others.

Mr. Scott—There is a good deal in this matter of keeping the cows clean and Mrs. Howie will tell us in the next subject some things that will help us in this matter and I do not think there is anything done in her stables but what can be done in others throughout the state. In the stables which she will describe, we try to keep the cows lined up at the edge of the gutter, and in that way a good deal is accomplished in keeping the cows clean. The cows are curry combed and we try to keep out what we are in the habit of calling the stable odor. For my part, I do not believe there is any need of it. We wouldn't want it in our own houses.

Mr. Moore—Neither would the average farmer if he had a standard to go by, want it, but he doesn't know it. As Prof. Emery has said, the first thing to lead to improvement is to realize the need of improvement. The average farmer cannot see anything the matter with his milk, he is so used to it that he doesn't know what is the matter. You have to show him some perfect milk. I have tested every sample delivered at a creamery where they had a hundred patrons, and there were as many varieties, but most of those farmers really did not know but their milk was all right. Still if you give them a sample of good, clean milk and ask them to taste it and taste their own, they can see the difference.

Mr. Foster—Especially the last half pound in the can.

Prof. Emery—I want to speak again of the way this premium butter was produced in Minnesota. These inspectors spoken of by Mr. Moore went to the farms and there selected the milk from the fresh cows and rejected the milk from cows that had been a long time freshened. We have this information from the commissioner himself. It shows that first-class butter is to be made where the milk is drawn from cows that have lately freshened, kept clean and the processes have been kept clean and sanitary. Now, if we could get these things to the attention of our dairymen, incite them to keep everything connected with the dairy perfectly clean, to thoroughly cool the milk, etc., we should have made a step forward, and I am very glad that the next paper is one that calls attention to the subject of how to keep cows clean in the stable. It seems to me that is beginning at the right end, because if the cows are kept clean in the stable, it will be easier to keep the milk clean outside.

COW STALLS.

Mrs. Adda F. Howie, Elm Grove, Wis.

Mrs. Howie.

The clear-sighted, ambitious breeder or dairyman of the present time will lay quite as much stress upon the influence of surroundings and conditions in the development of the finer characteristics and enduring qualities of a dairy herd as to the more frequently advocated advantage to be derived from a superior breed or type of cattle. For an instinctive judgment should unerringly guide him to the certain knowledge that neither breed nor type of undisputed merit could ever make a more than ordinary showing in the hands of a careless or indifferent herdsman, or under discouraging stable conditions. Therefore, in his earnest search for hidden or dormant qualities that may add to the value or productiveness of his cattle, he will be obliged to give careful heed to the seemingly trifling details that may serve to govern, even in the slightest degree, the character of off-spring, or the quality and quantity of product. And, while he may have read with both interest and profit numerous valuable chapters dilating upon the varied experience and ultimate success of others, he will not rest quite secure in his convictions until his confidence has been founded on actual experience and augmented by a close study of the natural tendencies of the animals comprising his herd. So much printed space and urgent eloquence has been devoted to strenuous appeals for more sunshine and better ventilation in our cow barns, that even the stubborn advocate of "what was good enough for the past is good enough for the present" can no longer find courage or voice to defend unsanitary stabling. The numerous new or thoughtfully renovated barns throughout our state are a worthy tribute to the steady advancement of wiser and more humane methods in the housing of our stock, yet, even with roomy, well constructed barns, where a diligent research for up-to-date improvements, together with a care for perfect sanitation, has led the owner to believe himself justified in looking forward to a substantial monetary reward for his lavish investment, the results may fall far short of his expectations if he does not go still further in his painstaking calculations to secure the greatest possible amount of comfort for the cattle.

The Stanchion.

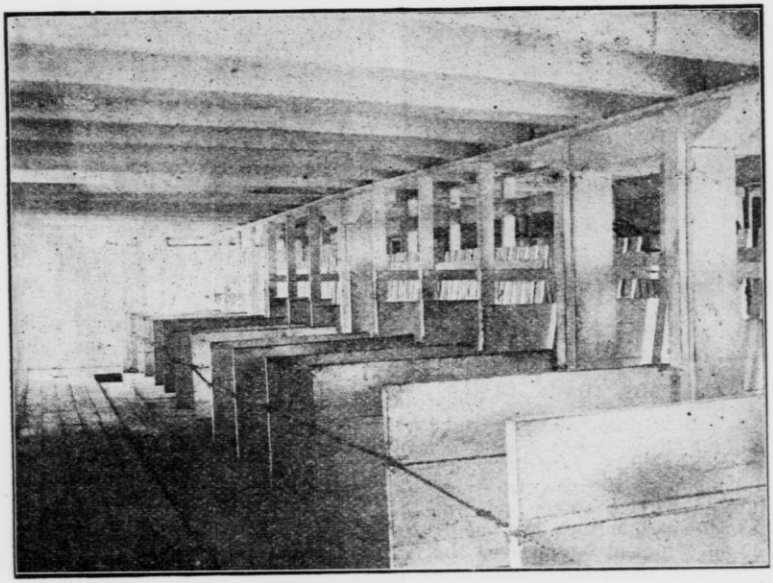
It is scarcely necessary to even mention stanchions in connection with modern cattle fixtures, for the intelligent breeder or dairyman who stops even a moment to take counsel with his better judgment and humane impulse, will unhesitatingly condemn as a relic of barbarian stupidity, if not absolute fiendishness, the rigid stanchion, that, even in this stage of advanced civilization, may sometimes be found in a modern cow barn. There is little excuse for this offense against progression, and, if

the man who has thoughtlessly introduced this instrument of torture in his stable will use his powers of observation, it will require but a short space of time to convince him that almost any kind of a stall or tie would be preferable to the rigid bars that cannot admit of perfect rest and a reasonable amount of freedom. No one possessed of a compassionate nature can walk down before a line of stanchion fastened cows without feeling a thrill of pity for the creatures that stand hampered like traitorous felons and with mute, appealing eyes proclaim an innocence reflecting on either the wisdom or sympathetic instincts of their owner. And this, too, when down through the ages comes untarnished and still legible the little guide board to man, which bears the significant admonition "A merciful man is merciful to his beast," and while the wording of this proverb has been slightly misquoted, its meaning has in no wise been changed.

And it is not alone the merciful, but the shrewd business man who will quickly recognize the practical advantage to be derived by placing a cow under the most comfortable conditions, and with a little thought all the needful requisites of the owner, in regard to preserving cleanliness, a minimum amount of labor, together with convenient handling of the animals, may be so easily blended with the desirable cattle comfort that one will regard the stanchion in the light of a hideous nightmare and try to forget that it ever existed.

The Comfortable Stall the Best.

The question of securing a commendable cattle stall will be an easy matter if one will give the necessary requirements careful consideration, and by giving the rights of the cow a first place in our calculations it will be no difficult matter to provide a stall that will satisfy all demands the most exacting owner could require. The first requisite for this purpose is clean, dry and ample space, where she may have perfect liberty and control of head, neck, limbs and muscles, and one important reason for this is that when a cow is resting she may lie in a natural position, which will invariably be found to be with her head on her side. And any stall that will insure this freedom of

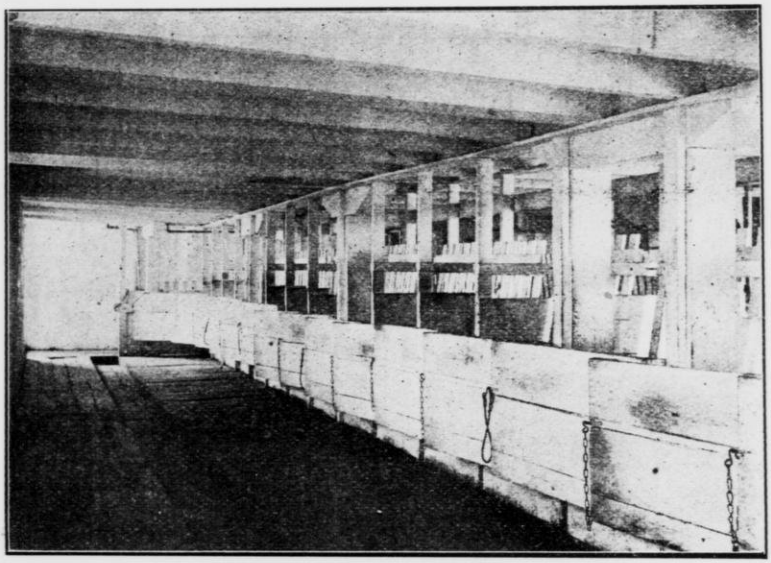


Cow Stalls in Place for the Cows.

movement may be regarded as worthy of consideration.

There are a number of most excellent patent stalls which are intended to supply both comfort for the cattle and satisfaction for the owner. Among them may be mentioned the McLeary, the patent on which is for the hinge to the self-adjusting partition, the Drown and the Bidwell. Either of these stalls will afford clean, dry and comfortable quarters for a dairy cow and the additional cost of fitting up a barn in an approved and humane manner will be trifling when compared with the increased profits that have been derived from such sources of improvements. Another stall that has proven most satisfactory is one that we have used in our own barn for a number of years and on which there is no patent. It is free to all who may desire to fit up a building with neat, cheap and unpretentious individual stalls. It is simply a succession of doors, with no posts in the rear, and, when the doors are folded back, the platform is left clear from all obstructions and may be swept or scrubbed with little labor or trouble. As there are no posts to become spattered or to interfere with rapid work while cleaning, one can readily see the advantage of being able at all times to keep a neat and attractive row of stalls.

At each end of the row is a 4x4 extending from floor to ceiling. These posts serve as anchorage for chains which are fastened from one door to the other and form a sufficient guard to keep the cattle from backing out of the stalls. A gutter at the rear keeps the platform dry and clean, and adjustable feed boxes make it an easy matter to adapt the stall to the length of any cow. And still, the beneficial influence of a roomy, convenient stall may be quite overcome by the evil resulting from the effects of a cement floor, or an undue slope of the platform.

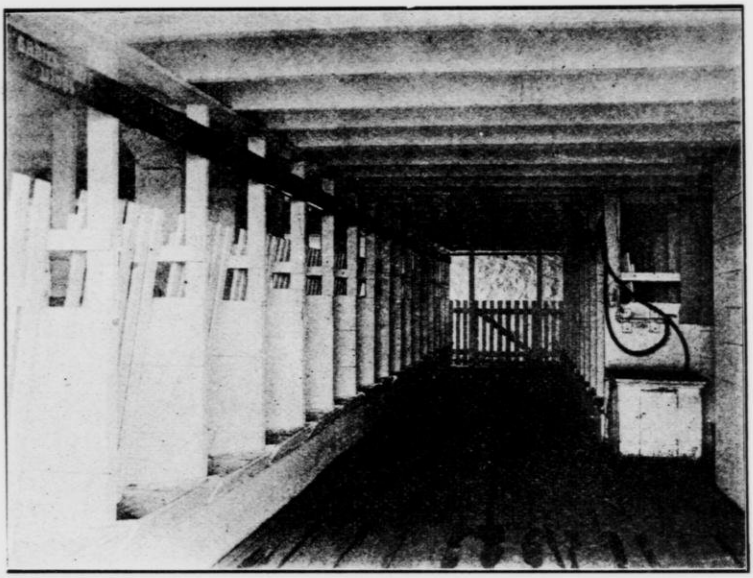


Cow Stalls as Opened When Cows Are Out of Barn.

The Cement Floor.

While the sanitary features of a cement floor may make a strong argument in favor of its adoption, any one of a reasoning mind must quickly discover its defects and as promptly reject it as a proper base for a desirable cow stall, and even if the entire barn floor be composed of this unyielding and cold

material, the platform on which the cattle stand or lie should be protected by a thick layer of some porous substance between it and the bedding. A covering of boards will, in a measure, prove a remedy, or rather a preventive to the rheumatic ills and serious udder troubles that may arise from a cow being compelled to rest upon a floor of this kind. Some valuable experiments along this line have recently been made by one of the conductors of our Institute force, which will at least furnish material for earnest thought, and may cause an owner to hesitate before placing the health and welfare of his cattle at stake.



Front View of Stalls, Showing Feeding Floor and Manger.

The Feeding Facilities.

A half inch slope will be quite sufficient to insure the necessary drainage and, even with so slight a decline, the bedding should always be carefully arranged so that all breeding stock may lie on a level surface, or with the weight of the body falling towards the shoulders. The stall with the individual feed box is to be given preference over the continuous feed trough for one reason: the proper amount of food may be fed without danger of a greedy companion satisfying her own appetite with a part of the ration designed for her neighbor. The stretching and pushing that is often acquired in this pernicious habit will result not only in unsightly swollen and calloused knees for the cows, but will prove a source of great annoyance to the systematic herdsman who wishes to keep a careful account of the kind and quality of food consumed by each animal.

The cow stall and its necessary adjuncts is one of the most important features to be considered in fitting up a modern dairy barn, where a herd is kept with the laudable object of developing the highest quality of excellence in the cattle and the maximum amount of profit for the owner.

DISCUSSION.

Capt. Arnold—What do you call this stall?

Mrs. Howie—There is no name to it, I guess it is the Howie stall. It is one my son invented for our own cattle to use. You will observe there are no posts at the back, these little doors swing back against the partition.

A Member—Is that better than the McLeary stall?

Mrs. Howie—I do not know that it is better. There is no patent on this, and you can get it a little cheaper. Those doors fold back and you have a clean, straight platform and you can turn the hose on that platform and scrub it off with a broom.

Prof. Emery—This stall was in operation before the McLeary stall was invented.

A Member—I was much troubled with my cows breaking the points of their toes in that kind of a stall. Have you been bothered that way?

Mrs. Howie—Oh, no; we should not compel a cow to stand so close to the gutter as to do that. This stall will admit of the cow stepping forward a little and moving back; never cramp a cow. I have seen in some barns chain marks all across the backs of the cows' udders where they have been cramped in that way. The toes will be liable to slip off when cows are so pressed for room. We never have that trouble, because we do not cramp our cows.

Prof. Emery—How wide are these stalls?

Mrs. Howie—They are three feet three inches from center to center, and that is quite wide enough even for a large cow, while for a small one it will be impossible for her to turn around, and that is all we wish to prevent her from doing. We want her to have perfect liberty otherwise. When the cow lies down, she can stretch her legs out and she has control of every muscle of her body, consequently she is comfortable and content, and that is what we must strive for if we are to have the best results—cleanliness, comfort and contentment.

Mr. Jacobs—I put in stanchions before I knew Mrs. Howie. After that I did not rest well, I wanted things fixed so my cows could rest well and I simply hung doors on the stanchions, put a post at the rear and hung doors there. The stanchions are there today, but they are left open and the cows are enjoying practically the same liberties as those in the adjoining Bidwell stalls.

Mr. Foster—I want to clear up one little bit of fog. Is there, in your opinion, any stall or manner of fastening cattle, in use, that will obviate the necessity of currying those cows, or cleaning them off?

Mrs. Howie—No. Our object should be to produce a first-class product right on the farms for the credit of the farmer himself. Our reputation is built there, that is our home and our occupation. Every great man strives to be at the head of his profession, and if you are a breeder or a dairyman you must consider this matter. Now, do not figure at all times to cut off work, to save work, we hear so much of that. First, make the most excellent product that is possible, and after that economize on work if you can, but when you have once produced a perfect product, no matter if it has required great effort, you will not wish to take a step backward. Now, we should curry our cattle if we are to have the best results. Some may say, "I haven't time." Of course you haven't if you curry those cattle but once in a month. You know if you didn't wash your face more than once a year, it would take quite a bit of time to get the dirt off, but if you will do it day after day it requires only a few minutes. One may curry an animal in just a few minutes with a good, stiff brush and curry comb. This is not alone intended for cleanliness, but it is a means of securing perfect health and the better condition of our cattle; it will stimulate a healthy circulation and the milk is made through the blood and as long as we can get a better quality of milk, it will pay us to thoroughly brush our cattle, and after you have once seen a row of finely groomed cattle in your barn it will break your heart to look down the row and see them filthy.

Mr. Scott—Is there less filth adhering to the cow with this stall than with any other fastening that you know of?

Mrs. Howie—Yes, there certainly is. Now, there is one thing that has troubled me a great deal, and that is, compelling our highly developed dairy cows to lie on a cement platform with those tender, nervous, highly-developed udders, and I am going to ask Mr. Scott to give you his experiments along that line, because I consider them valuable, and I am sure you will stop and think about it before placing your cattle on cement platforms.

Mr. Scott—I tried a very simple experiment in the month of January this year in a stable where the walks and gutters were cement and the platform upon which the cow lay was plank. I took two tin basins and put a quart of water in each basin at a temperature of 98 degrees, covered the basins with four thicknesses of cloth. There was a like amount of water in each basin, and I placed one upon the wooden platform and the other right around the partition on the bare cement. The temperature of that stable was very low, 39 degrees at the commencement of this experiment. Then I took the temperature of that water every 15 minutes. We started at 98 degrees and in 15 minutes the water upon the plank was 80 degrees and that upon the cement 74, a difference of six degrees. At the end of the next 15 minutes, that on the plank was 74 degrees and on the cement 66, a difference of eight degrees. At the next observation in 15 minutes, it was 70 degrees on the plank and 60 on the cement, a difference of 10 degrees; at the next observation, 67 on the plank and 56 on the cement, a difference of 11 degrees. Next, 65 on the plank and 52 on the cement. This made 13 degrees difference in an hour and a quarter. The difference remained at 13 degrees until the end of two hours, when I ceased making observations. Eight hours after the water was placed there, I made another observation, and the temperature of the stable at that time was 38 degrees, and the water upon the plank was nearly the temperature of the stable, that of 40 degrees; while that upon the cement was two degrees below, or 36 degrees. Now, this experiment is hardly fair, because, had it been the body of a cow instead of water, she generating heat, would have soon warmed the plank up to the temperature of her body, and that plank of necessity would have been as low as the stable temperature, or 39 degrees at the start; while the cement would have continually drawn the heat from her body — the radiation would have still continued.

Capt. Arnold—Why didn't you put that water there at blood heat?

Mr. Scott—I did not put it at blood heat of the cow, which is 102 degrees; 98 degrees is the blood heat of the human family.

Mrs. Howie — You can see that no matter how carefully we stable our cattle, we must give attention to every detail. You must keep them not only perfectly clean, but you must leave no unwholesome conditions, such as lying on cement platforms. If one produces poor milk from unhealthy cows, not even aeration will benefit the quality of that milk.

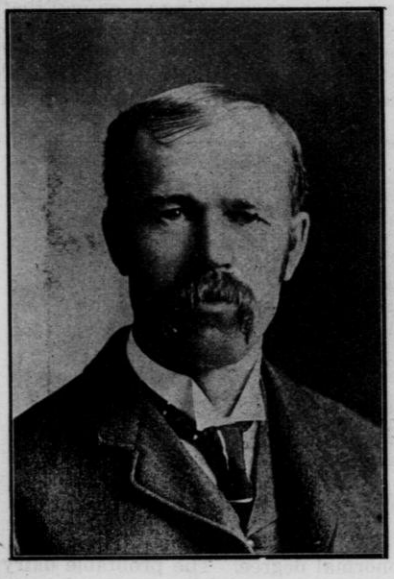
Recess till 1:30 P. M.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. Mr. L. P. Martiny was called to the Chair.

THE DAIRY COW.

E. C. Jacobs, Menomonie, Wis.



Mr. Jacobs.

All cows give some milk and all make some beef of some kind when slaughtered, so all are to a certain extent dual-purpose cows, but to be profitable, they must have the function of making beef or the function of giving milk developed to such a degree that they will render a profit over cost of keep from one or the other. The value of a cow will depend:

First, on her ability to produce beef;

Second, her ability to produce milk;

Third, her ability to perpetuate those qualities in her offspring, although the latter value will often be a minus quantity.

As to the kind or breed of cows to keep, every farmer should seriously consider what kind of a farmer he is or can be, and what kind of a farm he has; then he can intelligently determine what kind of cows will be best for him to keep. He should consider that this is a great dairy state, second in amount of dairy products, and second to none in natural advantages; that with her many cities and 3,000 creameries and cheese factories, a good market for the dairyman is available in nearly every part of the state; that a good dairy cow will always pay a profit if intelligently handled, and to those who are not in a position to make a profit in beef production, or who wish to make the most profit possible per acre of land, the dairy cow will especially commend herself.

It is often urged that the average farmer should have a cow that can give milk profitably and whose steers will make profitable beef animals. The average production of the cows of Wisconsin is about 160 pounds of butter per year per cow; then will not the average cow of the average farmer fail to make any profit in butter production; and observation teaches us that there is no profit in raising the steers from those cows. Is it not better to have a cow that can do one thing at a profit than it is to have one that can do two things at a loss? And the breeding of dairy cows with the milking function highly developed and capable of perpetuating that function in their offspring, is sufficiently difficult, without being handicapped by trying to breed the opposite or beefing temperament in the same animal.

As all cows produce offspring, so all farmers who keep cows and do not de-

pend on purchasing them to renew their herds, are breeders, and the same laws govern their operations as applies to the breeder of pure bred cattle. It would be well for many of us to investigate our breeding operations and see if we are allowing unprofitable cows to perpetuate themselves, or if we are failing to have the profitable ones reproduce themselves with their good qualities still farther enlarged.

The Sire.

As the improvement in our herds will usually come through the sire, his selection and care should be carefully considered, and if wisely done, his good quality will run on for generations, and will help increase the good effects of each succeeding sire in the herd. The beef men do not need to be cautioned against introducing dairy blood into their herds, but many seem to think it is all right for the dairyman to select sires from a beef breed, especially if from a so-called "milking strain."

What an animal has not inherited it cannot transmit, and a cow may be a very profitable producer at the pail and still not have inherited the milk-giving function strong enough to transmit it to her progeny with any degree of certainty. She transmits from her blood and not from her udder. So, in selecting a sire, it is not enough that he have a dam that is a profitable producer of dairy products, but he should be descended from a long line of dams that were profitable producers, and sires whose daughters were producers, so that in tracing back his blood lines we shall always find them possessing the dairy quality which we wish to perpetuate, and an animal that does not have this kind of breeding is not worth considering as a sire of dairy cows, even if he has milked his dam and another cow during calfhood and thus acquired the title of "milking strain."

When we have an animal whose blood lines for many generations trace only to ancestors whose qualities we wish to perpetuate, we have gone a long way toward having an animal that will be able to perpetuate those qualities, but the profitable qualities of our cattle are artificial, some function of the animal has been developed to an abnormal degree. The profitable dairy cow is far removed from nature's cow, and it is necessary to constantly guard against the tendency to revert to original and unprofitable types. To do this, a sire must not only be descended from ancestors possessing desirable qualities, but whose blood lines have originated from a similar source and have an affinity for each other, that prepotency, or the power to transmit qualities possessed, may be increased instead of impaired.

Sires should be selected continually from the same breed and from the same families within the breed, or from those families that nick or breed well together. It is the violation of this principle that is responsible for very much of the nondescript and no-

Herd at Pasture on "Elk Lake Farm," Home of E. C. Jacobs, Menomonie.

purpose stock in the state. The prepotency of the good blood has been lost or wasted by crossing. The blood lines were not of a common origin; the breeding power was lost, and reversion has taken place.

Training and Development Must Accompany Good Breeding.

The training and development of the animal for the purpose desired must accompany the breeding. We would not expect successful results on the race track from horses that had been bred for generations without development for speed, and so it is with the dairy cow; we are breeding an animal for performance, which is more difficult than to breed for type alone, and if that performance is not stimulated by the same good feeding and environment that has developed the milking qualities in her ancestors, she will fail to become the profitable dairy cow that her breeding justified her in being.

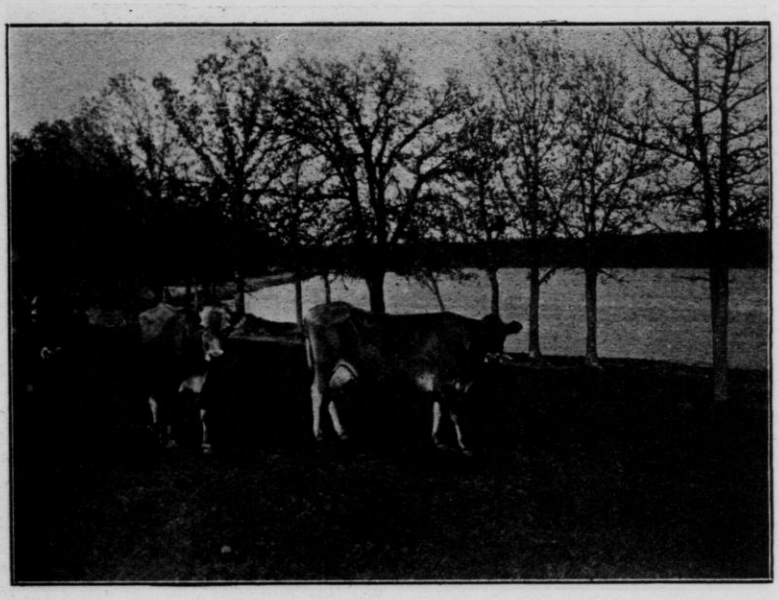
She should be trained from calfhood to consume and digest a large amount of food, then by gentle treatment and comfortable surroundings, her inherited tendency of milk giving will be given an opportunity for development.

Have a definite purpose or ideal in mind.

Breed in line of first effort.

Give the dairy cow the care which will develop her milking qualities.

Weigh and test each cow's milk, that no unprofitable cows may be kept or perpetuated in the herd.



At the Summer Resort, Elk Lake Farm, Owned by E. C. Jacobs, Menomonie, Wis.

DISCUSSION.

Mr. Foster—Tell us how to select a proper sire for a dairy herd.

Mr. Jacobs—Of course, that is a very important matter. You cannot select an animal on pedigree alone; you must have more than that. In addition to what I said in my paper in regard to his breeding, I should want the individuality of the animal to correspond to his breeding, and as to his prepotent power, it is a very hard matter, perhaps, to distinguish this in an animal, and a still harder thing to tell someone else just how to do it, but he should

show vigor in every movement, his whole appearance should indicate that he has intelligent life, that he is full of vigor and animal life, that it is so strong in him that if he isn't handled very near right he will be pretty apt to get cross. That kind of an animal goes wrong very easily, they are very highly organized, very nervous animals.

Mr. Foster—If I were going to buy a calf to raise, to place at the head of my herd, how will I judge him? He will not show the development of which you speak at that time, so what am I going to go by?

Mr. Jacobs—I should go by his pedigree very largely if he is a very young calf.

Mr. Foster — But suppose I don't know anything about the parents or the history back?

Mr. Jacobs—If you are a good judge of breeding in this breed of animals and you saw it, you will probably know what those animals may do.

Mr. Foster—But the ordinary farmer is not a judge along that line. Now, how can he know that he is getting what he is paying his good money for?

Mr. Jacobs—I think that one of the best things is the reputation of the breeder, backed up, of course, with his statement of the pedigree and performance of which I have spoken.

Mr. Foster—That is about all, isn't it, practically?

Mr. Jacobs—No, it isn't all, but it is a long way, and I think it is the best way for a man who is not a judge himself. How would you answer that question, Mr. Foster?

Scene on Jacobs' Farm, Showing Herd Header and Manure Spreader being Loaded Direct from the Manure Carrier.

Mr. Foster—I would say that one of the most important things for the ordinary farmer to know is what the parents, grandparents, great-grandparents, and as far back as he can possibly go, have ever done. That is what I would ask, what they have done. Then if I was buying the animal, I would keep close tab on him to see what he had done. Because he came from a great family way back, like some of the human race, is no sign that he is any better than the ordinary individual. I

want to know what his whole family have done, see if there is any weak point there, and that will bring you right back to the records of individual production.

Mr. Convey—Isn't there some danger in introducing fresh blood of getting infectious diseases among your herd?

Mr. Jacobs—Very much. It is a very important thing in introducing new blood to take them only from herds we know are free from disease, or keeping them in quarantine until such time as we know nothing will develop later on.

Mr. Meyer—What breed do you prefer?

Mr. Jacobs—I want to make butter, the kind that will give the most butter fat.

Supt. McKerrow — Which kind is that?

Mr. Jacobs—I do not know. I would certainly recommend a dairy breed, an animal bred for the purpose for which we want to use.

Supt. McKerrow — Will you name those dairy breeds that you would select from?

Mr. Jacobs—The Guernseys, Jerseys, Holsteins and the Ayrshires, although I am not personally acquainted with the latter, we do not have many of them in this state, they are all dairy bred animals.

Mr. Foster—Would you condemn a heifer that had had only one calf if she did not come up to your satisfaction?

Mr. Jacobs — That depends on the heifer; it depends on a great many things. It might depend on her breeding and perhaps on whether she had had any bad luck, or something had happened that she had not done well the first year, but if I had done my part by her and she did pretty poorly the first year, I should not continue the experiment any longer. If she came pretty nearly up to it, and her breeding justified her in doing a great deal better, I might continue her for another year to see if she wouldn't do better.

A Member—How many pounds has a heifer got to make in order to be retained?

Mr. Jacobs — Well, we haven't any standard just at present. I do not know as we ever will have. We are selecting out the poorer ones, there are always some poorer than others.

Question—At what age do your heifers freshen?

Mr. Jacobs—We prefer to have them freshen at a little later than two years. We used to think it was best at two years, or possibly a little younger, but we have learned some things, and one of the things we have learned is that it is better to have them freshen from two to two and a half years old; I prefer two years and three months at least.

Question—What breed of cows do you keep?

Mr. Jacobs—Well, if it is essential to this question, I am not ashamed to say that I am keeping Jerseys, although I haven't any reflection to cast on any other dairy cow for dairy purposes.

Mr. Foster — How do you pick out your poorest cows to get rid of?

Mr. Jacobs—By their records. I use some judgment also, Mr. Foster.

Capt. Arnold—About condemning a heifer who does not do well the first year, two of the best cows I ever had on my farm — one was a pure bred Shorthorn and the other was a cross bred Shorthorn with Jersey—both of those cows when they were heifers did not do anything the first year to speak of, and I was about ready to condemn them, but they afterward developed into the best cows I ever had on my farm. I would never condemn a heifer the first year. Now, if I were breeding stock for the dairy, I would get a two-year old sire, or a three-year old. You are taking a good many chances on a yearling, I do not care what breed it is. Saying everything about prepotency, transmitting the qualities of his ancestors, there are individual inherited qualities that go with individual animals that you can only be sure of their utility by buying them after they have proved their utility.

Mr. Meyer—What is the average test of your herd?

Mr. Jacobs—I could not give it to you; we never test in that way, each cow's test stands individually.

Mr. Foster—If I were to go to your dairy to buy a cow, how would you know what value to place on any one cow in the herd? You have said you

have no record of production, you are just using your judgment?

Mr. Jacobs—I see it is troubling Mr. Foster that I have spoken about records and it has developed that my records for the last year are not complete. Mr. Foster knows as well as the rest of you that sometimes we have to depend on our hired help for a great deal, and the last two years we have been up against it, have not been able to do all the things we wanted to, and that is the reason our records are not complete for the last year. For the last six months, and for several years previous to last year I can show Mr. Foster just what the cows are testing, just what the milk is weighing each month, and if he will come to my place I will be able to put a price on any cow there that, if it is not satisfactory to him, will be to me, whether he takes her or not.

Question—What has been your experience where a cow or a heifer has become beefy, what has been her tendency after that?

Mr. Jacobs—My experience has been that that cow continued that beefy tendency. I have had cows that went dry very much too soon, and the beefy tendency seemed to increase on them after that.

Question—What is your highest and your lowest test?

Mr. Jacobs—I will answer the question, although I do not think it is essential, as the point is the amount of butter fat she gives in the long run. I have had cows that tested as high as seven per cent. I do not remember any that tested below three and one-half, but very often the highest testing cow was not the most profitable.

Question—How long would you recommend the use of the same sire in the same herd?

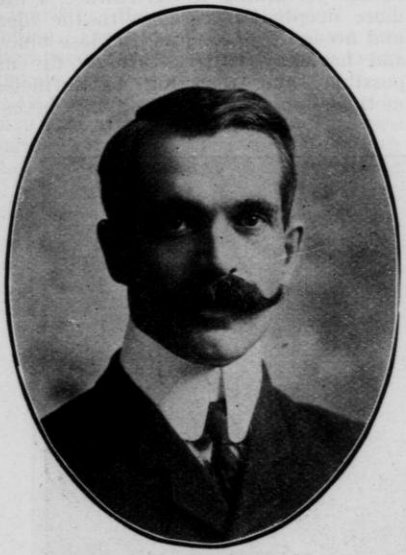
Mr. Jacobs — From my own experience, I cannot recollect using a sire to his own progeny. I am rather inclined to favor changing, but I would rather have a sire from the same family than to use him or take one from an outcross, especially if we have a grade herd. We want to intensify this breeding power and that would help to do it.

Mr. Linse—I think it is a fact that some of our best cows, as you may say, have their off years, will not do nearly so well as in previous years, and they will show up a kind of tendency to lay on fat, and yet the next year they come around all right and will be as good as ever.

Mr. Jacobs—I have seen that in my own experience, that a cow that got a good rest and got in strong flesh, if she had the dairy instinct she would use that strength in her next milking period. Perhaps the question of raising the calf so as to develop it to the best kind of a cow has not been brought out quite strong enough. It is very necessary, I think, to feed this young animal well during its growing period. Then is the time when we are establishing the constitutional vigor, and that is what we want in the dairy cow. That is the reason why we want the heifer to have time to do that in; we want to give her longer than two years, and establish her as strongly and vigorously as possible, and if we feed her the right kind of feeds, there isn't much danger of hurting the milking tendency by getting a little flesh on her.

SUMMER FEEDING.

Prof. Geo. C. Humphrey, Madison, Wis.



Prof. Humphrey.

There is no occupation or profession that furnishes greater opportunity for clear thinking than that of agriculture. The farmer is always confronted with problems, the solution of which tends to exercise the mind as well as the hands. Summer feeding is one of these problems. There are many farms in the country that can feed and maintain more live stock conveniently in winter than they can in summer. This is true, in many instances, for the reason that no provision is made for summer feeding. Where the more intensive system of farming is practiced, in combination with live stock husbandry, more attention must be given to careful feeding throughout the entire year. Feeding must be a business as much in summer as it is in winter. The time is past when cattle, sheep and hogs can be turned out in the spring-time and cease to be a care until they are again corralled late in the fall for winter feeding. This old system, which in earlier days was practiced with fewer animals, is being abandoned and a new one is taking its place.

This new system is being brought about for the following reasons: More land is being broken and put under the plow, which reduces the pasturage and increases the value of land to the extent that it must be worked more intensively, in order to pay interest on the money invested. A system of farming is being adopted which increases the number of farm animals kept, and we are becoming wise to the fact that live stock interests are of paramount importance upon our farms. It is becoming more the aim to provide a home market for farm crops by feeding them and marketing animals, or their products, thus deriving greater profits and at the same time giving opportunity to return to the soil, in form of manure, a large percentage of that which has been taken from it. This system of farming is to be encouraged, for it is the one means of insuring a state of fertility and usefulness of our farms in years to come. Again, our markets are discriminating against animals for meat purposes which are not early matured, and seldom do we consider our most profitable meat animals to be those which are allowed to summer on sparse pastures and perhaps winter at the straw pile before any attempt is made to fit them for market. The push and hustle of the American spirit has come up against our live stock conditions, and men who are the winners are pushing to their utmost capacity. Our meat producing animals are pushed as rapidly as possible from time of birth, and are put upon the market in as short a time as possible, while breeding and work animals are grown to a state of maturity in a manner to insure their highest form of development and greatest usefulness. Under no circumstances can this be done if animals are neglected and not properly fed throughout the entire year. No time perhaps in the year is there more danger of this

neglect than in the summer, when droughts occur, extremely hot weather and flies prevail, and the farmer is busy with the rush of the season, and pastures tend to grow short rather than long.

It is the experience of every good stockman that the problem of providing feed for the summer is one of prime importance, and it is hoped that a system of providing feed for summer can be adopted that shall enable us to work upon a more firm basis than merely that of experimentation. We must come to know and recognize a system of summer feeding that shall give us confidence in it as being valuable, the same as we have confidence in and know the value of certain systems of winter feeding.

In discussing this subject, I admit that my experience is limited, and my knowledge as regards the problem of summer feeding does not permit of my offering any prescribed course or system for you to follow. It is only a few opinions and suggestions that I have to offer at this time, which I trust may lead to a discussion that shall prove of benefit to us all.

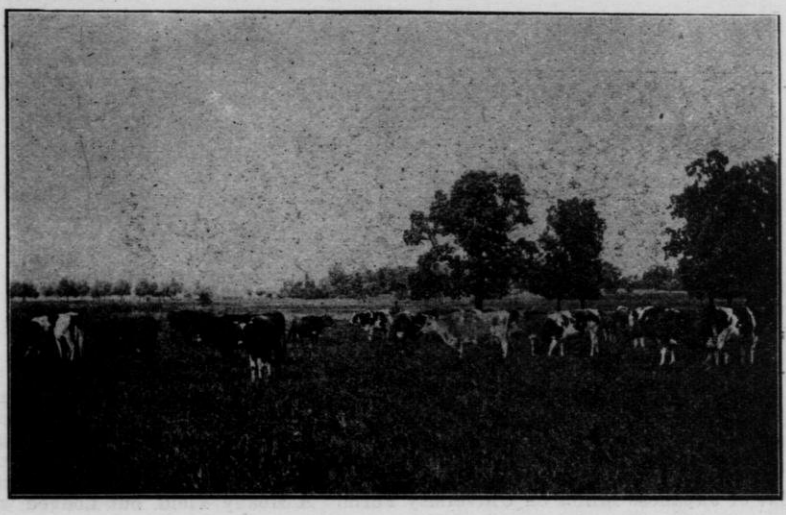
The Pasture.

In all my work with live stock and things pertaining to agriculture, I am more deeply impressed with the idea and necessity of keeping in close touch and harmony with nature so far as possible, and resorting to artificial methods only when absolutely necessary. There is one thing above all others that nature has provided for summer feeding, and that is grass. It used to appear as an insult to be told to "go to grass," but it seems today that it is a sadder mistake to turn away from it. Grass grown for pasture is a free crop on most farms, and like everything else that is free, it is quite badly neglected. There are too many grass fields in all parts of the country that are misused, being grown up to brush, which if cleared, burned and land seeded, would aid much in solving the problem of summer feeding on a great

Plat of Sorghum being Grown for Fodder on University Farm.

many farms. There are other fields which may be called old, sod-bound, wasted pasture lands which need to be rejuvenated; and again there are those which are shortened by injudiciously turning stock onto them early in the spring when the ground is soft and permitting them to be poached and ruined. Fires too, in many sections, are permitted to run over pasture lands and do great damage.

As farmers we are only beginning to turn our attention to growing grasses and clovers as a crop and this with the idea more especially of producing hay. The attention given the growing of alfalfa is encouraging, and will result, I believe, in our learning to appreciate the value of giving more attention to the production of crops that will offer us better advantages for summer feeding. I can recall to mind a few fields that have been fitted and seeded with the idea of making permanent pastures, and the growth of feed on these fields was apparently very satisfactory and so claimed to be by the owner. One field in particular which contained a mixture of timothy, blue grass, orchard grass, meadow fescue and some clover plants, impressed me as being very fine. Prof. Shaw has recommended for permanent pasture in this section of the country the following mixtures of grasses and clovers: Timothy 4 pounds, blue grass 3 pounds, red top 2 pounds, orchard grass 2 pounds, meadow fescue one pound, tall oat grass one pound, meadow fox tail one pound, alsike clover 3 pounds, white clover 2 pounds, alfalfa 2 pounds, yellow clover one pound, total 22 pounds. While this may include a greater variety than many would select for certain soil conditions, the aim should be to have variety enough to insure a catch of some one or more grasses over the entire field. One spot in the field may be too wet for some varieties, while others would survive, some varieties, the meadow fescue for instance, will endure drought and cold better than some others. It seems needless to say that in seeding a permanent pasture, great pains should be exercised in fitting the ground for the seed bed. Much the same process should be followed as that of seeding alfalfa. Where alfalfa can be grown in abundance, nothing more seems necessary to furnish pasture, soiling and hay, but we are not altogether assured of success with it in Wisconsin and may have to resort to other plants and grasses which are



University of Wisconsin Dairy Herd on Good Grass Pasture.

better adapted to our section. I believe that every farmer should be doing something to establish better pastures, commencing on a small scale perhaps until he is assured of success, and then gradually turning more of his lands into pasture. No criticism can be offered this suggestion, for the reason that we as farmers are land poor. Less land better tilled in connection with more good pasture land would be much more profitable. We hear men say they are laboring to make two blades of grass grow where one grew before, but we are too conservative. Let us resolve that we will go home and make a score or more blades of grass grow where one grows now.

A Plat of Japanese Millet on University Farm. A Heavy Yield, but Lodged with the first Heavy Storm, and Proved an Unpalatable Soiling Crop.

Need of Crops to Supplement Pasture.

With our variable seasons, subject to droughts in summer, it is wise for us to make provisions for times of emergency and have some crop that will serve as a supplement to pasture. In growing these crops, with which we are more or less familiar as soiling crops, the following considerations seem worth while.

In the first place, where good pastures are provided, there is not a necessity for these crops in abundance only in seasons of drought; consequently, it is a waste of time to grow large quantities of these crops, when they are not needed, unless they are of value when matured and handled in a ripened condition. It is the practice of some to recommend and grow a large variety of crops for this purpose, which does not seem advisable, for the reason that more time and expense is required where a variety of crops is grown, and if they are not fed in season, they cannot be handled as conveniently as can a few good crops. It is the experience of many dairymen, too, that cows changed from one soiling crop to another do not respond as well as they do where they become accustomed to one kind of soiling which is palatable to them. The palatability and total yield of various crops, and their usefulness in a ripened condition, when not used for soiling or forage, is the guide to direct us in making our selection of the crops we will grow for summer feeding.

Corn.

In addition to grasses and clovers, which includes alfalfa, it seems corn of the different varieties is to be recommended first of all in sections where it can be grown. In sections where it cannot be grown, peas and oats and barley will probably serve as its best substitute. A crop of corn is valuable in many ways. It is useful from the time it is in the silk until its supply is exhausted. The silo, which is fast becoming a necessary adjunct to every well managed farm, has increased the value of corn, both as a winter and as a summer feed. We hope to be able to report this year the result of feeding silage to our dairy herd in the summer time. We believe there are few methods of handling corn on the dairy farm that is any more economical than that of putting it in the silo. Where large herds are maintained, the amount of time and labor required in summer to handle soiling crops, and the disagreeableness of handling it at times when the weather is wet and fields are muddy, go to argue in favor of summer feeding of silage.

Sorghum.

Next to corn, sorghum is very highly recommended as a late summer feed for cattle, hogs and other classes of stock. Enormous yields of it are reported, surpassing that of any other crop, and its palatability is unquestioned. It can be cut and cured where sowed thick and is not allowed to get too coarse, and will serve as very good hay, the leaves being smoother and equally as palatable as those of corn. Cattle and pigs will eat the grain and chew the stalks of ripened cane, and in this form it is considered to be good feed that need not be wasted if not fed as soiling.

Rape.

I consider the Dwarf Essex variety of rape a plant worthy of recognition and valuable where it can be successfully grown to furnish summer feed for lambs and growing pigs. The nature of its growth enables it to yield a large quantity of palatable feed until late in the fall.

There are many other plants which grow luxuriantly, such as the millets and vetches, but their palatability and greatest usefulness seem questionable, and under these circumstances it does not seem wise to recommend them. More or less concentrates are necessary for successful feeding, and to make our feeding profitable, it seems we cannot afford to feed concentrates in combination with other feeds that cannot be recommended with a certainty.

DISCUSSION.

Mr. Foster—You spoke about permanent pastures. Is not some caution necessary about that, or can we go at it and lay down a permanent pasture wherever we happen to be located?

Prof. Humphrey — I have suggested that you commence on a small scale until you are satisfied what you can do. There is not a farmer here but what has an acre or two of waste land somewhere handy to the barn which he can seed with very little difficulty to some mixture recommended by our best authorities on grasses and give it a trial. You may fail; I failed last year in getting a catch, because we were a little late in sowing our seed, and the spring drought followed and the seed never started, but we are going to try again—it didn't cost much. The trouble is, we think about these things and think they will cost too much and we never do anything. We are looking out for obstacles, most of us, but what you want to do is to go home and commence doing something.

A great many of us are what we might term "land poor," we have more land than we need to work. We follow up this scheme of rotation, which is a good one, trying to cover a vast number of acres, when, if we would cut them down one-half and practice a good system of rotation on the one-half of our farm, perhaps for a period of 10 years, and turn the other half into permanent pasture for five or 10 years, I believe it would be more profitable for every man than to try to work so much land. While you are working one part of your farm intensively, practicing rotation, just let the other part be raising a good permanent pasture.

Mr. Goodrich—Most all farms have places that are not really suitable for rotation of crops, sidehills or some land

that is not in the right shape for plowing.

Prof. Humphrey — Very true; as I said, there are a great many little patches on our farms that are being neglected year after year and nothing is being done with them. Perhaps they will furnish a little pasture, but they might be seeded and put into the best kind of a pasture, and I believe that when we know more concerning permanent pastures, we will find it practical to let more of our land lie in that condition. We do not appreciate what a pasture means, we do not know, a great many of us, the cost of growing soiling crops for this summer feeding. I am in hopes that we can give you data from our work at the Station that will show you what it is costing to grow these soiling crops and to feed them to our herds.

Mr. Convey — For several years we have kept land in permanent pasture, and it is the kind of land that Mr. Goodrich speaks about. We find it gets sod bound and runs to weeds, but worse than that, we find it gets to be much in the same condition as a good deal of land that is used for sheep, it becomes infested with insects, worms, lung worms, etc. I admit where you have long grass the same things do not occur, but on low ground your calves and colts get full of stomach worms.

Prof. Humphrey—I do not know to what length of time you could permit a field to lie as permanent pasture before it was necessary to break it up and seed some other portion of your farm. My experience is limited, as I say.

Question—Is rape not good for cattle also?

Prof. Humphrey—Rape for dairy cattle cannot be recommended, for the reason that it taints the milk. It is true that rape is a good deal like turnip when fed to the dairy cow, it has a tendency to taint the milk.

Mr. Linse—The question of soiling is the most important question we have to deal with with the cow, and I say whether you have permanent pasture or pasture not permanent, it is necessary to look for some soiling crop in our short and dry summers, and a dairyman especially cannot very well carry on successful dairying without having some soiling crop. I have been raising soiling crops for the last 40 years, and while I had lots of pasture, no matter whether my cows had more pasture than they could consume in the start, pretty soon the drought would come, or the time will come when they will not touch it, and you have to resort to soiling crops. I feed silage as long as it lasts, but so far I cannot make it last, although I have kept building silos and silos and am going to build more. Last summer the silage lasted to the first of July.

Capt. Arnold—Some men seem to consider only their own locality. Now, this idea of a permanent pasture is a practical thing, especially in northern Wisconsin and along the river counties. How would Mr. Rietbrock have undertaken in his vast territory to have stuck to rotation of crops and not have any permanent pasture? How would a man in Trempealeau county get along without a permanent pasture? They are a necessity and the idea is to make the best of it. I have found out through experience that you never can have as good permanent pasture after you have broken the land as if you had never touched it, just take it in its native state and get it seeded and you will have a better pasture the year around than you will have in any other way. After it has become sod bound then use a cutaway harrow, or a disc harrow, or better than that, turn the hogs in and let them harrow. Sow on some grass seed, this mixture spoken of by the professor, and then you have a permanent pasture for three or four years longer, and then do it over again. Never cultivate this rough ground at all. I want to know, however, whether it is going to pay to feed cattle grain in the summer time, Professor?

Prof. Humphrey — My experience is limited, and I am not able to answer intelligently to what extent you could feed these cattle grain, but I am satisfied that you can afford to feed your dairy cattle more or less grain in connection with the pasture or soiling.

Mr. Scribner—We have to be governed a good deal by the lay of our land, and all that. If your land lies in a suitable way to have rotation of crops, we will be able to take advantake of it. We have one field in hay and one field in pasture; after the hay

is cut off, we are able to give our cattle twice as much pasture from that time until fall, just when they need it the most. I realize that we can get a good deal more pasture off of new seeding than we can some old land.

Mr. Martiny—You work your pasture in with your rotation of crops?

Mr. Scribner—Yes.

Mr. Jacobs—The quality of the soil also makes a difference in the question of a permanent pasture. I have seen considerable disappointment on land that was not fit for cultivation and in some of our soils I know that the length of time to leave a permanent pasture is one year, and we get better results in that way, and if we have more land than we can cultivate properly, I believe it is a good thing to sell it and let somebody else pay the taxes on it.

Prof. Humphrey—I do not think we understand the growing of permanent pastures as yet. We never have studied that subject as we have studied the growing of corn, for instance. I think a good many failures have been due to the fact that we have not properly selected the location nor the seed, nor properly put it into the ground. I confess I know very little on this subject, and shall be glad of any points I can get the benefit of in such a discussion as this.

Mr. Convey—We have tried the summer feeding of grain, and we agree that it pays; but we must depend on green soiling crops, even if we feed the grain. Grain is high priced, expensive, and we get just about as good results in feeding green clover, sorghum and silage. There may be seasons when you may not be able to piece out your soiling crops, and then of course the grain helps out.

Capt. Arnold—You have been in a locality where they have the best fodders and they raise the best cattle, and we are anxious to know something about this. Some claim that you can feed a bunch of steers all through the summer season at a profit. I never have succeeded in doing that. I think that as much as we desire early maturity, if you keep a steer only to the age of 16 months, they ought to have some chance to rest their stomach from the highly concentrated feeds and during this time give them flush pasture. As I said yesterday, in long pasture the sugar is all up in the stalk. Now, this would prevail along through the months of June, July, and August, and I would feed my cattle grain up to the time they are put on this flush pasture, and begin to get them on the feed as rapidly as possible after they had left the pasture, during all this time keeping them away from the flies in the daytime and turning them out at night. I have yet to learn that I can make money by feeding these steers grain through this flush season with that kind of grass. The dairy cow that has to trot all day and hunt her living isn't going to give much milk, but if steers have the right kind of feed I do not believe they will gain much more in the interim than to pay for the food three months in the year.

Prof. Humphrey—I believe that in feeding beef cattle the aim and object should be to keep them improving continually. Now, if there is a period during the summer when your fat cattle or your feeders can be turned out and make gains, or even maintain their weight on pasture in dry weather, that is not a profitable time to feed grain to that class of cattle, but I believe it is possible to furnish some grain through that period of the summer when flies are bad and pastures are parched and short, which will prevent cattle losing in weight, because we have to make up losses when we bring them in.

Mr. McGilvra—Two years ago, at an Institute held at our town, one of the gentlemen who was working on the Institute was talking about permanent pastures, and he referred to his farm near Beloit. That pasture, this gentleman stated, had never been plowed, but it was occasionally top-dressed. That was a little piece of land, he said. Now, then, a good many here have jumped to the conclusion that the professor had been advising us to seed our farms, irrespective of the surface, but he says the rough spots, and that is all right, because most of us have rough spots that might better be seeded then to attempt to crop them, because they are likely to wash away any time.

Mr. Goodrich—Almost all farmers have some land that is not just fit in

its present situation to practice rotation of crops upon. I will give an instance on my farm. Quite a good many years ago I had a piece of land (ten acres), pretty nearly level, but there were some places that were too wet to plow, and the spots that could be plowed were in little patches around, making it very inconvenient. I turned that into a permanent pasture; I sowed a large variety of seeds, orchard grass, red top, timothy, alsike clover and red clover, I do not remember any others, and I sowed on a large amount of seed. Now, I had the kind of grass that was fitted to every variety of soil, and, after a few years, there were some places where only the red top had survived: there were places where the ground was cold and wet and there were places where there was hardly anything but marsh grass, different kinds grew on different parts of it, all through the field. If I had only sown one kind of grass there, there would have been places where the weeds would have grown up, but by doing as I did there was something fitted for every variety of soil. Then there is another reason why a variety is a good thing; some kinds of grass grow up early in the season and soon begin to get old and tough. Then other kinds come up later and in this way you have a mixture in which there is fresh feed nearly all summer. That is a good field to plow now, because I have tile drained it and taken the water out, and I do not have to have it in permanent pasture, but on hilly land with plenty of variety, a permanent pasture is a good thing, such land as would be washed down most likely if we tried to cultivate it. That permanent pasture I speak of has been there for 18 or 20 years. I top-dress it occasionally and I would scarify it, dig it up occasionally, and seed it over again, and it is a very productive pasture all the time.

A Member—How would green clover do to put in the silo for summer feeding?

Mr. Convey—I have tried it for summer feeding. I think summer silage is harder to keep than winter silage, it spoils on account of the warm weather.

A Member—How would you sow this seed on permanent pasture to make it a better pasture, at what time?

Prof. Humphrey—My idea would be to treat the land similar to the treatment for sowing alfalfa; that is, to plow in the fall or very early in the spring, and then work your land down thoroughly, getting it as level as possible. We cannot hope to seed successfully on land that is not properly fitted, full of hills and hummocks, but if you work the land down thoroughly and make a good seed bed and then sow on the seed early in the spring, I believe that is the better way.

A Member—I mean the permanent pasture that is already seeded down. You do not want to plow that down? At what time would you seed it?

Prof. Humphrey—Early in the spring, just as the frost is coming out, I should consider the best time, and I would try to get a mixture that would contain seed fitted to all kinds of conditions. The mixture that is recommended is timothy, blue grass, red top, orchard grass; with some alsike clover and white clover, and perhaps a little alfalfa.

Prof. Emery—Do you recommend alfalfa?

Prof. Humphrey—In our western districts, where they grow alfalfa in great abundance, they pasture it very successfully.

Prof. Emery—I think we are practically assured that if we pasture alfalfa it is a dead failure.

Supt. McKerrow—I have to a very limited extent mixed alfalfa seed with different clovers and timothy, where I have been going to pasture, and I have been well satisfied with it. I have seen pastures over in Sheboygan county, Wisconsin, and on the farm of Mr. A. Simenton, in Ontario, where the men who owned the pastures are very well satisfied with their expenditures for alfalfa seed to put with other seed in the pasture that was to lie for two or three years.

Mr. Goodrich—Would you recommend any one to pasture an alfalfa meadow?

Supt. McKerrow—No, sir; we are talking about pasture, not a meadow. It is profitable to mix in with other seed, but pure alfalfa should never be pastured.

THE APPLE ORCHARD.

Geo. C. Hill, Rosendale, Wis.

When a couple of young people get a piece of land and start to make a new home, one of the things thought desirable and provided for is the fruit orchard. Sometimes it is the man that thinks first of the orchard, but more often it is the wife, she naturally appreciating the value of fruit in the home.

On account of its beautiful color and tempting flavor, some have thought the apple was the fruit plucked by the first lady of the land with which to entice her lord, but unless the native apple of paradise was better of color and flavor than the wild apples of our forests, I do not think the temptation to partake would have been very strong.

The apple is acknowledged to be the king of fruits, because of the variety in flavor, color and long season of usefulness, and its adaptability to a wide range of soil and climate. It is grown with more or less success in nearly all the counties of Wisconsin. Some sections, as the red clay soils of the eastern counties, and the rolling clay lands of western Wisconsin, are well adapted to orcharding. Fairly good results are had on the prairie soils, while the sandy valleys give the poorest results.

Commercial Orchards.

If one is located on some of the first-mentioned lands, and has a liking for apple growing, the business may be profitable. In that case, I would plant few varieties, mostly Duchess, Wealthy and Northwestern Greening. There are other sorts desirable for show and to eat, but we want apples to sell—money makers—enough of one variety to fill a box car. These varieties are hardy and productive, the fruit is handsome, good quality and good sellers; the trees are shapely and lasting. Some question the quality of the Northwestern Greening, but its size, beauty and long keeping habit keep it in the list of profitable market varieties.

The Farmer's Orchard.

The farmer's orchard is another affair. The family need a variety of fruit; early, medium and late, of various flavors, size, colors, tart and sweet, suitable for both eating and cooking. Hardiness may be partially sacrificed for quality. The Red Astrachan tree does not live forever, but will produce fruit enough to pay for planting.

Varieties for Home Use.

For an orchard of 25 trees, I would suggest two Duchess, two Astrachan, four Wealthy, four Fameuse, two Talman Sweet, two Golden Russett, two Northwestern Greening, one Sweet Fameuse, one Roman Stem, one Perry Russett, one Hyslop, one Whitney No. 20, one Sweet Russett. The three last are crabs. In addition, I would plant a few Virginia crabs for top working.

Every farmer, or some of the family, should know how to graft, a very simple art. After these crab stocks have been planted one year or more, desirable half-hardy, or some new variety may be grafted onto them near the top of the stem. Now we have a hardy stock, and in this way may grow some choice kinds like Northern Spy, Grimes' Golden, Fall Orange, and other desirable of the less hardy varieties.

How to Get the Trees.

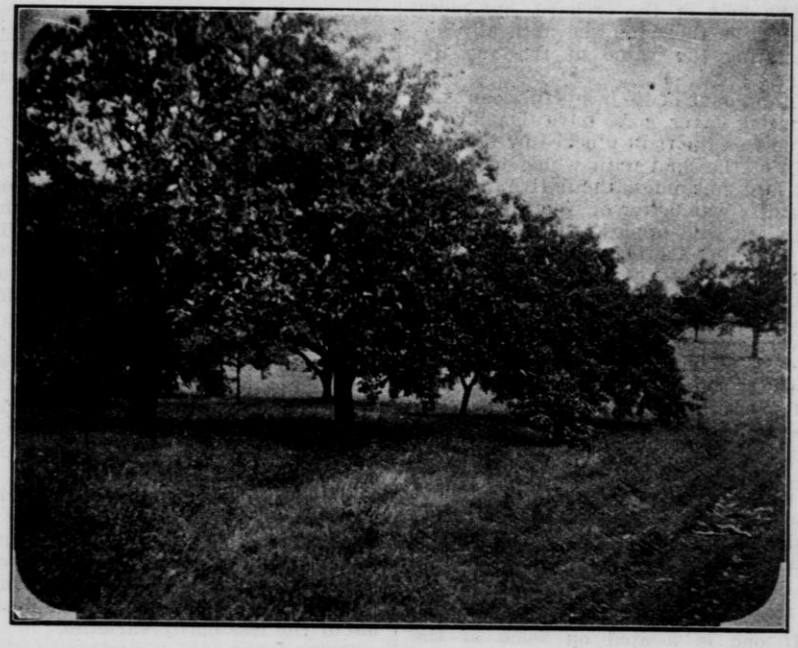
Send to several Wisconsin nurserymen for catalogues and prices. If the list of varieties is not complete, or prices too high, look further. In most catalogues, trees are offered for 18 to 20 cents by the dozen or 50, and the transportation will add two to four cents. A good, young apple tree is worth $1, but we can get all we want for 25 cents each, or less.

Traveling tree peddlers may benefit the community in one way: they induce many to buy trees that would not otherwise get them. It is a question, however, whether the results are much

good. Trees obtained in that way often are not properly cared for, soon go to destruction, and are a dead loss. Warranted trees are a snare and a delusion. It is only another way for the agent to call again and sell more. One can do his own insuring by getting live trees and properly planting and caring for them. I think my loss from transplanting would not exceed one in a hundred.

will be the better for it. Then the fruit is more easily accessible when near the dwelling. But we may find some better place to grow apple trees on another part of the farm, only it looks lonesome.

A northwest, north or northeast slope, with clay soil, is a good location, but the apple tree will thrive wherever the oak tree grows.



Over by the Orchard where the Snow Apples Grow, on Farm of Geo. C. Hill & Son, Rosendale, Wis.

I would not pay big prices for something new and untried. The latest fake is a seedless apple for $3 each. The quality has been pronounced inferior to Ben Davis.

Location.

I like to have the orchard near the dwelling. It is associated with a home of comfort and luxury; it is a thing of beauty. Any amount of sentiment can be indulged in concerning it, without harming one, and probably the orchard

I prefer thrifty, two-year-old trees to those which are older and larger. I want the tree pruned to nearly a straight stem when planted. This is one of the essentials of successful transplanting. Plant in rows 30 feet apart and 25 feet in the row.

Cultivation.

Give clean cultivation. Some hoed crop may help to keep up the culture. Alternate with clover. The fertility should be kept up, but not to too great

an extent. Never plow deep near the tree. It would be better if the plow is banished from the orchard after a few seasons' growth of the trees. The orchard is no place for a grain crop. Stock must not be allowed in it, not even the rabbit. It should not be allowed to go to grass. Clover is all right if we can keep the blue grass out.

The Grass Method of Orcharding.

A good deal of discussion is going on about the grass mulch method of orcharding. I believe it is all right under some conditions, but though it is successfully practiced on our farm, I do not like to advocate the method in public. Most farmers have too much grass already with their trees for their own or their owner's good. The orchard is mowed or pastured; the trees are sod bound, stunted, starved, drought sick, unproductive. I am acquainted with one productive orchard in Wisconsin that is in grass. It contains about 100 trees, many of them 30 years old. About one-third of the number are Fameuse. The orchard was in cultivation 12 or 15 years. The trees were headed low and cultivation became difficult. Then it was seeded to clover. After some years, June grass took possession of the ground. The grass mulch method would cut the grass and pile it under the trees to keep the soil moist and make fertility. Our practice is to take off one crop of grass and top-dress liberally with stable manure. No pasturing is allowed. The second growth of grass makes a cover crop for winter protection. Any small trees liable to be girdled are banked with earth, or coal ashes. The low habit of the trees makes it too shady under the branches for grass to flourish. The tough sod is not found there. Fruit that falls to the ground meets a clean, comfortable reception. The trees have been longer lived than those planted on neighboring farms with different treatment. No trees were lost or apparently injured during the destructive winter of 1898 and 1899.

Scarcely any blight has occurred. Yellow transparent trees have been in bearing several years without blighting, while some planted on the edge of the garden are doomed. The trees have been moderately pruned, water sprouts and root sprouts cut away. Spraying is necessary to grow fine fruit. The necessity will increase. There are about fifteen varieties in the orchard, Duchess, Wealthy, Fameuse, Plum Cider, Roman Stem and McMahan have been the most productive. The orchard is the most profitable acre on the farm.

Finally, my advice is, plant some apple trees, but do not practice any grass cultivation.

DISCUSSION.

Mr. Meyer—Wouldn't you recommend more winter apples than you have on your list?

Mr. Hill—Why, I thought a good proportion were winter apples. The Duchess and the Astrachan are the only two summer varieties there. The Wealthy is a fall apple and in some cases it may be a winter apple. Week before last we saw in one of our Institutes as fine a basket of Wealthys as I ever saw, just kept in a common cellar up to the last week in February.

Capt. Arnold—What is the best winter apple?

Mr. Hill—The best winter apple that we grow is the Grimes Golden. That is quite a tender variety, and yet we grow it top-grafted on crab stocks and it passes through our hard winters and never has shown any indication of dying.

Capt. Arnold—Is not mulching with stable manure injurious to the tree?

Mr. Hill—No, sir, unless you put it on too liberally and too close to the tree and get the ground so rich that you are exciting a growth that will injure it, but there are more orchards in Wisconsin starved than too liberally fed. When fertilizer is applied it should be spread over the entire surface of the ground.

Capt. Arnold—Can we grow Northern Spies or Baldwins?

Mr. Hill—We can grow Northern Spies in the way I spoke of. They are not long lived, however, but we can grow them by top working them on crab stocks, or by buying trees.

Capt. Arnold—I find the Hibernal will keep a little later into the winter.

Mr. Hill—I recommend you to get half a dozen Virginia crabs, for they are fast growing and you can put on anything desirable, or, if you lose a tree in the orchard, you can top graft one of these and put it in its place. We are all the while finding desirable apples in different portions of the state and we should get some scions and put them in.

Question—Have you any remedy to prevent winter killing?

Mr. Hill—We haven't needed any remedy, except in the winter of '98-'99, when the ground was bare and thousands, ten thousands of trees, died, and nursery stock was killed; but we didn't lose a tree, simply because of the grass mulch, I suppose. If we are sure we are going to have bare ground in the orchard it is necessary to have it protected in some way with a mulch.

A Member—Is it more apt to winter kill on a sandy soil than clay soil?

Mr. Hill—I do not know, but I think it is.

Question—Would you cut back trees this coming spring that were set out last year?

Mr. Hill—No. If I am going to plant a tree this year I would prune it back to nearly a straight stem. Now a good many nurserymen and tree agents recommend to the farmers to plant the tree just as it comes from the nursery. I do not think that is the best way, because in digging that tree it has lost about half its roots and it won't make any growth. I have always seen my best results by cutting it down to about a straight stem.

Mr. Meyer—Crabs will blight more than any other variety, will they not?

Mr. Hill—Some of the crabs; the Transcendent does and some of the others, but the Hyslop does not; the Whitney No. 20, which is called a crab, does not blight, and the Virginia crab does not blight. Do not plant any varieties that blight. Some of us differ about blight, and some cut it off and burn it, but do not go to that trouble. I think we always find blight when the new growth is rapid and soft and the weather comes out hot and muggy.

Mr. McGilvra—If you want to know anything about blight send to the Experiment Station and get their bulletin on spraying.

Mr. Hill—Do they claim that spraying will prevent blight?

Mr. McGilvra—Yes, I think they do.

A Member—At Madison they do not claim they can cure twig blight by spraying; the only way is to cut off the twig several inches below the blight and dip your knife in some solution that will kill the blight, and burn the twigs. When do you save your scions? When do you do your grafting?

Mr. Hill—It is best to cut the scions in the fall and put them in protection. I cut them about the time the ground freezes. I lay them in bundles, put on a label on a little piece of white wood, and they are put under a lot of leaves with some brush over them. In that way we get scions that the winter has not affected. It is best to put them in just as the buds begin to start in the spring, not very early, because if we put the scion into the stock early, say several weeks before the sap begins to flow into the bud, there is nothing to keep those scions from drying up, but when the sap is flowing in the stock then it goes immediately into the scion and it buds out.

Question—Did you ever have any lice on apple trees?

Mr. Hill—Yes, we have had our orchard covered with them, but they disappeared and we haven't had any real trouble with oyster shell bark lice for fifteen years.

A Member—What do you recommend for sun scald?

Mr. Martiny—Better tell how to prevent it.

Mr. Hill—It can be prevented by shading the tree, but that comes a good deal more on certain varieties than others, also on certain kinds of soil. I think a sandy soil and a cold winter are very apt to cause that kind of trouble, but it can be prevented by setting up a board on the south side of the tree—a board six inches wide. Planted with the tree it will last a good many years. Then when we get these low headed trees to shade the stem, that is a protection.

Question—How high would you trim an apple tree?

Mr. Hill—A two-year-old tree, if properly grown, will be about four to five feet in height, and of course it will have some limbs down to perhaps within eighteen to twenty inches of the ground. I would cut the limbs out to about three to four feet from the ground. When I was a boy in New England they started them way up so they could drive under them, and that would be necessary if we were going to keep up cultivation. But in our case, by heading low, when they begin to bear, the bearing branches touch the ground so that we can pick most of the fruit from the ground.

QUESTION BOX.

The Chairman—We have a little time left for general discussion if anyone has anything to say.

Mr. Meyer—We have a very fine herd of cows at Madison at the dairy barn, and they are fed, of course, a proper ration and well taken care of. I would like to know whether these cows are a profitable investment to the state for the feed furnished them and the labor of taking care of them, calculating it on a butter basis. Of course, not calculating in the $20,000 building.

Prof. Humphrey—We keep an accurate record of all food that is fed to our dairy herd and of all the results. In the report for the last year we find that the profits returned, over and above the cost of feeding for the poorest cow, was $30, and the best cow was $78.88, and you can figure the labor off of that. Of course, our conditions there would be more expensive than yours on the farm. Some of our help is high-priced, but I am satisfied the herd would be self-sustaining provided we had no bad accidents, with the help we employ just in the dairy barn. We figure on the basis of the butter fat produced, and we put a value on the skim milk of 15 cents a hundred pounds, figuring the butter at 20 cents a pound, although butter has been somewhat higher than that for the past season.

Supt. McKerrow—One thing we must bear in mind—that our dairy herd is kept for experimental purposes, not for profit, but if they can show a profit or pay their way, it will be satisfactory.

Mr. Meyer—That is what I was thinking. If under these high-priced surroundings they can pay their way, we ordinary fellows ought to make a profit.

Prof. Emery—The experiment station is organized and maintained not for the purpose of making a profit, as an institution itself, but to conduct experiments which will save the farmers from losses that they would sustain if they carried on operations in certain ways, and to make clear profitable methods for doing farm work. The money is appropriated to conduct those experiments in order to save ourselves from losses, and these experiments must necessarily often prove expensive.

Mr. Meyer—I would like to inquire how many silos there are in the county of Eau Claire.

Mr. Foster—There are about twenty-five in the county.

Supt. McKerrow—I have been speaking to a gentleman in the rear of the hall, Mr. Drummond, who represents a packing establishment in this city where there is a government inspector who inspects all animals killed, and he tells me that tuberculosis in hogs is doubling up each year the last two or three years, which shows that tuberculosis in cows must be doubling up also, because in a dairy district like the one in which they buy

their hogs, about the only feed they rely on that will carry the bacilli is skim milk. That is something for the farmers to think about.

Prof. Emery—And it is something for the farmers to think about to insist that the creamery returns the skim milk sterilized. In the ordinary engine two-thirds of the energy goes to waste in the exhaust system, and this great advantage to the farmers, the return of the skim milk, is not appreciated.

Supt. McKerrow—In addition to what I have said just now, if this country is doubling up the tuberculosis in the hogs that drink up the skim milk, it is also doubling up in the calves. At this rate tuberculosis in the dairy herds will increase as rapidly as it has in Denmark and other countries.

Prof. Emery—And it is quite time that through the agency of the state we see that diseased animals are not allowed to come in from other states.

Supt. McKerrow—That is another big question. I believe that there is a bill now before the legislature requiring the testing of breeding animals before they come into the state. You cannot test feeding animals in the stock yards at Chicago very well.

Prof. Emery—Then the question comes up whether a few feeders shall bring in diseased cattle to the detriment of the farmers of Wisconsin.

Supt. McKerrow—The great bulk of cattle brought into the state to feed are open-air cattle that have very little disease. The great danger comes in from the close-housed breeding cattle that are brought in.

Capt. Arnold—You mean thoroughbreds?

Supt. McKerrow—Yes, as a rule, or you might say dairy cows also, although there are not many grade dairy cows brought into Wisconsin.

Mr. Meyer—The experiments at Madison ought to help out on this line; such animals should all be tested.

A Member—It takes more than one test to determine.

Supt. McKerrow—No, one test determines, as a rule, if your animal is affected.

Mr. Vance—We had four or five cattle taken to the slaughter house. I saw those cattle all slaughtered and hung up, and they were cattle that I should judge from the coats on them had not been very closely housed. They had been taken care of probably as a great many dairymen take care of their cattle, and the ones that were apparently in the most healthy condition to look at were the worst when they were opened.

Supt. McKerrow—Yes, you cannot tell by a physical examination. Very likely what housing they got was in a close place where the air was foul.

Mr. Convey—There is a common idea that dairy cattle are more liable to this disease, but I have been surprised to find how much larger per cent there is among beef cattle.

Supt. McKerrow—Government inspectors in Chicago told me three years ago that when they inspected cattle from the ranges of the southwest that were never kept in barns they found no tuberculosis, but as the cattle were shipped in from the more northerly districts, where they are housed, they developed more tuberculosis. The cattle shipped from the dairy districts, where they are housed a great deal of the year, showed still more, but the tuberculosis did not run either with the dairy breeds or the beef breeds alone.

Capt. Arnold—Mr. Convey's statement that there are more beef cattle diseased than there are dairy cattle reminds me of the old riddle: Why do white sheep eat more than black sheep? And the answer is simply: Because there are more white sheep than black ones to eat. There are more beef cattle than there are dairy cattle, and therefore there is more tuberculosis among beef cattle.

Mr. Scribner—Do not tumble over yourselves and get scared about tuberculosis. Go ahead and clean up your barns, put in more light and better ventilation, and you will steer clear of tuberculosis all right. Feed a lot of silage. The foolish idea is sometimes expressed that this is bad for the cattle, but I have fed silage for twenty years and never raised an animal that had tuberculosis.

RESOLUTIONS.

The committee on resolutions, through its chairman, Mr. E. L. Aderhold, made the following report, which was unanimously adopted:

Resolved, By the Wisconsin Farmers' Institute, in its nineteenth annual session at Eau Claire—

That the thanks of this institute is hereby extended to the people of Eau Claire and vicinity for the cordial reception and entertainment of visitors and members of the Institute force.

Resolved, That we appreciate the hearty address of welcome given us by County Judge Geo. L. Blum; also the excellent accommodations received at hotels, and especially at the Galloway, which has been used as headquarters.

Whereas, We feel that we were especially benefited by the presence at our sessions of Mrs. Laws of Minnesota, Mr. Greeley of South Dakota, Miss Conley of Wausau, and Mr. Davis of Menomonie; therefore, be it

Resolved, That we extend them our thanks.

Resolved, That we commend the exhibits of farm products as showing a high quality.

Resolved, That we extend to the several railroads a vote of thanks for the special rates granted to those attending this Institute.

Whereas, the state has made an appropriation for a Wisconsin exhibit at the Lewis and Clark exposition at Portland in 1905, we do ask the authorities in charge to set aside a liberal portion of this fund to be used in encouraging a live stock and dairy exhibit from Wisconsin.

Whereas, The farmers and dairymen of the state of Wisconsin are sustaining an annual loss, which is estimated at not less than $5,000,000, in consequence of the unsanitary condition of some of the milk delivered at our creameries and cheese factories, and also the unsanitary condition of some of the creameries and cheese factories themselves, which causes a smaller consumption of, and a decreased price obtained, for our dairy products; therefore, be it

Resolved, That we, the farmers and dairymen assembled at this Round-up Institute, do hereby urge upon the legislature the necessity of the enactment of a law providing for a sufficient number of inspectors, to be under the control of the Dairy and Food Commission, which shall be adequate for the inspection of the factories, creameries and milk supplies, to the end that the laws upon our statute books may be enforced and this serious loss to our milk producers be prevented, and also to inspect all other food products which are offered for sale within the state. Be it further

Resolved, That Supt. McKerrow be and is hereby instructed to furnish each member of the legislature now in session at Madison with a copy of this resolution.

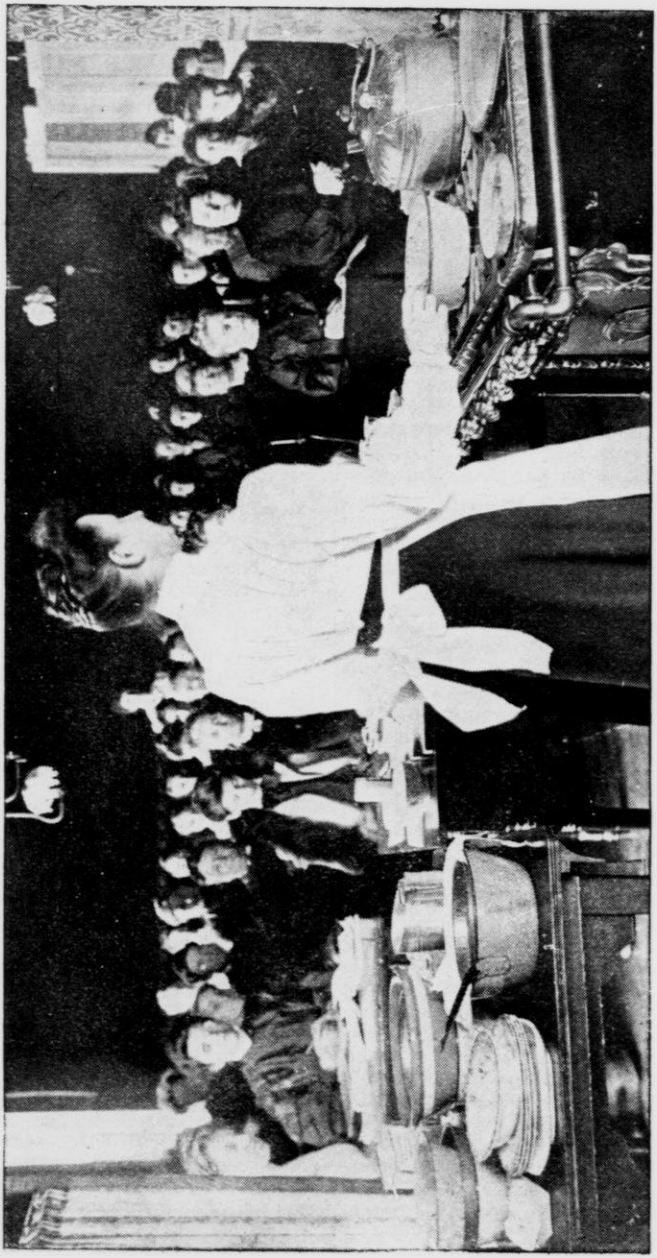
CLOSING REMARKS.

Supt. Geo. McKerrow, Madison, Wis.

We have been here for three days to hold this Nineteenth Annual Closing Institute of the State of Wisconsin. We have had fairly good weather, we have had fairly good attendance, and we certainly have had audiences of very high quality that paid very close attention to the discussions and have kept the discussions moving right along. I feel satisfied that the Bulletin recording this meeting in your city of Eau Claire will be equal to any of the other eighteen. The people of Eau Claire have shown a spirit of progressiveness, a spirit of cordiality, a spirit of fairness in every part of this work that has been equal to that shown anywhere where we have held the Closing Institute.

Now, we trust that you who have been here from a distance and you who have traveled over the rough roads in the vicinity of Eau Claire, and have probably suffered quite as much inconvenience as some of us who have traveled one or two hundred miles by rail, will all have received, directly and indirectly, sufficient to compensate you for your financial expenditure and trouble, things which you will find profitable in the future.

Now we will close this meeting. We will stand adjourned.



Mrs. Helen Armstrong Conducting Cooking School at Eau Claire.

WOMAN'S DEPARTMENT.

COOKING SCHOOL.

Held at Eau Claire in Connection with the Closing Farmers' Institute, March 7, 8, 9, 1905.

CONDUCTED BY MRS. HELEN ARMSTRONG, CHICAGO, ILL.

Assisted by Miss Emma Conley, of Wausau, Wis., and Mrs. Bertha Dahl Laws, of Appleton, Minn.

Stenographic Report by Miss Martha H. Schroeder, Eau Claire.

FIRST SESSION.

Tuesday Afternoon, March 7, 1905.

The subject of our work this afternoon is fruits and vegetables and the possibilities in the way of utilizing them. A great deal of time has been spent studying meats, perhaps more than any other one kind of food that we have, and meat being the main staple of diet, so far as nutriment is concerned, in most families, it is only natural that people should study most about meats, but there is no question but that the majority of us use too much meat; almost all of us would be better off for using a smaller amount of meat, for several reasons. In the average family meat is used twice a day, and in almost every home once; some use it for every meal. Meat is the most expensive article of food we have. It is desirable on account of the nutriment that we get from it and because it is more easily digested as a rule than vegetables. (I am speaking of beef and mutton; that does not apply to either pork or veal.) We can get a great deal more nutriment from vegetables than we realize. I think the reason why people do not use more vegetables is because the cooking of meat is easier. Almost every family who are vegetarians find that it takes a good deal of time for the cooking; it is more trouble to prepare one or more vegetables than to prepare one kind of meat. After all, when we come to think of it, our food is all from the vegetable world. The animals live on vegetables and grains and grasses and they get their strength and their bodies are formed from the food they use. It is easier for us to use the vegetable form after it has been taken into the animal system; but, you see, the source of the food in the first place is the earth, the vegetables and grains and grasses that grow in the ground. I am not a vegetarian, I am not advising a vegetarian diet, but it seems from study and investigation that we might get along more satisfactorily with less meat, both so far as our general health is concerned and so far as expense is concerned, because meat certainly is an expensive article of food, especially during the past three or four years. We all realize how much more it costs for meat now than it did five or ten years ago.

The amount of bulk required in our food is another point to consider. Probably many of you remember some years ago there was quite a fad in regard to the possibility of getting food in the condensed forms, such as condensed beef, and we did not know but the time might come when we would take all our food in the form of pills. People who have studied the matter thor-

oughly soon came to realize that we have to have a certain amount of bulk in our food, for instance, as we get it in cabbage and turnips and onions and the vegetables of woody fiber. We need a certain amount of that thing to do the work the stomach was fitted for, and certainly no organ was put into the body without use, so it seems best that we have some foods that contain bulk.

The preparation of vegetables takes more time and it takes more skill. I think it is easier to cook a piece of meat satisfactorily than it is to cook vegetables. I am perfectly surprised to see how many people there are who only cook vegetables in one way; they have no variety of ways in using the same vegetable. If it is carrots, it is the same plain carrot; if it is turnip, it is mashed turnip, and using the vegetables in different ways does not seem to occur to them. The variety of ways in which they may be prepared would seem like an endless chain, but we are all apt to get into ruts and set ways in our cooking. We find that out more when we go visiting, so in the cooking school we always try to bring up some of the things that are not so common and as much as possible get ideas from one another.

Vegetables.

We divide our vegetables into four classes. We have what we call the nitrogenous vegetables, that is, the vegetables that give us a good deal of nutriment; vegetables that more nearly class with meat as far as food value is concerned, and among these vegetables we have the peas, beans and lentils—the latter are not so well known, but of the three are more desirable. These are the dried vegetables you understand, and necessarily being dried, we have a more compact form of nourishment than we have in the fresh. The cereals also come in this class, but not all of them. When I say cereals in this class of nitrogenous vegetables I mean such as oatmeal and corn meal and the rolled wheat, and some of those products which require considerable cooking. I think there is quite a reaction today in favor of the old-fashioned cereals. We begin to realize that when we buy cereals already cooked and supposedly half digested, while they may taste good, for actual food value it is doubtful if we get much nourishment. They are a great advantage to the housewife at times, and all right if used in connection with other hearty foods, but when we try to make a breakfast on these prepared foods and fruits, as we are often advised, we are getting a rather light ration, the best part is the cream and sugar we put on—that is in the already cooked cereal—those we buy in packages and are told we simply have to heat them or serve them as they are with cream and sugar. But the oatmeal, the corn meal and vegetables of that sort give us a great deal more for our money than we get in prepared foods.

Then another class of vegetables are what we call the carbo-hydrates, that is the starchy vegetables that contain considerable sugar or starch, and we usually find the two together. In that class we have the rice and hominy and potatoes and wheat flour, and the bread is practically from the grain, so that is classed with the starchy foods. Of these we can use quite a large amount, and they are useful to us in many ways because they give us bulk and a certain amount of nourishment.

The third class are the fatty vegetables, and of those we have nuts and olives, the ripe olives are decidedly preferable, but they are not often to be had. I think the time will come when we can buy the ripe ones as cheap as the green ones. They are more delicious than the green ones, are purple in color and are very delicious in flavor. In bulk they are not so expensive.

The fourth class are the green and succulent vegetables — those in which there is a good deal of water and some mineral matter. In all vegetables we have a large proportion of water, but these vegetables are such as spinach, cabbage and onions. They are useful to us for the bulk and water and the salts and mineral matter. Of course, salts and mineral matter do not mean very much so far as building our body up is concerned, but they mean a good deal in keeping our body in good condition. There was a time when many people thought when spring came it was time to take spring medicine; it

was necessary to use something in the spring to get the body into good condition. When people who lived in the country especially, where hearty foods are used in the winter, ate a great deal of salt pork and dried meats and smoked meats, and not very much in the way of green vegetables, the result was when spring came, after a long stretch of this kind of diet, the liver would get torpid, and people would take medicine for the liver and all sorts of patent medicines were taken to obviate this condition. Nowadays we can get something in the way of green vegetables all winter. We always have cabbage and onions and turnips, and there are very few places where we can't get lettuce once or twice a week, and when we can get those and take them, we don't need medicine. It is only a question of whether we will take medicine in an acceptable form in the winter or dose up in the spring with a lot of disagreeable stuff because we have not taken it as nature provided.

Besides all these fresh and dried vegetables, we also have a great variety of canned vegetables. I do not want you to understand that it is advisable to use a great deal of canned goods, but there is no question but what to the average housewife there are many times when the convenience of the canned goods cannot be over-estimated; they help out in an emergency, and it is a good thing to keep a shelf in the pantry called an emergency shelf where we can have certain canned vegetables and meat and fish, so that with a little ingenuity and attention (I do not mean serve these things just as they come from the can) we can make palatable dishes. This is for once in a while when it becomes necessary to use these things, and it is rather desirable to know one or two things about them.

When vegetables have been canned for a length of time they of course are kept from the air, and they are very apt, when they are first taken from the can, to have a rather flat taste. As we say, it has no life, and we find if we take the vegetable out of the can some time before it is to be used and expose it to the air, it gets back some of this oxygen that has been taken from it. In using certain vegetables we always drain off the water, for instance, peas. We drain the liquor off the peas and then cover them with cold water to freshen them, then let them stand a little while and then drain that off. They are better used that way than when used just as soon as opened. Of course, as everyone knows, no goods of any sort should stand in the can, after the can has once been opened, and in cooking the fresh, as well as the canned vegetables, it is well to use either enameled or aluminum ware. Many vegetables would be spoiled if cooked in tin, and I consider tin the most unsatisfactory article for cooking purposes. It is not cheap in the end; it scorches easily, gets out of shape and does not give one-fourth the service of one good aluminum pan.

Some Things to Remember in Cooking Vegetables.

In cooking our vegetables, there is one rule that always follows, and that is that all vegetables are put on to cook in boiling water. That is quite a little point to remember, with the exception of dried vegetables, which have to be soaked over night. Those we put on to cook in cold water—after they have been softened by soaking. We do this, first, for flavor, and second, for appearance, or perhaps that should come third, and second, the food value would be less in cooking in cold water, in that vegetables that are put on to cook in cold water will have less flavor and part of the real food value is drawn out in the water, so we always use boiling water in cooking all the vegetables. There is another thing that is necessary, and that is to remember that in cooking all the green vegetables we use salt in the water, and for all vegetables which grow under the ground we use no salt. That is an explosion of the old theory that we should put salt in the potatoes.

In using the salt, it never should be put into the water when we freshen green vegetables. Many times we have spinach or lettuce or celery that seems to be slightly wilted when it comes from the market, and if that is the case it should be put in cold water to freshen it, but under no circumstances should salt be added to that water.

That is the German way of preparing cucumbers. They slice the cucumbers into cold salted water, and they become very soft and they also become much more wilted than they were in the first place. The cucumber never should be eaten except when it is crisp, and never should be allowed to soak in salted water. At the best, it is not easily digested.

We sometimes use soda for softening the water in which we cook our nitrogenous vegetables. We find, for instance, in cooking the beans, when we have dried beans (and this answers for all the nitrogenous vegetables), if we cook the beans in the water without the soda it takes longer to soften them, and in using the soda it consequently shortens the time for the cooking.

Those are the main points to remember in the preparation of vegetables. I think when we understand all of these, and the principles that lie back of them, we will be able to handle any vegetables and make satisfactory dishes. Of course, we have to understand something about combinations, but these points cover the main part of the ground in cooking all of our vegetables. I have a long list of vegetables here and I think it would be surprising to some of you to see how many vegetables we have to cook, and the number of ways of preparing them.

Fruits.

I want to say a few words about fruits, and then I will explain about the dishes to be prepared. A good many people have an idea that fruit is an extravagance, and that to have fruit is a luxury. I used to think that way myself. I remember when I first kept house I felt it was one way I might economize not to buy much fruit. In a large family a great deal of fruit can be used, especially where there are a large number of children, but in the end it is economical. It is better to pay for our iron in fruits and vegetables than it is to buy medicines that have iron in them, for it certainly is more palatable and a great deal better for us, we will save doctors' bills and we will avoid many a day of ill-feeling and sluggishness and general stupidity. Sometimes when we are not really ill or actually sick, we feel miserable; we don't feel full of life; we wake up in the morning with that tired-out feeling, as though we were not energetic. The diet has a good deal to do with that. Fruit will keep our condition much better than we can where we neglect to use these remedies of nature's; they are certainly the preventives of a good deal of the ill that we seem to suffer, so that even when fruit is expensive, as it is in the winter, it is well to always have some kind of fruit in the house, and the apple is one of the best kinds. I was talking with a gentleman the other day who raised apples. He was talking about different varieties of apples, and he said one kind was the best, and I asked him why, and he said "Because it makes such good pies." And I felt it a slur on the apple to always put it into pies. There are so many other ways in which we may use the apples that are simpler and more wholesome and less expensive and better for us generally than the inevitable pie. Tomorrow afternoon I shall give some of the desserts we may use in place of pies. I think Miss Parloa speaks in her book of those people who are unfortunate enough to eat pie every day, and many of us would be better off if we used less pie. Fresh fruit, of course, is the most desirable of all. It seems to me a shame to take such delicate fruit as strawberries and make them into pies. The flavor is never so fine after cooking as it is in the fresh condition. The same is true also of raspberries.

Another mistake we make is in craving fruits out of season. Just as soon in the spring as we can afford to buy strawberries, we want to buy them, and when strawberries are best in our particular locality we have had them so long that we don't desire them. If we only would be satisfied with things when they are ready for us—nature gives us one kind of food one part of the year and another kind at another—it would be better for us to consider this, because these fruits come around one after another. Just as soon as the warm weather comes on, we have something for variety all the time. In the winter we have oranges, apples and

bananas when they are perfectly ripe, and I want to say that bananas when they are at all green at the end are not fit for use, except for cooking. I want to show you some of the bananas that were brought here this afternoon. There is a banana that to a great many people would look to be fine, because it is firm and yellow all over and has scarcely any blemish on it, but it is decidedly green on the end. Just as long as a banana has any green part on the end it is not thoroughly ripe and it is one of the fruits we cannot digest unless it is ripe. A banana that is green has no more of the delicate flavor of the banana than has a raw turnip, and so far as my digestion is concerned I would as soon eat a turnip as a green banana. We can cook bananas like that, but if we are going to eat a raw banana it should be perfectly ripe, and the riper the fruit the thinner the skin. You notice always in peeling a ripe banana that the skin will be thin, and when the banana has begun to turn dark all over it is at its best; that is when the flavor is the finest and when the bananas are most thoroughly digested. Many people cannot eat bananas at all, but to the average person of good digestion they are a very safe and wholesome food and take the place of some of the other kinds of food we use constantly.

In using oranges, the inner skin, that is, the white part of the skin, is the hardest to digest, and really, if we get good, juicy oranges, the perfect way to eat them is to suck them. In that way we get all the flavor, all the juice. If we take the orange, peel it and break it into sections, unless we are very careful to scrape off the white part on the outside, we have a great deal of the bitter flavor; so if the oranges are sliced we take off all the outside skin. In preparing the orange for a fruit salad, I cut off all the skin of the orange and this inner skin. This may seem wasteful, but it is better than to simply take off the peeling. Just cut off all the outside and then cut the orange into slices or sections. If we have an orange with a good deal of seeds, and especially with this fiber through the center, it is best to cut the orange into sections. I will show you what I mean. In doing that, use a sharp knife, and after the outside skin has all been taken off the orange, then take the knife and cut right in next to the skin, close down to the center of the orange, and then the other side of that section right next to the little fine inside skin, then we have a whole section of orange without any skin on at all. It is the nicest way to prepare oranges for fruit salads if we have oranges with seeds. We can do this over a bowl this way so as to save all the juice. What is left is pulp and we can squeeze the juice out of that and we get none of the objectionable rind on the outside.

In using the fresh fruits, it is not desirable to use a large amount of sugar with them. Many times there are acid conditions formed because too much sugar is used on fruit. It is well to remember that and not let children get into the habit of coating fruit with a large amount of sugar. They are rather apt to use as much sugar as they are allowed to, and sometimes fruit does not agree with people on that account.

In using the apple raw, except for a few kinds that have a very thin, tender skin, the skin should not be eaten, and that especially for children, because they do not chew food as well as they should and this skin goes into the stomach in large pieces and it is indigestible. The same thing is true in baked apples; the skin of the baked apple is hard to digest, and except for people of very hearty digestions it is better to avoid the skin. A baked apple is better in flavor than boiled or steamed apples, and baking them slowly with a small amount of sugar gives them a finer flavor. We can use an open pan and bake them in a moderately hot oven, with sugar, perhaps half an hour or forty minutes, or we bake them in a covered earthen dish and put the apples in that with a small amount of sugar and water and cook them for a long time very slowly. By using an earthen dish and baking the apples for several hours in a slow oven, the flavor is perfectly delicious and entirely different from the apple baked in an open pan. Then with meats we often serve hot apple sauce, or stewed apples, or the browned apples, where we have the apples cooked in the oven

and cooked slowly with butter; and sometimes we bake them in cream. Put the half apples, or thickly sliced apples, in a flat earthen dish and about half cover them with cream and bake them until the apples are soft, but it is not always possible to have the cream to do that. Then there is a great variety of puddings and desserts that are simple and made with the apple as a foundation. A steamed pudding is always less digestible than a baked pudding, and the same is true of dumplings. The consistency is so soft that we are not apt to chew it thoroughly, with the result that it goes into the stomach in the form of dough balls. That is one reason why fresh bread is less digestible than stale bread. If it is not moist we chew it thoroughly, and the result is it is half digested before we get it into the stomach. It is not the heat of the bread, but because it is so soft that we do not masticate it as much as we should. A person once made the statement that if people would thoroughly masticate their food, that is, chew each mouthful fully and sufficiently, we would get along with half the food we use, and I do not know but there is a good deal of reason in that, because it is not what we eat, but what we digest, that counts. We should, in teaching children table manners, teach them to be careful that each mouthful is thoroughly chewed. This is better, not only for their digestion, but also for their teeth. We hardly ever see good teeth and a poor stomach, or a poor stomach and good teeth. A physician once said in selecting a wife he would look for a girl with good teeth, for after all you see there is a reason for it. "It is all well enough," he said, "to have a good complexion and smiling eyes and dimples, but give me a girl with good teeth."

Fruit Salad.

RECIPE.

Drain the juice from a can each of choice pears and sliced pineapple, also four large oranges cut into dice, add to this one and one-half cups of sugar and boil about half an hour, or until reduced to a thick syrup. Pour this while hot over three-fourths of a cup of pecans or English walnuts cut into bits, and when cold add the juice of two lemons. Have the pears and pineapples cut into even pieces, and add these with the oranges and three-fourths of a cup of cherries to the cold syrup.

I want to speak about the fruit salad first, and the fruit is already prepared for that. I have used oranges, cutting the orange as I described, and the bananas, sliced pineapple and English walnuts.

Now, there are two ways of making the fruit salads. They are used as a dessert as a rule, or sometimes for lunches or special occasions we use the salad first instead of the soup. We make our salads in two ways; either use the fruit and sugar mixed together or make a syrup of the fruit juices and sugar. We can use a great variety of fruits. In using the oranges, I put them in a strainer, and the pineapple, with the juice all drained from the pineapple, and I put the juice of both in an open pan and let it boil down to half its original bulk, then add the sugar to let it make a rich syrup, and then let it boil so it slightly jellies in falling from the spoon. We pour this hot syrup over the nuts and that softens them slightly. Many times the nuts are so hard that they are rather objectionable with the soft fruit. This syrup is poured on the nuts. We don't cook the lemon juice; we add the lemon juice after. I picked out the ripest of these bananas to use for this salad. These others I am going to use for baking. I have here the hot syrup, also bananas. I am going to mix that with the oranges and pineapples. Sometimes we add cherries to this, and we may use candied cherries. I do not use any of the cherry liquor, because it rather spoils the appearance of the salad; it discolors everything. We can add peaches—sometimes I add pears if they are real firm, but we do not like to use any fruit that will lose its shape. This salad may be served plain, it may be thickened like a jelly, it may be molded, or it may be made stiff enough to hold by the spoonful.

In cutting the pineapple, where we have the sliced pineapple, we cut across with a sharp knife on a plate. In season we can use strawberries, and if I

am using strawberries I like best to cut them in halves, otherwise the sugar does not get to the inside of the fruit. It is well to have the fruit all prepared a little while before it is to be used, so that every bit of the juice can be thoroughly drained off, and always use a little lemon juice, because that will take away the flat, insipid taste that we are apt to find with the sweet fruits. In all our sweet desserts and dishes of that sort, we always use lemon juice to develop flavor and also to prevent that insipid, flat taste.

I like best to mix this a little while before it is to be used and then let it chill thoroughly. If we don't have this syrup the dish cannot be served so attractively. This can be served in sherbet glasses, or in small-sized dishes, and many people serve whipped cream with it, but it seems to me it is better without and is more wholesome. Sometimes the grape fruit is also added to this for those who care for that flavor. The English walnuts were cut in halves after they were split and sometimes we use the pecans in the same way as the walnuts. Now that should stand until it is thoroughly chilled. It would be better if we had time to chill it out of doors. This is a large recipe and would serve quite a company.

Marguerites.

RECIPE.

Beat the white of one egg very stiff, adding one tablespoon of powdered sugar and several tablespoons of chopped nuts. Spread over Saratoga flakes and brown slightly in a slow oven. Sometimes raisins, dates or figs are used with the nuts.

Where we have no nuts in the fruit salad, a very nice plain sweet to serve with it is what we call the Marguerites, that is the plain salted wafers covered with a meringue and some nuts, and that is really one of our simplest and best kinds of cakes. It is not cake at all, but it is so easy to prepare and is delicate and combines nicely with anything in the way of fruit. I only used a small amount of the nuts in the salad because I want the balance to use for the Marguerites.

For those we beat the whites of one or two eggs quite stiff, add to it a tablespoonful of powdered sugar for each white of egg and use with that the chopped nuts. Sometimes currants are used in place of the nuts, or raisins or dates, but as a rule these are made with the nuts, and if we want them particularly nice we sprinkle them with the powdered nuts. They are simple and much more wholesome for us than rich cakes. They may be served with ice cream also.

When I start to break eggs into a cup, that is to break them separately, I think about a little article I read in one of the magazines a little while ago, which shows how absurdly we sometimes express ourselves. The case was of a man whose wife was ill and there was no one to attend to things very much, so finally in a fit of desperation he thought he would go out in the kitchen and cook something himself. He took up a cook book and found a recipe which began in this way: Break five eggs separately into bowls, and he came back to the bedroom after a little while and said: "I don't know what I am going to do. The rule says to break five eggs separately into bowls, and I can only find four bowls."

I use the whites of two eggs for this quantity, and have about a quarter of a cupful of nuts. In beating the whites of the eggs we always add a small amount of salt to the egg to help harden the albumen and make it keep its shape after it is beaten light. A deep bowl is all right for the yolk of eggs, but where we have a large surface of the white of egg exposed to the air we can beat them light more quickly. That is why we always use a platter or a shallow dish instead of a bowl. We only use a bowl for the yolks or for the whole eggs. We beat the white of the egg quite stiff and add to it the sugar, beating the sugar in gradually—powdered sugar is all right. We can put this mixture on the small wafers, or on the long salted crackers, and bake them long enough to cook the meringue through. We always find that when we take the bowl to the window or door that the eggs will beat more quickly, because we get the fresh air on the eggs, and eggs should always be cold before beating. For meringues we always beat the egg in the same way, putting the sugar in gradually. If we

put the sugar in all at once we are apt to make it syrupy or sticky. When we can hold it on the beater it is stiff enough to begin adding the sugar. Where a larger amount of sugar is used than a tablespoonful to each egg, as we sometimes have in some of our recipes, we fold the last of the sugar in the same as we do in angel food or sponge cake. If this is to be flavored, a few drops of lemon juice is to be used, because it whitens it. This will cover quite a large number of crackers, because it is only to be spread on rather thin. We sometimes find in making a meringue, especially where we have it spread rather thick, that it looks all right after we take it out of the oven, but the egg is not cooked through. If the oven is hot it browns before it is done and then becomes thin and watery when cool, or it shrinks away from the edge. That is usually where it is cooled too quickly. If it is cooked too fast, we often see little brown bubbles formed, the egg and sugar forming a syrup.

For those who like a very crispy meringue, the meringue may be covered with a fine grating of sugar after it has been spread, either the powdered or granulated sugar may be used. As soon as we have these wafers done, we will allow them to cool slightly before serving them. We will have the fruit salad and wafers served together.

Baked Bananas.

RECIPE.

Remove the skins from bananas, place on an earthen or granite dish slightly greased, sprinkle the fruit with lemon or orange juice and sugar and bake.

The bananas are served in this way with meats, especially beef steak, or sometimes are used as a sweet with a sauce, but we will use them plain this afternoon.

In removing the skin from bananas, we are always careful to remove the little thread along the sides of the shape of the banana, as it is not very digestible. If the fruit is rather unripe, we may have to baste it a little during the cooking, and in that case we will have to use a little more lemon juice and sugar.

In cooking vegetables, you know, we always put them on to cook in boiling water, but under no circumstances should that water be drawn from the hot water boiler. It always should be cold water put into the tea kettle and heated on the range. The water from the water boiler should only be used for washing purposes.

Creamed Cabbage.

RECIPE.

Slice cabbage with a sharp knife and cover with a boiling, salted water. Cook uncovered until tender (from 20 to 30 minutes), drain thoroughly and heat through in white sauce.

For one and one-half quarts cooked vegetables make sauce as follows: Melt two tablespoons of butter in a sauce pan, add three tablespoons of flour and pour in gradually one pint of milk, stirring constantly. When thickened and smooth, season with a teaspoon of salt and paprika.

One reason why I have selected this homely vegetable is because there is so much difference in cooking cabbage. Many people put cabbage on in moderately hot water and cook it for an hour or an hour and a half. It turns dark and reddish, has a strong, rank flavor, and is entirely unlike what cabbage should be. If we have boiling salted water, and cook the cabbage uncovered, we get a more delicate flavor and we do not have the house full of the odor of cabbage, and that is the same with onions. We can cook both cabbage and onions without strong odor if we are careful. Where we have the cabbage or onions closely covered, all of the steam is concentrated in that kettle, it is all there. When we take the cover off it is everywhere. If we cook it with the cover off it is not nearly so noticeable. Of course, the water must be boiling when we begin and must be kept cooking all the time.

In cooking cabbage, the length of time depends upon how the cabbage is cut. If we cook it whole we will have to cook it an hour, and if we cut it up we can cook it in about twenty-five minutes. I have sliced this and as soon as this water is boiling I am going to put it on to cook, and with that we will have a cream sauce. If the sauce

is nice, we have almost as delicate a vegetable as creamed cauliflower. Cabbage is not nearly so indigestible when cooked in this way as when it is cooked for a long time in a closed kettle and the water is not salted. There are many other ways of cooking cabbage besides this way, but this is one of the best. The raw cabbage is more easily digested than the cooked cabbage. The cabbage was cut with a knife, not shredded fine with a cabbage shredder, which is really more convenient, and we use about a quarter of a teaspoonful of salt with that and the boiling water. Just as soon as the cabbage is done it should be carefully drained. The best thing is to put it into a collander or a large strainer, but if that is not convenient put the lid on and drain it off as carefully as possible; all the liquor left in the bottom of the kettle will spoil the sauce. Onions we treat in the same way, making a sauce afterwards, or serving the onions with a little butter and pepper and salt. We can bake them with a little butter and water in the pan and that is the best way of all to cook the large Spanish onions.

We use this cream sauce for all of the creamed vegetables, for cauliflower and beans, that is, the green beans or lima beans, we use part of the water in which the vegetables were cooked, but in cabbage and onions we do not use the water, but make it entirely of milk. We use two tablespoons of butter, that is rounded spoons, or we may use other fats than butter. We may use bacon fat instead of butter (the fat we have left after cooking bacon). It does not make so white a sauce, but tastes well enough to make up for the difference in appearance. This is particularly good with baked potatoes. We cook three tablespoons of flour with the fat and then add a pint of milk gradually. That makes a rather thick sauce and those who prefer a thin sauce may omit one tablespoonful of flour.

Some Ways of Serving Vegetables.

Another point that is well to remember in cooking vegetables is that we should not use any more water than is necessary, and that is especially true with the green vegetables. In cooking green peas, for instance, use as little water as possible, the smaller amount of water gives it not only a better flavor, but a better color; the larger the amount of water the more coloring matter is drawn out of the vegetable. In cooking spinach we use no water whatever. In washing spinach we are told to "wash it until clean, and then wash it some more." Put the spinach in a large pan of cold water, then put it in another pan and then pour it back and forth, using clean, fresh water each time, so there is not a particle of grit in the bottom of the pan. Then we take it out of the water and put it in the kettle, without adding any more water at all. If we cover it closely, then the moisture that there is there and the steam that is caused from the heat will let it cook without scorching. If it is young spinach, we can cook it in ten or fifteen minutes; if it is older it will take a longer time.

In cooking rice and macaroni, we follow the same method as we do with the cabbage: to have the water boiling and to have it boil hard. With those vegetables we have to use a good deal more water because of the starch that they contain. If we cook macaroni in a kettle with only a small amount of water, it sticks to the kettle. If we have a great deal of water and it boils all the time we can cook it without any trouble. In cooking rice, we drop it slowly into the kettle. Wash the rice until it has no longer a milky appearance and then drop it into this water. Just as soon as a grain of rice can be mashed soft in the kettle, the rice is thoroughly cooked. Put it in a collander and let cold water drain through it; that washes off the starchy water and keeps the grains distinct. Then put it over hot water to heat thoroughly. Allow it to steam about ten minutes over hot water, and then serve. For some purposes we cook rice in a double boiler in milk, which gives it a different consistency, and for rice croquettes, or to use rice in muffins, it is all right to let it cook in the double boiler. It will take an hour or more to cook the rice in this way. Rice can be used in many different ways, not only as a sweet and in puddings, but just as we would use a vegetable; but if we serve rice at a meal it should

take the place of potatoes. We do not need rice and potatoes at the same time. Down South, they often serve rice, white potatoes and sweet potatoes at the same time. If there is any doubt about everyone liking the sweet potatoes, the white and sweet can be served together, but we do not serve rice with potatoes. The same method is used in boiling macaroni as rice. Macaroni may be prepared with a brown sauce, or a tomato sauce, or with a cream sauce and cheese, or we may bake it with milk, flour and butter, or with the sauce and the cheese.

Red cabbage is often used in the same way as the white, but is more often used as a salad. The salad is one of the best ways of serving our green vegetables—and when I say salad I mean green vegetables. The green onions, lettuce, spinach, tomatoes and celery are best served with salt and pepper and a small amount of vinegar or lemon juice and olive oil. Some people do not like olive oil, and that is unfortunate. It gives us so much in the way of nutriment and is so thoroughly assimilated. People who use a great deal of olive oil seldom have headaches or indigestion. Vinegar should be used sparingly.

Some kind of a green vegetable ought to be on our tables every day. Although in winter we do not have the fresh vegetables that we have in summer, we can use our stored vegetables. Carrots we cook plain or in stews, or cut them in quarters and brown them in a little butter, and add parsley to them. Young carrots with cream sauce are one of our most delicious vegetables. Our cauliflower we serve either plain or with a sauce made with a little butter, and we occasionally use a Hollandaise sauce, one made with butter and lemon juice, parsley, salt and pepper. Celery is one of our most desirable and economical vegetables. We use the roots and leaves for soups and in flavoring our meat dishes, and the outer stalks may be used for creamed celery—cutting it into bits, and cooking it until it is tender, and then making the white sauce for it. Sometimes we serve the cooked celery in a brown sauce. The inner parts we use for salad and the finest inside bits are used on the table for a relish. If the celery is washed some time before using and wrapped in a wet cloth, it will keep crisp many hours in a cool place. We can keep lettuce 24 hours in the same way, wrapping it in cloth. Spread the leaves out in a cloth, roll it up lightly and put it in the refrigerator. It will be crisp, and it will not be wet outside.

Question—Do you use a wet or dry cloth for lettuce?

Mrs. Armstrong—A dry cloth, but it becomes damp from the lettuce, the cloth will take up all of the moisture from the lettuce. If it is a large amount it may take two cloths. The leaves will not break if it is rolled carefully and it will be dry and crisp.

The egg plant is another one of our vegetables that can be served in several ways. We can use a frying pan and a small amount of fat—that is the way the egg plant is generally cooked after dipping in batter or egg and crumbs. It is very good baked stuffed with bread crumbs, or simply baked in the shell, so long as it is cooked until it is perfectly tender.

Green peppers are another one of the vegetables very little used. The season is short, only from August to October. They may be used in a great variety of ways. In using this pepper we always remove the inside. Cut out all of the inner part and remove that carefully, then cut the peppers into half, brown them lightly and serve with steak or chicken. We sometimes stuff the peppers and bake them, using a stuffing of meat, ham or chicken, or veal, or a combination of meat, and we also use a rice stuffing and bake these and serve them on toast. It is a very good way to use left-over meats. I usually put them into a sauce pan and cover them with boiling water first, then drain them carefully, and then put in a filling and bake them half an hour, and have a sauce served with them. When used for a salad, we use them green, unless they are too hot.

I am going to make the sauce for the cabbage in the same sauce pan that it was cooked in, putting in the butter and adding the flour to that, and put in the milk. I will heat the milk for this while I am explaining about these other vegetables.

Question—What causes the cream sauce to curdle at times?

Mrs. Armstrong—One thing that will cause a white sauce to separate while it is cooking is because there is too much butter used. We never put salt into our sauces until they are done, because salt will also cause milk to curdle. When we cook the sauce a long time, the butter will separate from the fat. A few tablespoonfuls of hot water added, and let it come to a boil, will bring it together again, if it is not cooked too long.

Turnips are usually boiled and mashed. The white turnips are very delicate prepared with cream sauce, the turnips cut into dice. After boiling, we may slice them and bake with crumbs and butter, or stew them in milk.

I am afraid there isn't going to be time enough to speak about half the vegetables we have. Sweet potatoes, for instance, we bake, steam, or boil and mash them. Browned in deep fat after boiling, they are especially fine. The southern people have a delightful way of cooking sweet potatoes by parboiling and then slicing them into a baking dish with sugar and butter and when the dish is filled add water to half the depth of the dish and cook them until the potatoes are transparent. It is what they call the candied sweet potatoes, and they are delicious. They are also made into croquettes and fritters and escalloped in a baking dish, just as we do our white potatoes.

The winter squash is delicious baked in the shell and basted with a little butter and water during the baking. Green and string beans, we usually serve plain, or with a slightly thickened sauce, using the water in which they are cooked for that and sometimes adding milk, too. The dry vegetables we soak about 12 hours and then put on in cold water and boil until they are perfectly tender, anywhere from an hour to an hour and a half. A little soda added to that will hasten the time for cooking.

The tomatoes are more wholesome eaten raw, but we can use them in many different ways. Tomatoes may be baked whole or stuffed and baked, or sliced and baked with cracker crumbs, or stewed with a little crumbs added, and also either broiled or fried. The flavor of the tomato is never so fine if sugar is added. The old-fashioned way of stewing tomatoes one or two hours is not nearly so good as the modern way of cooking them until tender and then thickening with bread crumbs. Panned tomatoes are cooked in thick slices in a little butter. When cooked on both sides, place on a platter and make a white sauce in the pan with butter and milk. These are very good and very simple, and make a delicious breakfast dish. We sometimes scramble the tomato with the eggs, adding a few tablespoonfuls of already cooked tomato to partly scrambled eggs, or cook the egg in the stewed tomato until set.

The kidney beans are not used as much as the other. They are among the best of our canned vegetables and only require heating. If we want to use any vegetable that has been served with a sauce for a salad afterwards, rinse off the sauce with cold water. Green peas are best plain boiled. In cooking corn, if the corn is cooked on the ear, that is, if it is boiled, it is best to leave on a little of the inner husk. If we leave just a cutting of the husk all around the corn the flavor is fine. It will take all the way from 15 to 25 minutes to cook corn. Just as soon as it is tender, it should be removed from the water, because it will become water soaked if it stays in the water longer than is really needed.

Peas we cook rather slowly, on account of the amount of sugar in them. Hominy, both the coarse and fine, are both good to use, used not only as cereals but as vegetables. I often find that Cream of Wheat is nice used in the sauce for lunch when we have meat gravy to put with it. In making a sauce, we melt the butter and add the flour to that and cook the two together until they are frothy, then pour in the liquor. If we have the milk hot we can make the sauce more quickly. The two advantages of making sauce this way over the milk thickened with flour and water stirred to a paste is that we cook the flour thoroughly while we are putting our sauce together, and we have a different flavor, because the flour is cooked in the butter and it gives us a better taste. We must be sure the flour is thoroughly cooked, or

it will be unwholesome and unpalatable. The seasoning should be added at the last, especially if lemon juice is added, and if we have a fish sauce we add a little lemon juice. There should be just enough sauce to moisten every particle of the vegetable that is used. We prefer to have the white pepper for white sauces. For variety this creamed cabbage may be put into a baking dish and covered with butter, crumbs and browned in the oven.

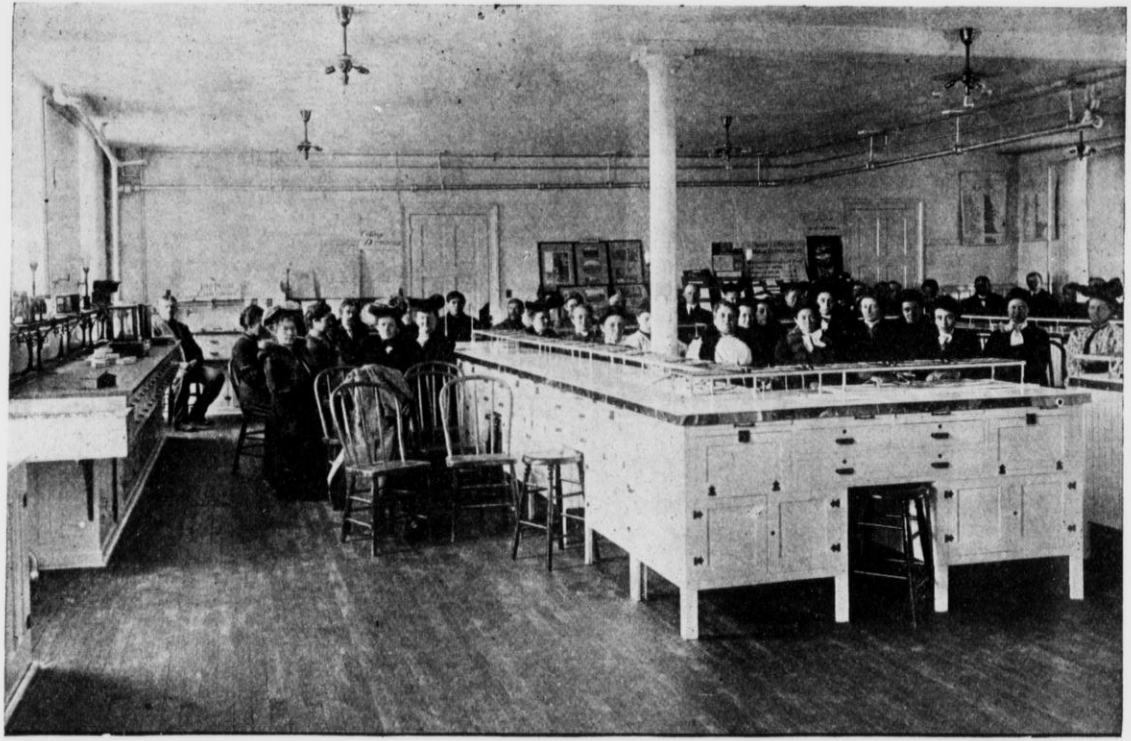
There is just enough of the milk and the sauce to thoroughly moisten every bit of the cabbage, but the sauce is not thin enough or in large enough quantity to spread from the cabbage. I want you to notice especially the color of the cabbage, it does not look red and of that pinkish color as it does where cabbage has been cooked a long time.

Question — Do you consider the cooked salad dressing unwholesome?

Mrs. Armstrong—The cooked salad dressing is much less wholesome than the French dressing made with olive oil and salt and pepper. I would not advise using a cooked salad dressing every day, as we might use the olive oil and the lemon juice and the vinegar. Use cooked salad dressing occasionally; it is certainly very convenient to have in the house, a home-made article, of course.

Question—Is it good to soak rice?

Mrs. Armstrong—No. We wash it thoroughly in cold water, but we put it on to cook in boiling water. If we soak it, we soak the starch out of it. I would not advise the soaking of rice or macaroni. The people who use rice the most never soak it. The Chinese and Japanese cook it very rapidly, and they cook it to perfection.



Housekeepers' Conference Held Under the Auspices of the Department of Home Economics, University of Wisconsin, February 14-24, 1905. The Cut Shows the Food Laboratory of the Department.

SECOND SESSION.

Wednesday Afternoon, March 8, 1905.

Our lesson this afternoon is on quick breads and the use of soda and baking powder.

I want to explain why I have devoted the lesson to these quick breads, that is, breads that are made in a moderately short length of time, like the baking powder and soda mixtures. We believe in yeast bread mixtures for regular use, but it is not always convenient to have it. In every family there is occasionally a time when something extra in bread form is required, something desired for variety; so please do not get the idea that I am substituting the baking powder and soda mixtures for the yeast bread. It is simply for occasional use, and, as I said before, for variety. All of these breads are easily made and most of them cooked in a short length of time, with the exception of the steamed bread, which requires considerable time. That, however, is so easily mixed, and the cooking is so simple that it can scarcely be called a difficult thing to make.

If we are going to use warm breads of any kind, it is far better to use warm baking powder mixtures than the yeast bread. A warm baking powder mixture is more easily digested, but in either case it depends largely upon the baking and the thorough mastication after the dish is ready to eat. Many times people find warm breads indigestible, when they might not do so if they were thoroughly masticated, and that is the main reason that hot breads are likely to cause indigestion. They go into the stomach in the form of partly digested dough and are scarcely assimilated at all.

Steamed Brown Bread.

RECIPE.

Sift together one cup each of rye meal, corn meal and whole wheat flour (or one and one-half cups each of graham and corn meal may be used) with one and one-half level teaspoons of soda and two of salt. Add three-fourths of a cup of molasses, a pint of sour milk, and steam from one to three hours, according to size of molds used.

The first part of the work this afternoon will be the preparation of the steamed brown bread, and in preparing all the different dishes which we have in our lesson, as a rule, there is always some other way that may be followed in preparing the dish, something that may be substituted for an article called for in the recipe, so as far as possible I will explain about those things in going along—tell how the same recipe may be used in several different ways by slight changes. I am always sorry for the woman who is tied to the cook book. If she does not understand enough about proportions and food substitutes to be able to use her ingenuity and individuality and a little inventive ability, she is sadly equipped, not only so far as economy is concerned, but in simplifying the labor. So we call attention to the different things that may be substituted in that way, in order to make one recipe do double or treble duty. What we need to understand is the proportion, and why things are put together in a certain way. It seems to me that the greatest difficulty with our cooking is because we do not understand the reasons for things. We do things because our grandmothers and our mothers did, and yet we cannot explain the reasons for many of the processes which we carry out—and that is largely the secret of success or failure in our cooking, understanding why. If we fail in making a dish a certain time and do not know why we failed, what is to prevent our failing the next time? Absolutely nothing! If we cannot see the reason and rectify it the next time, we are no better off than we were in the first place. The fact is, what we look for most in our cooking is the reason for things and the principle that lies back of it. Cooking is a science, providing we only understand some of its principles. We hear people

talk a great deal about luck. You hear people say: I had bad luck with my bread yesterday and good luck with my cake today. It does not show a great deal of thought put into our work. If we take a certain combination of materials and put them together in a certain way and apply a certain degree of heat, we ought to get a certain result. There ought not to be a question in our mind as to whether anything is going to turn out right or not, but when we put our materials together carelessly, when we fail to recognize proportions, then we cannot expect to succeed. It always pays to measure materials, for in that way we insure success. We can save time if we do not stop to measure, but do we save time in the long run? Don't we have something we have to throw out quietly and not say anything about it? That is all waste, and it is even worse waste if it is eaten when it is not fit to eat. If by taking two or three minutes longer, we insure success, doesn't it pay to take those two or three minutes? Some people say that experienced cooks do not measure, but after all they measure in this way: by their judgment and experience; they measure by the eye, as we say. An experienced cook can tell in an instant by the appearance of dough or batter whether it is of the right consistency or not. It is only the practical housekeeper who can be certain of results. The average woman does not take the pains to measure. She takes a coffee cup to measure her flour and a teacup to measure her milk, and says she has had bad luck. We figure on the half pint measuring cup. It does not make so much difference in the exact size of the cup, provided we use the same size for all material. But all our cook books are written with the half pint cup for a basis. These sized cups are more convenient, too, as they are marked off in thirds and fourths, so we can tell if we have just the right proportion without measuring.

For this steamed bread I have given you the proportion as it was given originally, the old-fashioned New England brown bread, where it was made with corn meal and graham flour and rye meal. I very rarely find it possible to secure genuine rye meal, so that instead of using the rye meal I have given the proportion also in using the corn meal and flour together, and whole wheat flour can be substituted for the graham flour, so the bread may be made with either of these two flours and the meal. The bread may be made with a smaller amount of meal, say one cup of the meal and two of the graham flour. There is one thing we have to make a difference in if we use the Graham flour and no corn meal, and that is the quantity of flour in proportion to the milk. There is no meal or flour that thickens so much as corn meal, so if we omit the corn meal we will have to use more flour in order to get the right consistency to our batter. Corn meal mixtures are always made softer than any other of our batters and dough, on account of the swelling in the cooking — on account of this swelling of the meal—so we will simply bear that in mind when we make this bread simply with graham or whole wheat flour. I am going to make it this afternoon with graham flour and corn meal.

We always sift the graham flour first and throw away the bran. A great many years ago when graham flour was first used it was supposed this bran in the flour was very useful, and undoubtedly it is to some people, but the truth of the matter is that this bran is very irritating and to a great many people it is decidedly objectionable. It is better to be on the safe side and not use the bran rather than run the risk of irritating the intestines. If the bran is thoroughly masticated it is all right in certain cases. Bran works in such a fashion that it causes the material to pass right through the system instead of being assimilated. So that is why in using graham flour it is well to sift it first and throw the bran away. In buying graham flour it is economy to buy that which has the smallest amount of bran; and this flour should be measured after sifting; this calls for the flour that has already been sifted. If we measure it first there is all of this bran to be discarded and the batter would be too thin. We sift all of our dry material together first. I shall not be able to make the full recipe this afternoon, for the mold that I use is a little small. The rule will fill three one pound baking powder

cans. When the bread is raised and cooked in one large mold, it will be necessary to cook it for about three hours in order to have it thoroughly done. In the one pound can we can cook it in an hour or an hour and a quarter. The idea of having this tube through the center is that the loaf will cook in less time on account of the circulation of water and steam in the inside, as well as on the outside. I can cook it in an hour and a quarter, or an hour and a half in the tube mold. We are careful in greasing these molds to grease the mold and lid as well, because if the mold is filled two-thirds full the batter will rise to the top and touch the lid. If the lid is not greased, we are likely to break the crust off the bread.

I want to explain now about the use of soda in using baking soda for mixtures of this sort. Instead of dissolving the soda in the old-fashioned way with milk or water, we find it more satisfactory to sift it with the flour for two reasons: where soda is wet it is very apt not to be thoroughly dissolved, and you have often noticed, undoubtedly, a loaf of ginger bread that had yellow spots all through it, or corn bread that had brown streaks in it from the soda being only partly dissolved. There is that objection, and one other also: where we wet it, it will lose some of the strength of it. As soon as it is wet, it begins to effervesce, and just so long as it is wet before the cooking begins, just so much strength is lost in this way. In olden times where people used saleratus instead of baking soda, it did not make so much difference in wetting it, on account of the extra strength of it.

The flour sifter is not fine enough, so I use a very fine strainer, or a piece of cheese cloth, but the wire sieve is convenient for other things, too, and it takes less time if we rub the soda right into the flour. We are always very careful in measuring soda, a level teaspoonful always means a level teaspoonful—not a particle more. I am using about two-thirds the recipe. This bread may be made with buttermilk or sour milk, sweet milk or water, so you see there are four changes in making the bread. The buttermilk and sour milk are more desirable, because they make a more tender bread, but we can make a very good bread with the sweet milk, or use water with it, or the water alone, if we have not the milk convenient. We make no difference at all in using the soda with either sweet or sour milk where we have molasses, because molasses contains acid to be neutralized; we may use either sweet or sour milk, it makes no difference so far as the soda is concerned. Of course, if we have the sour or buttermilk it is better to use it.

It is always more convenient and satisfactory in making doughs and breads of all sorts to pour the liquor into the dry rather than the dry into the liquor. I notice so many times people in making bread will pour all the water or milk into the bowl first and then stir in flour; it lumps every single time. If we put a little of the flour in our bowl first and pour in the liquor gradually, we can keep the dough much more smooth, and so we always follow that method in mixing batter.

I am going to make this this afternoon with sweet milk and mix it with the molasses to a soft consistency, so that it will pour readily, on account of the corn meal we have. In this rule we have only three-fourths of a cup of molasses for the full rule. There is a good deal of difference in molasses. If I have a strong, dark molasses, I would rather dilute it with a little warm water than to have that strong taste which the bread is apt to have. On the other hand, with the light quality of molasses we can use the full amount the rule calls for. I do not like to use syrup, as it will make a sticky, light bread, neither does it contain the necessary acid. I prefer a high grade New Orleans molasses, and it is best to purchase this in sealed cans. We are then certain of the grade and cleanliness of it.

Question — Does the New Orleans brown sugar have the same effect on soda as the molasses does?

Mrs. Armstrong—No; we only find the acid in the molasses.

Question—How sour should the milk be?

Mrs. Armstrong—If the milk is sour enough to have separated and a scum is formed on top it is too sour. When we speak of using sour milk, we use

milk that is thickly clabbered. As a rule, a level teaspoonful of soda is used for a scant pint of sour milk.

Question—Sometimes milk isn't clabbered, but sour.

Mrs. Armstrong—Yes, that is true, but it is not so satisfactory to use unless it is really thickened.

Sometimes raisins are added to this brown bread, sometimes nuts. Either would be mixed with the flour before the milk and molasses are added. If they are dry, there is no reason why they should sink to the bottom of the bread, unless the batter is too thin, then they will fall to the bottom.

Another thing I want to call your attention to is the difference in flour. Of course, most of you realize that all of our recipes do have to be varied according to the flour we use. Some flour thickens more than other flour, so often we have to use either less flour or more milk than the recipe calls for. I will show you the consistency of this batter when we have it ready to pour in the mold, and we never fill the mold more than two-thirds full. We want plenty of room for it to raise. That is the consistency we have it—so that it pours readily from the spoon, but if there were no corn meal in there we would make it stiffer. This comes to just about two inches from the top of the mold. It would be about the same consistency with buttermilk. The sour milk and the buttermilk both make a thicker batter, so where we use sweet milk it will take a little less of the milk to have the same consistency.

I will show you how I am going to cook this. Instead of using a steamer, I am going to cook this in a deep kettle of water, and I have a piece of pasteboard in the bottom of the kettle. Several folds of paper, or half a dozen nails—or anything that will raise the mold from the bottom of the kettle—will answer the purpose. It is simply to prevent the batter from cooking to the mold. There is no objection, of course, to using a steamer — that is more commonly used—but oftentimes it is more convenient to do the cooking directly in the water. I make no difference in the length of time whether I use the steamer or the water for the cooking. We must have a kettle or pail deep enough to leave a space between the top of the mold and the lid itself. The water must be boiling from the time the work is begun until the work is finished. The idea is to have enough steam to completely cook the bread, it must boil and boil hard, for all of these breads and puddings which we put in the water. It is more convenient to cook it in the water than in the steamer, and it is easier to add water in the kettle than in the steamer, unless you have a steamer that has a funnel at one side so the water can be poured in without moving the bread, for, in adding water to this, if I jar the mold, the mixture might fall. Where the bread has partly raised and then been jarred or disturbed during the raising, it often has a hole through the center. The amount of water to be used must be determined by the size of the mold. If the cover fitted absolutely tight, I could have it high enough to come over the top, but this does not fit tight enough to run that risk. If I were using small molds, then I should have to use a smaller amount of water on account of the mold being so light that the volume of boiling might displace it. If that water cooks away, we must have hot water in readiness to add; it never should be cold water that is poured into that. If we do not have a mold that has a tight cover, it is better to place a piece of greased paper over the top. It is likely that the steam which rises from the water will condense against the lid and fall back and make it soggy. A piece of greased paper will answer just as well, if tied on the top of the can, as the lid. In using a kettle that has a loosely fitting cover, it will help some to lay a soft towel under the cover, to prevent escape of steam. The more of the steam that is lost, the more slowly it will cook. When we understand all that and realize just what difference these things make, we can use any of the recipes for steamed puddings and breads and boil them instead of steaming. The only advantage in the steamer is that we can cook something else underneath, and for certain things it is easier to use the steamer, but for the brown bread I would just as soon cook it, provided I have something to cover it. I do not like to have to add any more water during the first half hour.

Every once in a while I hear people say "I put my steamed bread on in cold water." But we know that the soda begins to form gas as soon as it has been moistened, and if we have to wait until the water is heated through, it seems certain that we will lose some of the lightness of the soda. Now, are there any questions about this bread?

Question—If you were to use the graham flour entirely, what quantity of flour would you use?

Mrs. Armstrong—I would use probably half a cupful more of the flour.

Question—And if you used the whole wheat flour?

Mrs. Armstrong—It would be about the same. After they are sifted they practically have the same consistency. A great many people have the idea that Boston brown bread is only good with baked beans. There are plenty of other combinations that are good with the brown bread. We consider the brown bread a more desirable winter bread than summer bread, on account of the heating qualities of the corn meal. We know corn meal is one of our heating foods, as we say, so we use it more in the cold weather than in the warm weather. The Boston brown bread is good with veal and oysters, with pork and chicken, and, in fact, I think it is good with almost everything. It is moist, but if it is thoroughly cooked it should not be soggy. Many people like a drier bread than this recipe makes. If you want it a little lighter and a little drier, use the same recipe and add to it a half teaspoonful of baking powder. Another thing we may do if we want the bread drier is after the steaming is all done remove the lid from the mold and set the bread in a moderate oven for half an hour to dry it out.

I would not advise the use of brown bread for people of weak digestions, because the corn meal is a little hard to digest, but for the average stomach it can be taken care of very well indeed if it is thoroughly cooked, but if it is not thoroughly cooked it is indeed hard to digest.

Another very convenient thing about this bread is we can combine the recipe and make at the same time a bread and pudding. I have very often done that after I have mixed my bread and poured part of it in the baking powder molds, I would mix into the rest of my batter in the bowl a little spice or chopped nuts, or chopped apples or dates—any of the fruits and spice—and pour it into the third mold and steam that and use it as a pudding. As there is no egg in it and no shortening, we serve with it a rich sauce that has butter in it, because this will require something that will make it a little richer than the pudding itself would be. This pudding is more wholesome and easier digested than any of the suet puddings. For this use the graham flour and milk and soda and molasses, just the same as for the bread, and omit the corn meal. Either a liquid or hard sauce may be used.

This is one of the most convenient breads we have for reheating. If I were going to make part of this into a bread and part into a pudding, I would not want to serve the two at the same meal, and I could have my bread warm and fresh and use the pudding several days later. The bread and pudding made in that way can be kept for several days, or even a week. After it is cooked, we take it out of the mold and let it cool fully; it should never be put away warm. After it is cooled, wrap it in paraffine paper. This could be wrapped in something else, but that is particularly convenient for covering articles of various sorts and wrapping up the different kinds of foods we want to keep. Keep it in a cool place. When ready to use it, put it back in the same mold in which it was steamed, put it in the tea-kettle and leave it there for half an hour, with the water boiling. Be sure and heat it through, and then it is ready to be served with the sauce. We can use part of the bread one day and save the rest and reheat it several days later in the same way.

There are a number of other ways in which the bread may be used instead of served plain. The steamed bread cut into slices and served for breakfast with cream or hot milk (it does not require any sugar) is good to use as a cereal. It is good for lunches; crumble it up in the milk and heat it that way. We also make toast from the brown bread. It does not toast so readily as other breads because it is more moist.

One very good way to use this bread, especially where it is cut into rounds cooked in baking powder cans, is to toast these slices and serve on each slice a poached egg, have one egg on each slice of the toast and then pour a little white sauce around it. We have another way of using the steamed brown bread, which will not be advisable for delicate people, but occasionally is all right for people of good digestion. That is when we have ham for breakfast, which isn't very often, after the ham has been cooked we put it on a hot platter and fry the slices of brown bread in the ham fat, and the two seem to go together nicely. So you see there are a number of ways in which the brown bread can be used besides the fresh bread. It seems to be a bread that most people like very well and it certainly is very simple.

Question — Do you ever bake the brown bread without steaming?

Mrs. Armstrong — Sometimes it is baked without steaming. I think it is better to cook it in steam, for baking is apt to make it too hard on the outside. If it is cooked in the oven, I think an earthen dish is better, because it will crust so hard in a pan before it is thoroughly cooked through. If it is baked, we make the batter stiffer than when it is steamed.

Question—Would you make the oven as hot as for white bread?

Mrs. Armstrong — No, I would not make the oven as hot as I would for white bread. The oven would be considerably slower, but this matter of the temperature of the oven is difficult to explain satisfactorily. Many times you hear people say: "I have the oven hot enough so I can put in my hand and count five or ten." It seems to me it makes lots of difference whose hand it is. I was extremely amused when I was down south last month giving a course of cooking lessons. There was an old darkey assisting me who was quite clever and she was much astonished at some of the questions some of the ladies asked. One of the ladies asked me something about the heat of the oven, and she shrugged her shoulders and said to me: "When I'se going to cook I has my oven just hot enough for what I'se going to cook," and that seemed to be her solution of the problem. So this matter of the heat of the oven, a moderate oven, a hot oven, and a slow oven, they are simply relative terms.

Quick Graham Bread.

RECIPE.

Sift together two cups graham flour, one cup white flour, one-third cup of sugar, one teaspoon salt and five level teaspoons of baking powder. Mix with a little less than two cups of sweet milk and beat well. Pour in buttered loaf pan and bake in a moderate oven three-fourths of an hour.

A scant cup of sliced nuts or dates may be added to this bread with excellent results.

I am going to use the dates cut into bits for the bread I am going to bake this afternoon.

I want to call your attention here to one thing in regard to these baking powder mixtures: that baking powder breads of all sorts are more expensive than yeast mixtures, but, as I said in the first place, we only use these occasionally. This quick graham bread may be made with either graham flour or whole wheat flour; it may be mixed with some white flour, or made entirely from the wheat, sifting it first, as I suggested, and measuring after sifting. It is sometimes made wholly from white flour. It makes a good plain bread. We have no shortening in the bread at all; there is nothing but the baking powder, flour, salt, and milk. For the white bread we do not use the sugar, but it seems to me that the graham and wheat breads are a little more palatable if they are sweetened. If this bread is made with nuts or dates, it would be suitable only to use for lunch or for supper, or to use for the lunch basket. It is one of the nicest of quick breads for that purpose and the dates or nuts make it much more palatable. There we have something that is almost as likable as cake, and a great deal more wholesome and less expensive. We would not serve a nut bread at a meal where we have meats, because it makes too hearty a combination. It is one of the most convenient of breads, because the mixing is so quickly done. If we know in the morning we want something extra in the way of bread, it can be baked

while the dishes are being washed. It is better the same day it is made, or, at least, the next day. I would not try to keep a baking powder bread more than the second day, because it will dry out. If it is made with sour milk and soda, it will keep moist a little longer. It must be well baked. Better make it in small loaves than try to make it in a large loaf and run the risk of the inner part not being completely baked. We can use figs, nuts, raisins or currants. If we chop the fruit in a chopping bowl, it is much easier to chop if a little flour is added, otherwise it sticks together so. Nuts may be chopped or sliced.

In looking over the recipe, you see this calls for the two flours together, or we may use all one kind of flour. I am going to slightly increase the quantity and make small loaves of this. For a pan as small as this, two cupfuls of flour would be sufficient to make a loaf, and that is a very good sized pan, because it will bake the bread in a short time. It not only saves attention and time in looking after it, but it saves fuel, and we are more sure of having it thoroughly baked. Bread pans are very much better made from heavy tin than made from the thin tin. This pan, though small, is considerably heavier, because it is made of this heavy tin ware. The best are made from Russian iron and are more durable and better than tin.

We always get a smoother crust on our bread and cakes if we grease the pan lightly first and then sprinkle it with flour. It is not so important with the bread, but it makes quite a difference in the cake. If we use butter for greasing, it should be butter taken from the top after the butter is melted. If we take it from the bottom of the cup or bowl we will get too much salt. We prefer unsalted fats for greasing, as the salt makes the dough stick to the pan.

In using baking powder for mixtures which are stiff, we may use three level teaspoonfuls of baking powder for each two cupfuls of flour. Where we have a larger amount, we use a slightly smaller proportion. There is a great deal of difference in measuring baking powder. If we use eggs, we get the lightness from the egg itself. People seem to think in this recipe I use considerable baking powder, but I find they measure their baking powder by the heaping spoon—which is really five or six level teaspoonfuls.

In all baking powder mixtures, we have the oven rather hotter than we do for the soda mixtures, and for such a mixture as this we want a moderately hot oven. If the oven is too hot, the bread will crust over on the outside before it has raised enough—just as we often see a loaf of cake. We often find there is a crack on the top, because the crust was formed before the raising was completed, and as the raising went on it had to break open the top of the crust. Where a cake does that it is from one of two things: either the batter is too stiff, or the oven is too hot. On the other hand, if the baking is too slow, we have a dry, hard bread.

In using nuts, we may use any kind: the English walnuts or pecans, or mixed nuts may be used. Mix the fruit thoroughly with the flour before adding any of the milk.

Question—Is there any covering on your bread pan?

Mrs. Armstrong—There is no objection at all to having a cover if we are sure the cover will not touch the bread. If we lay a paper over it should be a greased paper. I would rather cover my bread during the first part of the baking than run the risk of having too hard a crust formed; and the same way in cakes, we usually make a cover for that when it is first baking.

I am going to make this with half milk and half water. This same mixture may be used in a shallow baking pan and served broken into squares, just as we would make a corn bread. We may make it into muffins by adding two eggs, having the yolks and whites beaten separately, and that rule would be sufficient for a small family. If you have water instead of milk, you can put shortening in if you wish, but it really does not need it where we have the fruit or the nuts. The only difference we have to make when we bake dough in a loaf or in small pans is the difference in the consistency, and we can use the same recipe for small cakes or a loaf or layer cake by making this slight change in the batter. The thicker the batter, the slower the

oven must be. This quantity that is given in the rule calls for two cups of milk.

Question—Doesn't water and baking powder make your biscuits a little lighter than if you used milk?

Mrs. Armstrong—I have never noticed that, but I do know people often prefer the use of water to milk, especially for cake.

I am baking this in two small loaves to save time in the use of the oven. I heated the oven by using both burners of the gas range, but I have turned the back burner off now, and I think we can get sufficient heat by using the one burner.

Question — When you are setting yeast bread, how much salt do you use to the quart of water?

Mrs. Armstrong — In making yeast bread, we allow a cupful of wetting for each loaf, that is, for a moderate sized loaf, so a quart of water would make four loaves of bread, and the usual proportion of salt is a level teaspoonful for two loaves, that is, two level teaspoonfuls for a quart. The salt is never added until the sponge is light. We consider either the dried yeast or the compressed yeast more desirable than the home-made yeast. I would no more think of making my own yeast today than my own soap or candles.

Question—Why not?

Mrs. Armstrong—I will tell you why. If we can get our yeast made by people who know how to do it with chemical accuracy and with a scientific cleanliness impossible in a family kitchen, we have a yeast that is more wholesome than anything we can make ourselves. I am talking about what we call surgical cleanliness. Such yeast is absolutely pure and it is absolutely clean. Yes, I have come across some that is slow in coming up. If I had any uncertainty about my yeast, I would test a small amount of yeast in a cup by itself. I never had that difficulty in using the yeast foam. Occasionally in buying the compressed yeast, we get a cake that is soft and pasty, or that is dark and shows that it has been kept for some time, but if it is firm and free from an unpleasantly strong odor, it is all right. We consider that either the dry or compressed yeast is more wholesome and more certain in its results than any of the home-made yeasts. I do not want you to understand this as simply my personal opinion. It is what is considered best by people who have made great study of this question. In our colleges and scientific experiment stations there are people who have tested the yeast plant in all forms and they found this to be true universally. That is why I would no more think today of making my soap or my candles than of making my yeast. If we can buy an article in a pure and wholesome condition and it gives us a more definite and perfect result at a moderate cost, why spend our time and materials on an uncertainty?

Question—Which do you consider best, the compressed yeast or the yeast foam?

Mrs. Armstrong — If we make our bread with compressed yeast, we sacrifice flavor to time. If we make it with the yeast foam, we sacrifice time to flavor. If we have good yeast, we can make equally good bread with the yeast foam or the compressed yeast, but each has a taste of its own.

A Lady—I have lost two batches of bread with yeast foam.

Mrs. Armstrong—I think we can depend pretty thoroughly on the yeast foam, but, like all other products, occasionally there may be something that is not right. Of course, any dealer who will sell a product after it has lost its efficiency ought to be responsible for it. After it has been kept for a certain length of time, it will certainly lose part of its strength. A dealer ought to know how long he had a thing in stock. Of course, the yeast foam will not keep forever. I was extremely amused some time ago to hear a woman who has had a large experience in practical cooking and who has given a good deal of her time to domestic science along certain lines, and a woman who should have known a great deal better, state that she had yeast in her cellar now which was started three years ago and was making bread from it. She seemed rather proud of it. It would be interesting to see that yeast analyzed.

A Lady—I use the lightening yeast, and I only change once in six months.

Mrs. Armstrong—I do not like to get into this discussion too far, because we are talking about things that are way off from our subject, but the truth of

the matter is we have foreign yeast plants, as we say, which are in the air. Every time your yeast is exposed to the air, you are getting something in there besides the kind of ferment you want, and you are getting a less wholesome bread. We cannot be certain of having perfectly wholesome bread, as we are getting things in there we are not figuring on. I have eaten bread that seemed to be all right and not made under the best conditions, but that does not follow that is the best thing to do.

I was speaking about pie crust some time ago and an old lady said: "If you had a husband who was 75 years old and you had pie for breakfast every morning and he insisted upon it, would you try to break him of it?" I said, "No, I would not do anything so rude as that, but I would not begin that way with the children." Because people live to be 75 and 80 years old on bad diet is no reason to suppose their ways best for all.

Question—How do you fix your yeast foam before you put it into your bread?

Mrs. Armstrong—I always wet it. In using the yeast foam we soften the cake. I let it stand awhile and then mash it soft with a spoon. If I had yeast that I was uncertain about, I would use a small quantity in that way and make sure of my bread. It is better to do that than to waste all the time and material.

Question — What do you think of using potato water for bread?

Mrs. Armstrong—I never would use potato water under any circumstances whatever. No, I do not think it is poison, but it is not thought very wholesome. I tell you what we do when we use potato water: when we want to use the water in which potatoes are cooked, we always scald the potatoes first. There is a certain matter in the inside of the potatoes near the skin which we wish to remove, so we scald our potatoes first and then put them on to cook in freshly boiled water, and that is the only potato water we would use in making bread. There are certain people who in their experience of bread making can make better bread with inferior material than other people can make with the best of materials. It does not always follow because bread was good made in a certain way that that is the best way to make it, because that may be due to the experience of the cook. In regard to all of these things, we all have our own personal ideas: we have our notions or fads, if you please, and we are brought up with certain ideas which we think are the only methods for us to follow. If we are all of us to go on doing the same thing we are doing all the time that we have previously done, what is the use of getting together this afternoon? Every up-to-date housekeeper realizes that she has many things to learn. I never had a cooking school yet that I did not hear someone say to someone else: "What is the reason you are coming, for you are such a good cook?" That is the reason she is here; it is the good cooks who always take the most interest and it is the people who have the most experience who realize how much more there is to learn. The longer we keep house, the more we see there is to it and the more we see that the knowledge is going to be of benefit to us. I think tomorrow afternoon when we hear Mrs. Laws on the "Economical Preparation of Foods" we will get a great deal of helpful suggestion. I am glad to get all the comments the ladies can make, because we learn from each other all the time. I find that I always learn things helpful and useful along these lines; we want to get the most for the least effort and the least expense. No matter how much we love to cook, we do not want to cook all the time. There is nothing I enjoy more than giving a lesson on yeast bread, and the only reason I am not giving one this afternoon, instead of this baking powder and soda lesson, is because we have had the yeast bread given for the Round-up before, and all of this is for the Bulletin that is published this winter. I gave the lesson on bread in the Bulletin three years ago. It takes more experience and more intelligence to make good bread than any other kind of cooking we have. Many housekeepers get the choicest materials; the freshest eggs, the best butter, the finest flour, and then they forget the most important part of all, and that is brains.

The baking soda which comes in the little pasteboard packages should

be put into a little tin can, because it will lose its strength if it stands in the pasteboard box.

We will now give attention to the baking powder mixtures. In order to save time during this lesson this afternoon, I have already prepared a portion of the flour, sifting the flour with the baking powder and salt and rubbing the shortening into that, just as we would for baking powder biscuits and various puddings. A part of that will be put into plain biscuit and part for fruit rolls and part for the peach pudding—using the same mixture for all these things.

Baking Powder Biscuits.

RECIPE.

Sift together one pint of flour, one-half teaspoon salt, and three level teaspoons baking powder; cut in one tablespoon firm butter, and when well mixed moisten with milk or water as soft as can be handled. Roll out on a well-floured board, cut in small biscuits and place in a pan, wetting the tops before baking. Have oven very hot and bake ten or fifteen minutes, according to size.

Drop Biscuits

are made in same proportion, but soft enough to drop by spoonfuls in muffin pans or on baking sheet. They are quickly prepared and very good when well baked.

Twin Biscuits

are made with regular baking powder mixture rolled thin, cut into rounds, lightly buttered and baked after pressing two together. For variety a little chopped cooked meat or crushed maple sugar may be placed between them.

Fruit Rolls

are also made from same dough rolled thin, spread with a mixture of chopped figs, raisins and nuts, rolled up like a jelly roll, cut into strips and baked quickly. Crescents are made with same filling but not rolled up—two layers of very thin crust enclose fruit, and crescents are cut with roll cutter, brushed over with egg and milk and baked.

In making our biscuit, we do not make them so rich as the fruit rolls, but the principle is the same. We usually allow a level tablespoonful of shortening for a pint of flour for the biscuit. No biscuit is more delicate or more delicious than the biscuit made of baking powder, flour, salt and cream, but we generally use a little shortening in making the biscuit with milk, either rub it in with the fingers or chop it in with a knife—it must be finely mixed with the flour. If biscuits are required for breakfast, it saves time to prepare the flour the night before. I sift my flour, rub in my shortening and cover the bowl closely, so in the morning all that is necessary is to add the wetting while the oven is heating.

The baking powder mixture for plain biscuit may be used more stiff and rolled out and cut into rounds, or we may make what we call the drop biscuit. That is one of the quickest and most convenient methods; make the mixture just the same, but considerably softer, simply using more milk. This may be baked in muffin pans and baked in a very quick oven. It does not have a uniform shape, but it is delicate, and if it is quickly and thoroughly baked it makes a very delicate and simple biscuit.

With this mixture we not only make the plain biscuit, but the twin biscuit. For that we roll the dough considerably thinner than for the plain biscuit. After it is cut into rounds these are lightly buttered and two pressed together and baked in that way. A nice way is to put chopped meat with them before baking the biscuit for lunch. Then you have a ready made sandwich—chopped ham, or ham mixed with other meats, or a little chicken. Sometimes in place of meat we use grated maple sugar, or a light brown sugar, or cinnamon and sugar mixed together, and the children will enjoy sandwiches made like that a good deal more than the plain biscuit. If we are using ham, it would not need anything with it, but if we use beef or mutton we would need a little seasoning.

Peach Cake.

RECIPE.

Mix together one pint of flour, three level teaspoonfuls of baking powder, half a teaspoonful of salt and one gill

of sugar. Rub through a sieve and add a gill and a half of milk, one well-beaten egg and three tablespoonfuls of soft butter. Spread this in a well-buttered shallow cake pan. Cover the top of the dough with peaches pared and cut in halves. Sprinkle three tablespoonfuls of sugar over this and bake in a moderately hot oven for half an hour. Place the cake upon a warm platter and serve hot with sugar and cream.

Apple Cake

may be made in the same way, and a very good apple pudding is prepared by placing quartered apples in a baking dish; then sweeten them and add water, spread the crust over the fruit and cook either on stove closely covered or in the oven. Serve cream and sugar or a lemon sauce with it. This same dough may be used as a coffee cake by adding a little spice and raisins or currants; then sprinkle top with sugar and cinnamon. This is best when fresh.

I am going to use a part of this mixture now for a peach pudding or peach cake, and I have given a recipe also here for our apple pudding. We use the baking powder mixture soft and spread over the apples, using a granite or earthen baking dish, and remember apples cook through more quickly if cut in halves or quarters than thinly sliced; if they are thin they are apt to dry up. We put them in the bottom of the baking dish and sprinkle with sugar or cinnamon and cover this with a soft dough; simply spread that over the top of the pudding—that is easier than rolling the mixture out and putting on in a plain round, and it makes just as good a pudding; we often make our shortcakes that way. For this apple pudding we may have the crust on top and the apples below and serve with cream and sugar, or a sauce, if desired. If there is a good deal of liquor or sugar with the apples, it is not necessary to serve anything. Always use a little salt when you use the apples. We can bake this in a moderate oven, or cook it on top of the stove, by covering it closely; it must be covered tight in order to keep in the steam. I do not think a pudding made in that way is as wholesome as one baked. The one baked is crisper and less doughy than one which is steamed. We may also make an apple cake by having the dough spread in the pan and the apples put on the top, only that is usually made with yeast dough instead of a baking powder mixture. We sometimes make a roll with the soft apples and bake that or steam it, and we also bake it in small dishes and serve as individual puddings; we use the muffin pans, put a little soft dough in each pan, press a half or quarter of an apple in each one and sprinkle with the sugar before baking.

Question—Cannot we melt the shortening and pour it into the milk?

Mrs. Armstrong—The objection to melting shortening and pouring it into the milk is because that shortening when poured into milk will begin to harden again. I would rather wet the dough with the milk first and then stir in the melted shortening last if I were going to do one of those two ways, for then it can be readily mixed. Where it is melted it does not mix as evenly in a stiff dough. We never make a fine cake, for instance, with melted butter. It will not be as delicate as where butter is creamed. You will see the shortening will begin to harden as soon as it is used with the cold materials, so that should be added last. I am going to put this flour that has been mixed with the baking powder and flour and salt and butter in the bottom with the peaches on top. I use winter wheat flour; for bread we like to use the spring wheat or blended flours. Any of our well known brands of flour are good flours, but for baking powder mixtures I would rather use a winter wheat, and that is what I am using this afternoon. This is to be soft enough to spread in the pan. I am not going to have a very thick crust. Put the fruit on top, add a little sugar and bake this until the dough is thoroughly cooked and serve with the cream and sugar, or with the peach juice slightly thickened with corn starch thoroughly cooked.

I have used just two cupfuls of the prepared flour, that is, with the baking powder and shortening. I am going to bake this in an earthen dish. It could be baked in a pie tin and then carefully loosened from the pan and placed on a plate in serving. We have to

have the oven hotter for our baking powder biscuit and our fruit rolls, and I shall turn the heat on for that just as soon as I have these graham loaves taken out. This is the consistency of this mixture — stiff enough to drop from the spoon. I prefer a wooden spoon for several reasons; it is easier to handle, having a round, smooth handle it does not cut the hands, and the shape of a spoon like that fits into the bowl better.

This is the baking powder loaf made with the graham flour. I did not use any of the white flour in this at all this afternoon. I find this loaf is baked more evenly than the one in the smaller pan. This is the one baked in the heavier tin and the other was baked in the thin tin. A bread like this, if it is to be eaten fresh, should be broken instead of cut.

I turned the heat of the oven on now so that we have both burners going. For baking powder biscuit we need quite a hot oven, and it is always best to have the biscuit cut rather thin; the large, thick biscuits are apt to be soggy in the center and consequently are unwholesome. We would rather have them crisp and thin, as they are more digestible. There is nothing that is better for our digestion and our teeth than foods which are crisp and thoroughly cooked—something that requires chewing. The scientists tell us that today our children have too many soft foods, they do not have enough things to work upon, and the result is that they have to go to a dentist before they are six and seven years old. Where we insist upon having these soft foods and nothing that requires chewing, the teeth cannot develop as they should. I do not mean a hard, tough crust, but one that is thoroughly baked and is crisp. Plenty of butter, if you like, but where we have a crisp, well baked crust, and the butter on that, we have a very good combination.

For the fruit rolls this afternoon I am going to use the baking powder mixture made with the same consistency This is just the same for shortening as I used for the peach pudding, and with that I shall use the currants and some chopped nuts; the two may be used together or used singly or with raisins or any of our dried fruits, the figs or dates cut into bits, and a little sugar or spice may be added also. I am going to spread this out and then make the regular fruit rolls. These will require longer baking than the plain biscuit on account of the thickness and shape, so I would rather get these in the oven first and then increase the heat for the plain baking powder biscuit. One point that we must remember in making the stiff doughs to roll out is that we must not get them too wet. If we do we will have to add a great deal more flour in handling them. In baking powder biscuits we add the water gradually, not to get the dough too soft. I prefer to do this kind of mixing with a knife, working the flour thoroughly until the flour is stiff enough to all hold together. It may be rolled out then with the rolling pin or patted out with the hands, whichever is more convenient. If we get it too stiff the dough will be solid and the biscuit dry and stiff; if it is too soft we cannot handle it readily. Use just as little flour as possible on the board, because if we have considerable flour on the bottom of the biscuit dough when it is rolled out our biscuits will have a hard crust on the bottom, so we want just enough flour to keep the mixture from sticking. We sometimes use the sugar and cinnamon without any other fruit at all. In this have the spice thoroughly mixed with the sugar. Whenever we use sugar and spice, mix the two thoroughly together, otherwise the spice will form in lumps. After we have this mixture out on the board, we cut it with the knife very quickly and very lightly until it can be handled readily. Then we roll it out and add the fruit and spice. If the dough sticks to the board, we will have to loosen it before we cut it at all when we are cutting out the rounds, because it will spring back. We roll this thinner for the fruit rolls than for the plain biscuit. After this is about half an inch thick and as uniform as possible in shape, so as to save trimming, then we have it all ready to roll up. We may spread this with a little soft butter, which will help to hold the fruit and the nuts in place, or we may mix a little of the sugar and spice with the fruit, and sometimes a very little grated lemon rind, but not for people

with delicate digestions. It is the grated rind of the lemon in our lemon pies that is so much harder to digest than the lemon juice or sugar and other material that we use. After the fruit is spread on this mixture, press it down lightly, so it will stay in the crust after it is ready to roll. Then roll it up like a jelly roll and cut it up; we cut this into strips and put it on a buttered pan and let it bake until thoroughly done. In putting these into the pan, I like best to bake them so that a ring is formed around the pan and not have any in the center, because if we have any in the middle of the pan we are apt not to have them thoroughly baked. There you see how I mean, so we just have a circle around the edge of the pan, and after they are ready to bake we brush them over with butter, or milk or cream may be used in the same way, and then sprinkle with more spice and sugar.

Question—How many people would that amount serve?

Mrs. Armstrong — We have nine of the rolls, and of course it would depend entirely upon the appetites of the people as to how many it would serve. This afternoon I am expected to serve about 200 people.

I am going to put the rest of this mixture into plain baking powder biscuit, and this was prepared just the same as the other, only it has less shortening in it. I will make the plain cut biscuit with this, handling it just the same as we do for the fruit rolls. By the time we have these in the oven, we can take out the steamed brown bread, and also have the peach pudding ready for serving.

In serving this date bread, it, of course, had to be broken while it was warm, so it will not be so sightly, and, of course, it is not buttered, but when you make it at home you can put all you like on it.

In making these dishes this afternoon, it seemed better to make a number of dishes (illustrating different methods) and make small quantities than it would be to have spent the time in making two, or even three, and having large amounts. Where we have a large amount of mixture a slightly less amount of the baking powder may be used, but only very slight.

In cutting out the biscuit, I spoke about the dough being loose from the board before we attempt to cut it, and have a cutter that is sharp. A point which I wanted to make here in cutting our biscuit, after we have cut one biscuit we press the point from the next one into the dough in such a way that there is as little waste as possible in making the biscuit; so that we do not have all these little bits in between left over. It does not give as perfect shapes, but we have the advantage of avoiding a second handling, which usually means heavy biscuit.

After we have our biscuit in the pan, we prefer to spread them with a little milk or cream, or to wet them with water, and sometimes I use the melted butter—using only a very small amount in any case—and we have a more delicate crust. I would prefer the milk or the cream if I had it. Where we put our biscuit into the oven dry, they are very apt to have a dry crust, not a crisp and delicate crust as we prefer.

I am going to turn out the steamed brown bread now, and after that is taken from the mold I would like to have it passed through the room first, so you can see the appearance, the texture and the crust of the loaf. That loaf was in steam a little over an hour and a half, five minutes over an hour and a half; if the mold had no tube in it, it would need more time. I used a quart and a half of flour for the three mixtures, for the fruit rolls and biscuits and bread.

These fruit rolls we will bake a little longer than the plain biscuit: they can be baked for breakfast and served with coffee, or used for tea, or for the lunch basket, and sometimes they are used as a pudding, served with a sauce, or cream. We often use the dried fruits, spread with crushed apples or prunes, or any of the soft fruits, and then that can be baked and served with a sauce.

I spread the rolls with butter, just enough to keep the fruit in place. I pressed it in just a little, so it would hold as it is rolled over. The rolls can be used the next day, or may be reheated just the same as we may reheat any bread; put it into a pan and close-

ly cover this. Do not wet it, for it makes it soggy. If your rolls and bread and biscuits are good in the first place, they will be good in the second place if put in a moderately hot oven and closely covered and heated through. Have a pan that fits tightly over the other pan, so the crust won't get hard. A loaf of bread four or five days old may be put into your baking pan, covered up tightly with another baking pan that fits right over, heated in a moderately hot oven for half an hour, taken out and cooled thoroughly. Please do not wrap it up; that will make it steam. After you have taken your bread out from the oven, put it somewhere where the air can circulate around it and let it cool and you can use it a few hours later and nine out of ten people won't know but that it is fresh bread. I have done that again and again in my own home, and it seems to me that it is one of the most helpful things in regard to using up bread.

THIRD SESSION.

Thursday Afternoon, March 9, 1905.

RELATION OF FOOD TO HEALTH.

Miss Emma Conley, Instructor in Domestic Science, Marathon County Agricultural School, Wausau, Wis.

Few people are able to answer correctly a very simple question: Why do we eat? Few people can tell us why certain foods are good for us and certain other foods injurious, or why certain habits of eating are sure to lead to disease later in life. Few people know that many, many foods served daily at their tables contain adulterants, some of which cause slight disorders, or sickness that they never trace to its origin. Few people know the causes of anæmia, indigestion, dyspepsia, further than what the name implies, nor do they know that the proper food and care in selection and preparation of food will cure these ills, and that patent medicine cannot. In short, few people know the relation of food to health.

Until twenty-five or thirty years ago, very little attention was paid to the study of foods in this country. We have been so prosperous a nation that we never had to figure carefully the cost of foods, there has been an abundance of everything. In England and Europe many years ago the necessity for economy in living led people to study the question carefully, while in America we are practically beginning the study.

Why this utter ignorance of a subject that is of vital importance to every human being — of vital importance, because fame, fortune, ambition's highest goal, are "like the mist that appeareth for a little while and then melteth and fadeth away" without health. With all our progress, our tearing away of veils that have hidden truths in history, philosophy, science, we still believe that a doctor's prescription can, as if by magic, overcome the result of years of overloaded stomach, of overworked organs, of lack of fresh air, of neglect of exercise, of utter ignorance of the laws of health. Many misguided people laugh and remind us that parents and grandparents knew nothing of all this, and yet they lived and knew few ills. As before suggested, everything has progressed, except some few things that relate to the home.

Grandparents, if foreigners, lived on very simple fare, lived much out of doors during the day and had plenty of outdoor exercise; grandparents, if Americans, lived just as simply and knew little of office life, steam heated buildings, tram cars, pre-digested breakfast foods, canned peas, sweetened with saccharine and colored with copper and alum salts, strawberry jam that never knew a strawberry, and embalmed meats containing boric acid and sodium sulphite. Their lives were simple, fare simple, and many of the ills of the twentieth century were as unknown as motor cars and airships.

Physicians of today tell us that over half the disease is due to avoidable errors in diet. If this is true, and we know that it is, the relation of food to health is a known quantity and awaits our individual solution.

Is this knowledge inaccessible because of lack of material or books for study? Does it need the trained mind of the scholar to grasp the meaning or does it need years of research? Is it so dry and uninteresting a subject that it wearies the average mind satiated with neurotic fiction or oriental philosophy or society's scandal?

The Department of Agriculture at Washington, state experiment stations and colleges are eager to furnish free material that will give abundant

knowledge of the subject. Our government, our scientists, our progressive men recognize the importance, the value of the facts they have delved for. They do all they can; state facts clearly, simply, fully; give the information free to all who ask for it—but they cannot do the impossible. They cannot compel the thoughtless, frivolous, indifferent individual to read what will promote his health, the health of his family, and thus the health of the nation. Too many of us are like Browning's "Caliban"; we believe that sickness is some mysterious evils—the spread of tuberculosis, due to unsanitary conditions in homes and ignorance of its contagious nature, and adulteration of foods. Men do all they can in the latter case. We have dairy and food laws and commissioners to enforce them, but women could do much more. If women would thoroughly familiarize themselves with the food bulletins sent out and demand of their grocers only such goods as comply with the state laws, then the manufacturer who makes catsups out of waste products, coal tar colors, and uses salicylic acid to preserve the remains of a de-

COOKING ROOM, CLASS OF 1905.
Marathon County Agricultural School.

thing sent us by some unseen power, that, regardless of age or person,

"Lets twenty pass and stones the twenty-first,
Loving not, hating not, just choosing so."

Work for Woman's Clubs.

If woman's clubs really wished to accomplish something of inestimable value to themselves and to the world, they would cease looking after State Boards of Control and civic affairs and turn their undivided attention to two composing mass, would find his goods unsold. He would then of his own account send out goods pronounced pure. If the public, and especially the women, could become educated and enlightened buyers, there would be little adulterated food on sale.

A Pertinent Question Answered.

Why do we eat? We eat because food supplies the body with material for the growth and renewal of its tissues, and because food furnishes energy, the resultants of which are heat

and motion. The body must have food and the right food for growth of tissue, else there is not the right growth. It must have food to keep the body warm and to supply energy for activity, work and play, for without fuel there is no energy. Further than this, we must have a constant supply of oxygen to properly oxidize the food and set free the energy.

Did you ever obtain heat from a stove if you filled it full to the top and closed all drafts? We fill our stomachs full and remain all day and every day in poorly ventilated rooms and we expect the overworked digestive organs to assimilate or get rid of food that requires fresh air and a vigorous muscular activity to oxidize and assimilate. If proper food is supplied in the right proportion, if the system is not overstocked with waste material for overworked organs to get rid of, if food is not prepared in so villainous a way that it cannot be digested, if enough fresh air enters the lungs to properly oxidize the food, then there is no reason for sickness due to disorders of the digestive organs.

The Needs of the School Child.

Let us consider the physical condition, growth, activity and the needs of a child of from nine to 18 years of age —the school child.

During this period the mind and body are undergoing great and rapid development; there is constant muscular activity in all kinds of work and play, the normal child is active all day long. The great majority of loving parents think only of the need for mental development at this time, forgetting that the mind develops all through life while the bodily development ceases soon after school age. If physical welfare has been neglected, if development has not been perfect, the child suffers through life.

During the school period, the various tissues and organs increase in strength and size, the muscular activity develops and strengthens the muscles and trains them to act with power and vigor; digestion is rapid and thorough, and absorption and assimilation must be equally so. For these reasons, food must be abundant — it must furnish material for all these new tissues, must furnish heat and the energy necessary. Improper, insufficient food lays the foundation for dyspepsia, indigestion, and results in an enfeebled condition. Why, then, are so many children anæmic, subject to digestive disorders, poorly developed physically, fretful, selfish and nervous? An outline of the daily life of such a child will throw a flood of light on the subject.

Breakfast is late, or the child has remained in bed so long that if she eats her breakfast she will be late for school. Very often she eats no breakfast, very often she takes a cup of milk or coffee or cocoa standing up and then rushes to school. This child has had no food since six o'clock the night before and is really physically weak from lack of food, but the excitement keeps her up. At noon she comes in late, swallows her food hastily and runs out to join her school friends who are waiting for her, or she may not like the food served and refuses to eat, or a cold lunch may have been provided for her to take with her to school, a lunch of bread, pie and a piece of cake. If dinner is served at night, she may eat a hearty meal, but more often she eats a light supper and cares only for foods containing condiments, sauces or desserts. What is there in such a diet to furnish material for the great growth and development of the body?

Many parents blame the school when the child breaks down, thinking she has been overworked. On the contrary, she has been under-nourished, for most breakdowns are due to lack of proper nutrition and not to overwork. It is next to impossible to overwork the normal child. If you have a strong, healthy boy or girl, I think you will agree with me that studies do not worry much. It is when the nerves are ill-fed that the child becomes fretful and worried.

The first remedy for anæmic condition should be a diet of good beef and eggs, not patent medicines and iron preparations. The red in the meat contains the iron that is needed to give color to the blood and tone the system, and you cannot get what is needed by taking some iron preparation. Someone once asked me if a great many of the diseases of the digestive organs are not caused by eating too much meat. If you give a boy or girl simple fare, they will not eat too much, and the system can assimilate all they will eat.

It is after a man or woman have reached 40 or 50, when they cease to be active and do little work, after they have acquired the double chin of prosperity, that they lay the seeds for the disorders that come later. A child needs more protein in proportion to other foods than a man or woman fully grown. All they need is to repair the tissues that are wearing out, the child needs it for the growth and development of the organs.

All children should be compelled to remain at table during the entire meal. They should be ready for breakfast and breakfast should be ready for them, so that they may have ample time to eat it and reach school in time. Meals should be eaten slowly and there should be no nibbling between meals, but if boys and girls are hungry at four o'clock they should be given something to eat. Their bodies, all their organs are growing, all the functions are carried on so rapidly that the stomach is soon empty. They digest and assimilate food much more rapidly than older people do. The child should be given a lunch of bread and butter with jam or jelly, or a meat sandwich. Do not let children go to the nearest store and buy candy. I do not mean to say that I disapprove of candy. It is good if well made, and if eaten at the right time, but four or five o'clock in the afternoon is not the right time, because it interferes with the appetite for supper. The proper time for candy is for dessert, when there are other things in the stomach.

Breakfast for a school child should include oatmeal or hominy, or wheat, or some cooked breakfast food; bread or rolls or muffins and butter; eggs or bacon, and some warm drink. Dinner should include soup, beef or mutton or chicken or fish, potatoes and green vegetables, puddings, light dessert or pie. Supper should include some warm dish, as macaroni, or fish or meat balls, bread and butter, a small piece of cake and some sauce. Fresh fruits are wholesome, because they keep the blood in condition and aid digestion. Milk should form a good part of the diet in soups, puddings, and eaten with break-

PUPILS MAKING FLOWER GARDENS.
Marathon County School of Agriculture.

fast foods. The child's system demands sweets in some form and as they are a great source of energy, this demand should be supplied in jelly, jam, honey, simple cakes and cookies, good pastry and home-made candy. Pickles, spices and highly seasoned dishes and fancy cooking should be carefully avoided. If a child is given simple food, there is little danger that he will eat too much. The dangers from over-eating are not so great in school children as are the dangers from under-eating; by this is meant the dangers in eating simple foods.

After the body is fully developed, after the individual is less active, after it is possible to indulge the tastes for fancy foods, people over-eat and then is laid the foundation for gout, rheumatism and dyspepsia.

There is a great and open field for study in this subject of foods. A little knowledge of foods, their composition, nutritive value and cost, their digestibility, would make us all stronger, healthier, happier, and we would have sweeter dispositions—women all have sweet dispositions — but good, proper food would materially sweeten the disposition of the husband.

DISCUSSION.

A Lady—You did not say anything of milk as a food.

Miss Conley—That is one of the very best things that you can give a child. Milk contains about four per cent fat, five per cent carbohydrates and three and one-half per cent proteid, and it also contains a great deal of the lime salts necessary to build and strengthen the bone of the child. Most people do not know how to drink a glass of milk, they drink it in one swallow as they would a glass of water. As the milk enters the stomach, it is acted upon by the gastric juice and changed into one solid mass; if it is taken slowly it forms into smaller curds and then most of it comes into contact with the gastric juice and it is much more easily digested. Great precaution should be taken that the milk may be pure. The only way the typhoid fever germ enters the system is through the stomach. Milk and water are carriers of this germ, so be careful that the milk comes from healthy cows and is clean and pure. Diseases other than typhoid also come from an impure milk and water supply.

Question—Is protein the same as albumen?

Miss Conley—Yes, they belong to the same class.

Question—Is there no other way to supply it to children except by meat?

Miss Conley—Of all foods which contain protein, we get it in the form most easily digested from meat. Eggs and milk contain protein in form easily digested if served properly. Peas, beans and lentils are the vegetable foods that contain most protein, but they are harder to digest. Let us understand that while these foods contain protein, they contain much cellulose and so are harder to digest. We get protein in oats, wheat, and nearly all the cereals contain protein—about eight to 14 per cent protein to about 70 per cent carbohydrates. But there is another reason why the child needs beef. It is for the iron, the coloring matter for red corpuscles. Eggs will serve as a substitute for this same purpose.

Question—You spoke of candy being good for growing children. It is not a year since a leading physician told me that there is scarcely a child under 11 years old that can digest cane sugar in any form properly, and I wanted to know if there was any difference—if the beet sugar is more easily digested than cane sugar?

Miss Conley—Not a particle of difference. I will tell you what is a better form of sugar and that is honey, it is very pure. Dr. Gilman Thompson, probably the greatest American authority on Food and Dietetics, advises the use of sugar for children. He says: "The craving of children for candy furnishes a true indication of the requirements of nature, and it must be admitted that wholesome candy not only does children no harm but may serve them as an excellent food." Make the candy at home, so you may know it is made from sugar, not from glucose. Do not let children eat it at all hours of the day, give it to them as dessert. Of course, all people do not agree on this subject, but writers on dietetics agree that sugar is necessary for the growing child, sugar in some form. It is digested and assimilated by them

when taken in moderate quantities, no food is properly digested when taken in excess.

Question—At what age would you begin to feed a child meat?

Miss Conley—The first thing I would give a child in addition to milk is beef juice, that is between the age of one and two years. After the child is three years old give him a small piece of beef or chicken.

Question—What do you think of a lunch of bread and milk for children?

Miss Conley—It is a very good food. Children would be healthier if they ate more bread and milk than they do. Grown people do not need milk. Milk is a food, a nutritious food, and when we add milk to our meal we should take that into consideration and count it as a food.

Question—Would whole wheat well cooked be a good substitute for bread?

Miss Conley—It would be a monotonous diet. You mean eaten as a breakfast food?

The Lady—Yes, but for the child's lunch, if he would eat it properly.

Miss Conley—If the bran coats are not removed from the wheat it would be hard for the child to digest. A man working out of doors can digest foods made from coarser flour, flour that contains the bran coats, but one must have a very strong, vigorous digestive apparatus before her system can take care of it. That is the difference between the whole wheat and fancy patent flours. If you can thoroughly digest the whole wheat so as to get all the nutrition out of it, then the bran coats that are left act as a stimulant to the intestines, but if a person who works indoors, at office work, would eat whole wheat bread he would not get as much nutrition out of it as he would from bread made from fancy patent flour. His system could not thoroughly digest it. It is not what we eat, but what we digest, that makes us strong.

Question—Do you believe in pampering the stomach with all these patent foods, these breakfast foods? Don't you think it wise to consult the tastes of each individual person? Do you think it is right to force a child to eat things that are distasteful to him just because you think it is good for his health?

Miss Conley — Sometimes the taste of children is consulted so much that they do not care to eat anything that is provided for them. If away from home, however, where their individual taste is not consulted, they eat everything set before them. They should not be allowed to become so critical of food—it is hard for them later on. As to patent breakfast foods predigested: if you eat things already digested, soon you will not be able to digest anything. If you tie up your arm for a certain length of time it becomes weak, the muscles shrivel and you cannot use it. So with the stomach, it becomes stronger by working. I do not believe in predigested foods. One is advertised to contain 10 times as much available nutrition to the pound as a pound of meat or wheat or oats; four teaspoons contain so much nutrition that it equals in nutritive value the average meal. This is absurd. If it is made from wheat, it can contain nothing more than what is in wheat; if made from oats, it can contain nothing more than is found in oats; and if it is a mixture, it can contain nothing more than the average nutrition of the ingredients. No chemist under the sun can concentrate any known food so that you can get the amount needed for nutrition from a little pellet. If you could, your digestive apparatus, from disuse, would become atrophied. Do not let any food company insult your intelligence. If they put such claims on their packages, do not buy their foods.

THE HEALTHFUL HOME.

Mrs. Helen Armstrong, Chicago, Ill.

I want to talk to you just a little while on some of the other things that are necessary to make our homes healthful. There has been considerable said about some of these things, about sunlight and fresh air and restful conditions. The average child who has enough fresh air, enough sleep, enough exercise and simple food stands a very good show of growing up well, hearty and strong, but all these four things are equally necessary. It isn't simply a matter of food alone. We cannot handle our systems the way a man does his automobile, prepare it and store it to run for so many hours, or for so many miles, and then let it rest and store it again. We have to take our nourishment and sunlight and water at stated intervals, and we call water among the foods, not especially on account of its nourishing properties, but because it is so very valuable for us in several ways. We should drink a great deal of water. There are three ways by which it is eliminated: it passes through the kidneys, skin and lungs. The average person does not drink enough water. To drink water the first thing in the morning before we have eaten anything at all is a very good thing; some drink it hot and some cold. The hot must be brought down to the temperature of the stomach and the cold up to the temperature of the stomach, so whichever is the most agreeable is the most desirable. To drink at least a pint of water every morning the first thing on arising will be found an excellent thing for most persons. Besides the amount of water we take as liquid, we get a great deal in our foods. Scarcely any of the foods we use are without water, so we do take a great deal in that way; but we require considerable outside of the food. Very many times we hear it said that people should not drink water with their meals. The usual cause for that is because if we drink water while we are eating we are very apt to use it to wash down the food in the mouth. If we masticate our food completely and thoroughly, then there is no objection to using water, but it is only when it does away with part of the work of digestion in the mouth and the thorough chewing of the food that the water is objectionable that is used at a meal. Water is a very valuable thing, so far as our health is concerned, keeping the system thoroughly flushed and clean.

The Value of Sleep.

Sleep is another one of the things that is very needful, much more needful with the growing child who uses all of his energies during the day. A child is scarcely ever still. We do not need to say anything about children getting plenty of exercise, because they will get it, and it always seems perfectly absurd to have grown people tell children to keep still—that is not what they were made for. If the place where they are is not suitable for their play and exercise, there should be some other place for them where they can get the strength and development nature intended for them. A young child needs a good deal of sleep. Many of our children sit up too late at night altogether, and where it is possible for children to sleep late in the morning, if they are not feeling well, it certainly is desirable. If a child is worn out in the morning the chances are either that the ventilation has been very poor, or the child has not had sleep enough—children vary—some require more than others, just as we find other things vary with the grown people. We can scarcely make a mistake in having children go to bed too early when they are young, and this habit of allowing them to sit up till nine, ten and eleven at night is certainly a very harmful one for the child.

Relation of Amusement to Health.

The matter of amusement and recreation has something to do with our health. I use those two words, because our amusements are not always recreation. I think it was a German person who made the remark at one time that the American people make harder

work of having a good time than any people they knew. We take our pleasure so seriously; we go through so much effort to have a good time. When we speak about recreation we mean something that is going to give us a chance to think and consider other matters than we are used to considering. Recreation to be truly valuable to us gives us something that is restful or amusing or diverting without tiring or exhausting us. When we go to any amusement and are worn out afterwards, it is of very little benefit to us, but recreation is something to take us out of ourselves and out of our everyday lives and give us variety. As it has been said before, in regard to the work in the home, when we understand how to do it right, to do it in the best and simplest way possible; to get the best results with the least amount of effort, then we have time for these other things.

I was quite amused at a comment I heard the other day. There was a couple walking ahead of me, a gentleman overtook them and said: "Where are you going?" The first gentleman said: "O, my wife is going up to the cooking school and I think she had better stay away, for it takes every cent I earn now to pay for our provisions." He seemed to think if she knew more about it it would cost more, instead of realizing when we know more we can do better and have less expense. Such people do not look at it correctly. It is worth while to know these things. There is nothing so extravagant as ignorance, or so economical as knowledge.

Young People Should Be Taught How to Live.

One of the curious things about this subject of Domestic Science is the way some people understand it. Only last year I was invited to speak before a woman's club, before the Domestic Science department. They handed me a calendar with the meetings previous for the year. There was one day which was devoted to domestic science, there was one other day devoted to the serving of lunches, and the rest of the topics were in regard to art in Egypt and Greece. I did not quite understand it, we do not always see through these things, so I asked the ladies how it happened. They said they had domestic science in two days and were through with it. They were the most progressive people I think I ever happened to meet. We do not think we can learn domestic science in two weeks, or two months, or two years. We are always learning new things. This domestic science means just as much in our living as anything we can possibly study.

Another curious thing about our education is that while we are teaching our young people how to make a living, we do not teach them how to live! We do not teach them anything about taking care of themselves, or making homes for themselves, or making them comfortable or sanitary. I find as a rule women are very much afraid of scientific terms; they prefer to take their science in homeopathic doses. We feel it best to avoid terms or words that are not perfectly plain. The science is there, even if we are doing nothing more than making a loaf of bread. The science is back of it all the time, and when we understand these principles we are able to apply them to our benefit. We have time for other things when we do our work intelligently.

This matter of rest is something especially needful for the average housewife. A man has more variety in his work in a certain way. A woman has a great deal more variety in the number of things she does, in the kinds of things, but her work is apt to be in a circle. It is right there in the home. The average man thinks a woman only has to stay home and do the work, that she has an easy time, but after all, what does this work mean? It means knowing something about the furnishing and care of our homes, about the lighting, the heating and ventilating, the clothing that we wear, how to care for it, to mend it, to wash and iron, to turn and make over, and patch and darn, and all of that sort of thing. All that is but a part of what a woman has to do. They say there is one thing a woman can do that a man cannot do, and that is two things at a time, and the average woman can do half a dozen without any trouble; but in order to do them well we must understand how to get the best results. When we are using our brains and our hearts, we

appreciate the dignity of labor. No work is drudgery that we do with interest. Even if we are scrubbing the kitchen floor, if we do it well, it is just as much a matter of art as anything we can do. But when we leave our hearts out of it, our interest out of it, when we do it because we have to do it, then it is drudgery.

Furnishing the Home.

Our homes are pre-eminently for ourselves, why should we turn them into show rooms that our neighbors may come and copy? And that is what we do too many times. We furnish our homes just as other people furnish theirs, just what everybody else has, we have to have too. We are simply imitators when we are willing to do that sort of thing, when we are willing to get in a rut, when we use heavy, upholstered furniture and use things that make our work harder and are detrimental in every way to our health. To have things simple, to have our homes furnished in such a way that we may care for them easily, is something that means a great deal so far as our health is concerned. We think too little about the healthful condition of our homes and too much about superficial appearance. When a tenant goes into a house, he first assures himself arrangements are all right so far as legal conditions are concerned. If a man buys a home he wants to be sure the title is clear. He doesn't find out whether the sanitary conditions are right. There is nothing to assure us that we may keep healthy if we live in dust and bad sanitary conditions, have miserable plumbing, poor ventilation, or in a home located where other things are harmful. Very likely one of the reasons why we do not consider these dangers is because when disease comes to us through such causes as I have mentioned it comes gradually. It is the most insidious form of disease. It begins in this way: We get up in the morning and we feel all tired out; we have no life for our work; we had a poor night's rest. We go about our work in a listless, half-hearted fashion, the whole family talks about the system being run down. We think we are going to have nervous prostration. We should take that warning and find out what is the cause—that there is something wrong in the home when we have that feeling. If we are getting the fresh air we should, we are not apt to feel like that when morning comes.

The first essential of a home, I should say, is pure air. That is the one thing we simply must have in order to have the right conditions of health, and when people talk about ventilation, we hear a great deal said about letting in the fresh air, but we sometimes forget we must let out the foul air. We have a draft of fresh air come into the room and no chance to get rid of the foul air. It is the strangest thing that people who are as intelligent as the American people are, who talk as much about education as we do, and yet will breathe the same air over and over again. At two of the Farmers' Institutes I have been to this winter I have been in rooms where the windows were nailed up for the winter. Now, think of people sleeping under such conditions as that! Where we have no chance to change the air, and this in hotels where we have different people using the same rooms night after night! It is not very much to the credit of the intelligence of the people who will do such things as that. People are afraid of night air! They seem to have an idea that night air is harmful, and we must shut in the day air because we get so fond of it we use it over and over again; we are not willing to part with it, we have become so attached to it.

Another thing we are apt to overlook, and that is that cold air is not necessarily pure air. A great many people sleep in cold bedrooms, thinking if bedrooms are not warm that is all that is necessary. Cold air may be just exactly as impure as warm air; and it is the fresh outside air, it is the change of air, we are after, and not the temperature. It may be all right to sleep in cold bedrooms, but I do not believe it ever did anybody any good to have to dress and undress in a cold room, and especially children. They are not noted for their rapidity in dressing, and when a small child is 15 or 20 minutes, or perhaps half an hour, getting into his clothes in a room where the temperature is down to 40 or 50, he runs a chance of getting chilled. He never should sit around on a cold floor after getting out of a warm

bed. Children should have a warm place in which to dress and undress, however cold the bedrooms may be.

We believe thoroughly in airing the bedrooms the first thing in the morning. When the weather is extremely cold, we do not have to have the window open quite so much, there is always some air comes through the walls and wood work, so we need not have so much of the direct fresh air. In the morning we air the bedroom very thoroughly. How about our sitting and living room, where we sat all the evening, then put out the lights, closed the room and went to bed? All that air stays there all night long, and it is the first air we breathe in the morning when we go in there, and yet I venture to say that not one woman in a hundred has thought to air that room the last thing at night. It may be a little more expensive as regards fuel, and I will admit that it is, to do so much airing of our homes, because we must be careful always after we have a thorough airing to immediately warm the room again. People must not go into a cool room and sit down to rest, because we feel the cold so much more if we are still. It costs so much less, though, for doctor's bills, and is so much better so far as our general health is concerned, that we can well afford to spend this for fuel. If our homes are not comfortable, we are going to pay for it in more than the health of the family. The home should be a comfortable, enjoyable place, a place where we can do pretty much as we like, always considering the comfort of others. We entertain our friends, have a good time and let the young people come in and enjoy themselves. If they cannot have their friends and entertain them there, they will find some place where they can, and we cannot afford to send our young people somewhere else for their pleasures. At home is the place where they are supposed to have the best time of all, but too often it is only a place to sleep and eat.

When we put double windows on, we should remember that we are shutting out the air, and unless there is something that is movable we are not going to get the ventilation we should. We see little places in some windows about a foot square to let the air in. If a storm window is put on hinges so it can be swung out, then we can ventilate all right. In airing our bedrooms, we are very apt to forget about airing the closets, that the closet has the clothes hanging in it, and I regret to say it often has the soiled clothes in it. That is a very poor place for soiled clothes, but even if nothing is hanging in the closet but the clothes we have been wearing during the day, that closet must be thoroughly aired. A woman will come home from a shopping trip and she will take up her dress skirt and shake it in her bedroom. Where is all that dust going? Really, I would rather leave it on the skirt than scatter it around the room, for we are not half so apt to get it into our system. Dust that is not disturbed is not going to do much harm. I heard one woman say she disliked dust so much that she always let it alone.

Did you ever stop to think of how the average person goes about the dusting of a room? After raising all the dust from the carpet with her broom, she goes around with a feather duster and waves it around and shakes the dust from one place to another and then from that place around to another. When she is through, she has moved nearly all of the dust, but she has not got rid of any of it. She has exercised it a little bit, but she has wasted her own time and strength. She had better be sitting out in the sunshine getting fresh air. The only way to dust is to get rid of the dust; to wipe it off from the furniture, and we do not want upholstered furniture, that collects it so dreadfully. When we take the dust off it should be removed with a damp cloth. A cloth that is very slightly moistened with kerosene is one of the most satisfactory things a housewife can use. Kerosene or a damp cloth will take up the dust on the cloth, and then we may remove that dust. Dust should be burned after sweeping, it should be disposed of, and we are not doing much good when we are throwing it out in the air. I am not going to talk about germs, but we all know something about the dangers of dust and how much it means to us; so the fewer things we have that collect dust the simpler our work is going to be in taking care of the home.

I presume to some of you, the idea of not having any curtains in the win-

dows in the summer seems to be rather radical, but, at least, we might get rid of a great many of our curtains. The light sash curtain we like to use for our privacy, but the long lace curtains wave about in the wind, are quickly soiled and worn out and prevent some of the fresh air and sunlight in getting into the rooms. Foreigners understand that better than we do; they take them down as a rule in the summer. It looks a little odd to us at first. I think it is hard to get used to the appearance of a room where there are no curtains, but we might do that in many of the rooms and get more of the air and sunlight in that room. Another thing, I would suggest, that is of all the abominations of the olden time, the inside blinds are of the worst. It is almost impossible to keep them thoroughly cleaned, and all those little crevices and cracks are delightful resting places for dust of various sorts. If we would have our windows screened all over, then we can lower the upper sash and get a good current of air. It is a very good plan to have the window shades set two inches lower than they usually are in a room, in that way the upper window may be lowered two or three inches and the shade does not flap unpleasantly. This is a good way in the kitchen especially, where we must have the change of air in order to have the kitchen in good condition. If two windows are on opposite sides of the room. they can be screened all over and be arranged so as to be lowered easily. Have a hook put in the sash and have a short pole with a loop on the end of it, and the window can be easily opened and closed, but if a person has to get on a chair in order to lower the sash it is apt to be neglected, because it is too much work.

The Kitchen.

There are plenty of things to say about the bedrooms and living rooms, but after all I think we are less apt to pay attention to our kitchen. The inexperienced woman in furnishing a home looks after the parlor, then the sitting room and hall and dining room and bedrooms, and, if there is anything left, she furnishes her kitchen, and she furnishes it with whatever she can get in the way of cheap utensils. The kitchen is one of the places where we spend a great deal of time and where all the food is prepared. It should be as perfectly looked after as any laboratory. I have heard women down south say they very rarely went into the kitchen, because it made them so disgusted when they did. Some of the darkies there are very good cooks, but they do things under the most undesirable conditions.

Those of us who are fortunate enough to do our own work may have our kitchens furnished in a way that will be satisfactory, for we know the things we have will be cared for. Have linoleum on the kitchen floor. A hardwood floor may be easy to clean, but it tires the feet, and to those of you who have never had any rubber heels on your house shoes let me suggest that you try it once and see if your feet are not so tired when night comes. We stand so much of the time that it tires us. If we stand on a hardwood floor, we should have a small rug or a strip of carpet, but the linoleum is comfortable and is easier to clean. It does not pay to buy cheap oilcloth, but the linoleum that is heavy and a great deal more expensive is cheaper in the end.

Have the kitchen walls painted, instead of papered or plastered. If possible, have the side, that is where the wall and ceiling come together, rounded slightly instead of straight. Then there is no crack to catch the dust. Have as much air and light as possible, a transom over the kitchen door and the windows lowered from the top. See to it that the sink is the right height and the kitchen table the right height. Those of us who do our own work can have the table right for our own height. One of the most useful things I have found in my kitchen is an office stool that was cut just the right height to use at the table, so many things can be done sitting down as well as by standing. I did hear a woman say once, when I spoke about covering the kitchen table with oil cloth, that she thanked heaven the day had not come when she was too lazy to scrub her kitchen table. I assure you I am not too lazy to scrub my kitchen table, I am only wondering if I cannot spend the time to better advantage. If we can have our table covered with a smooth, white oilcloth, that is readily wiped off, isn't it better for

us to have our time for something else? But we do not look at these things from the right point and think about what it really means in the long run.

The Kitchen Utensils.

Of all the conveniences possible in your kitchen, have utensils that are well made. There is so much cheap stuff in the stores, that is not cheap in the long run. When we buy this cheap tinware, for instance, we are simply wasting our money. Get a few things at a time and make them last, and where we spend so much of our time in the kitchen it pays to have the things to work with. I have never known it to fail, when I have given a course of cooking lessons in a place for a week, but what some one would say: "I would like to cook too if I had all those things to cook with." It is not so very expensive. We cling to old and cumbersome utensils, or make shift with things fit for the ash heap, and I wonder if it is because we are so everlastingly economical. We haven't the courage to discard anything usable. It is not saving in that way—not really—because we do not save our time or strength or tempers. There is nothing that will keep one so good-natured as being contented. A good cook needs to have a good range in her kitchen. A contented cook is a good tempered cook. If we can have a gas range, then, of course, we are very fortunate indeed. Many of you are city people and can have the gas range, which is easy to clean and easy to work and does away with all that soot and ashes, and that takes time and means a great deal of labor. I find many women do not realize how much easier it is with a gas range than a cook stove. It is a great point to do away with all this extra work.

A sink that is made of porcelain is easier to clean than an iron sink. All the wash bowls should be flushed daily with boiling soda water — sal soda. That is one thing that is most convenient to use for that purpose. The water thrown in there should not be greasy. When that water runs out from the sink, the plumbing is such that there is a drop down below. It curves up a little bit and then goes down. The water rests in this drop. If that water is dirty, greasy water, it is not very good for the condition of the kitchen. Hot water will more readily cleanse the pipes than cold water, but sal soda, a tablespoonful or more in boiling water, will do more to prevent the clogging of sinks. When I was doing my own work, I do not think that the sink clogged up once in three years, and I think since I have had help in the home it has been stopped up dozens of times. These are simple things, the thorough flushing of the pipes and always remembering in the morning, for instance, when we draw water to put into the tea kettle, to let the water run for several minutes before doing that. The water which has been standing over night in the lead pipes is not the water we want to use for making our coffee or tea in the morning.

Now, I find if I go through all I had mapped out here that it will take too much of our time, it is such a large subject to cover.

I think you will be very glad to get back again to the subject of foods, as you certainly showed a great deal of interest in it in the first part of the program. After the talk last evening, I am sure you will be pleased to again meet Mrs. Laws, who will talk to us about the preparation of foods.

ECONOMICAL PREPARATION OF FOOD.

Mrs. Bertha Dahl Laws, Appleton, Minn.

I was very much interested in listening to these lectures, and I know most of you have been also. I am very glad indeed to endorse everything that has been said. I was very glad about what Mrs. Armstrong said about being interested in the things we do and that it is the way in which we do them that makes the difference to us. I so often think of Lydia Child's saying: "Though with my hands I feed pigs, no power on earth can prevent my soul from communicating with angels."

I am also glad she spoke about ventilation; that is a good subject; we simply cannot exist without fresh air. I know that from experience, because when I was a young girl I was in bed with consumption for a year and a half, and I was cured, not by any kind of medicine, but by pure, fresh air, so I know what it will do if you will only give it a chance to do it. Even in the smallest roomed farmhouse, we can get a piece of two by four, raise our window and drop the window on it. Now, you see, the fresh air does not come in in a swift current, but it comes in between the two window sashes with an upward sweep, just exactly as if you had turned a hose of water on there. As it drops it is being warmed. By the time it reaches the floor it is not cold air, and it doesn't come in with that draft of which we are so much afraid. When I first began lecturing with the Farmers' Institutes, I was thinking I would spend most of my salary hiring carpenters to take off the storm windows in hotels where we stopped. It is wonderful how much pure air will help us to keep well and strong. I almost believe you can eat anything, cooked any way, if you have plenty of fresh air. You do not want to run the risk of this sort of kill or cure performance, however, so we prefer to have good food cooked in the right way. A teacher in one of your Wisconsin schools says she had a pupil who was quick and smart, except on Thursday morning, then she was stupid and was sleepy most of the forenoon; she was trying to discover what was the matter with her on Thursday morning and asked her if she went to a party on Wednesday evening, and she said no, and at last she said in desperation, "What do you eat for breakfast on Thursday?" She said, "We always have buckwheat cakes and sausages on Thursday." She asked her mother if she would not have them on Saturday morning, for then she can go out and play and will get plenty of oxygen and can digest buckwheat cakes and sausages, but, she said, on Thursday morning she sits here over the school desk and we are expecting the surplus blood to be up about her brain and it is really around her stomach digesting buckwheat cakes and sausages.

Making the Best of Our Environment.

Now, I want to talk a few minutes to those of you who possibly have not even the plumbing and cannot have all these things, even though they are so desirable. Of course, my work, after I left the public school work, has been principally among people who did not have them—in the country—and there we have to contend with a great many inconveniences, and we can do so much ourselves to counteract it. A year ago I was doing a great deal of work in Canada. We drove over 300 miles, leaving all roads behind us, simply taking the old Indian trails and following them in a wagon. We held three Institutes a day sometimes and slept over night in the homes of the settlers, and I tell you I learned how people can get along beautifully and be very happy, contented and healthy and have a good deal of culture and education, too, under very trying circumstances.

I remember one day we drove up at noon to a place over 30 miles from the railroad and we rode to the kitchen door, and I jumped out and said, "I will go and see the lady of the house and see if we can get something to eat." I knocked at the door and a very tired looking woman came to the door.

She said, "You don't want any dinner, I hope." I said, "Yes, we have been driving for 30 miles and held an Institute, couldn't you get us something? I will be glad to help you get us some bread and butter and coffee and eggs." "Eggs! I haven't seen eggs since we came out west. Our butter is all gone and we haven't any milk." It was a very unsatisfactory looking home, very uncomfortable. She was as unhappy as she could be. "Have you no children?" I asked her. "Yes, they are not here. Just as soon as they got old enough they have gone away from here, and I don't blame them, I would go too if I could." We got along a little further for supper; it was about the same size and under the same conditions exactly. I got out by the kitchen door to knock, but we did not even get a chance. A very good looking woman came to the door and said, "You are the Institute people, are you not? I thought you would be along this way, so I got ready for you." In 15 or 20 minutes we had an elegant supper on the table, and the beauty of it was everything was grown on their farm. There we had the finest kind of ham that had been cured right on the farm, and we had chicken and eggs, fine radishes and lettuce — nobody could live better than we did there, and everything had been grown on their farm, 35 miles from any railroad! She told me she knew the other family well; they came there the same time, both were heavily in debt, now one had great beautiful barns, fine stock and everything just as fine as could be. The other was in debt, and their sons, just as fast as they could, had gone off to the city. The other one had five sons with five farms all around the old one. They had a piano and organ, they had the best of books. Now, these families had started exactly the same way, had the same kind of a farm, same kind of land, the same conditions—the difference was wonderful! We can make ourselves, we can just about make our conditions, but we have to be interested in it, we have to study it, we have to make that our life work!

A Convenient Kitchen.

I want to tell you about my kitchen. It is small, but I am proud of it. I would like to have you all see it. It is plain, and I do not like to have a lot of stuff around to keep clean that I am not using. I have on one side a sink. I am not fortunate enough to have plumbing. I covered the wooden sink with zinc. I took a great, big, tin funnel and to that I fastened a piece of ordinary garden hose. I bored a hole in the outside wall of the kitchen. Outside stands a barrel on wheels and all the water that goes in that sink runs out and is carried away very quickly. In the winter I cannot do that, so I turn it through the other wall in the sink into a pail, and I can see when that pail is full. Above the sink I have hanging everything I want to use there. I always wondered why it was that a kitchen was such a poorly furnished workshop. It is the most important workshop in the world, it is true, because in the kitchen you are building the man and woman of tomorrow, they must build their bodies from the food which they eat. Now, if it is such an important workshop, why is it so poorly furnished? It is because women work there. You go into a kitchen on an ocean liner. When we returned from Europe on the "Baltic" we had 3,500 people on board—that is a city in itself. There were just three little closets in which all the cooking was done for those people, but it was arranged perfectly, because men were doing the cooking in that kitchen. Look at a shoemaker, how conveniently he has every tool arranged in his shop. Everything is right there. He has his pegs right there and don't walk for them every time he wants some. I tried to use that same business idea in fixing up my kitchen. I stand in the center of the floor and I think, "Where am I going to use this?" I decide where, and put it there. So, above my sink I have my dish pans, dish cloths and soap handy. In the next wall here I have a large window. Here I have my table covered with oilcloth. On the end of it I have a piece of zinc nailed on so I can set a hot kettle on it. I always have my kitchen table on castors, then I can roll it anywhere I want. So, if I am making cakes for breakfast, I do not have to take a walk from my stove over after that batter every time, I roll it over to the stove.

If I roll out cookies, I have it right there. Now, on this side of the window, I have spoons and egg beaters, and all that sort of thing that I am going to use there hanging right up on a little plain moulding, two cents a yard it costs. On this side of the window I have an ordinary set of pine shelves. I keep spices, flavoring extracts, and all that sort of thing there where I can reach over and get them without taking a single step. On this wall I have an ordinary range; above it I have fixed a rack where all my lids are. If I am cooking anything I can lean over and take a lid. On the other side I have another rack where I keep pie tins, etc. You think probably they gather dust—they are used too often to gather dust. They are very convenient and handy for me to get at.

I have white sash curtains in the window; I have a box of parsley growing there in the window. It gives a nice look to the room, too. I have other little conveniences; it is a convenient place to work. I have had girls come into my kitchen and say, "Isn't this nice? I would like to work here. It looks like a doll's kitchen." Have it convenient, for it saves time, and then, as Mrs. Armstrong says, have the best of utensils. It does not take long to burn up enough rice or potatoes or prunes to pay for a good kettle.

The Selection and Preparation of Food.

Now, next to the workshop, which is so important, is the kind of food we are going to cook there. The time is crowded, so I will not have time to speak of it much now. The cost of foods is nothing to judge their nourishing value by. We pay a great deal more for taste and looks than we ever think of paying for nourishment. We must depend upon the composition of the food.

Our food is made up of two classes. We have the red part, the protein, it is the part that builds blood, muscle and tissue, the part we must have, and especially children. It is the expensive part of our food always. Then we have the starches and sugars, the carbohydrates she spoke of. Starch and sugar is the same thing, only sugar is starch turned ripe and starch is sugar not turned ripe. In the spring before an apple is ripe it contains starch; in the fall that same apple contains no starch, but a great deal of sugar. All summer the sun cooked that apple and turned that starch into sugar. The sun has cooked it. That is the part of the food that gives us heat and fuel. If you ate a pound of fat it is the same as if you ate two and a half pounds of starch or sugar. Then we have this little mineral matter here, which is so important; it gives the firmness to the bones; it gives us red blood; it keeps us healthy. We get a good deal of that from fresh vegetables and fruits. If you are going to boil vegetables a long while in a whole lot of water, you had better throw away the vegetables and drink the water.

Now, we have next the starch food. We have these two classes: the one that builds the body, the other that gives the power to work with. The potato is an excellent sample of starch food. If your child ate a potato of this size, it would only get so much body building food as this marked "C." We want to cook that starch. If we take a slice of raw potato and look at it through a microscope, we will find that it looks like this: a lot of little bags made of tough cellulose. Inside of them are little hard, wrinkled up kernels of starch; they do not taste good; they do not do any good. If your child eats a raw potato these kernels go right through that child's body and come out absolutely unchanged, but it takes six hours to dispose of it; he has spent his time and strength in getting rid of it. Even you, unless you are a very strong person indeed and do a lot of physical work, cannot digest raw potato. In cooking the potato, we want to do just what the heat of the sun did to the apple. The apple in the fall is sweet, the potato is not. The sun does not get at the potato, so we have to do that—finish nature's work. We want to dissolve or burst those bags, pop them open, fluff them open, let the heat get at the kernels of starch and make them mealy. You know how they look when they come on the table properly boiled; just as if you had taken powdered sugar and sprinkled them with it. They are easily digested. In the cooking school I always have my girls cook a

potato the wrong way, then the right way. If we cook them right, put them into boiling water, have a quick, intense heat, like the heat of the sun, and keep them at the boiling point. Do not have too much water on them, and I never cover them. The minute they are done I pour them at once into a collander, then I put them back over the stove and keep them uncovered. You can put that potato in your hand and crush it as a handful of sand. Naturally that potato getting into your stomach is very quickly digested. Baking is the best way of cooking potatoes. In the winter I always bake them in the coal hod of my heater. They bake beautifully in three-quarters of an hour and it does not cost you a cent for fuel.

Now, then, as an example of the other class of food, we take an egg. That has no starch in it; there is nothing in it that requires a quick, intense heat. It is absolutely ruined by a quick, intense heat. The same thing that makes the oyster tough when it is boiled is in the egg, that is the albumen. Now, you see, the egg is also three-fourths water. The rest of it is protein and fat. Wherever you find anything red on my chart it is protein, and yellow is fat. If you have typhoid fever and your temperature is 104, the doctor possibly even dare not give you milk; he would give you a raw white of egg. He will not give you the yolk, because in it there is fat. That will give you more fever. Now, in cooking an egg, there is this fat, but I cannot change that by cooking. The only way in which I can change fat is when I ruin it—when I take good butter and fry it until it is brown. Browned butter is simply nothing but fatty acid. It is all right if you can stand it. If you can afford to throw away that money you spent for your butter, it is all right to fry it, but you are not getting a food. I am cooking one thing when I am cooking eggs, and that is protein. I want to do exactly the opposite from what I did when cooking potatoes. Most people cook eggs this way: put them into boiling water, four minutes soft and ten minutes hard. Now let me tell you how I cook them. It is not any trick at all. Put six eggs into a kettle, pour over them six cups of cold water and set it on the stove. Lay on top of that a dairy thermometer—that thermometer floats. Now, as I walk back and forth I look at that every once in a while. I never let them come to the boiling point. When it registers 170, I take that off the stove, put it on the kitchen table and let it stand there 10 minutes. The egg is just like a gelatine pudding all the way through, perfectly digestible. Where the doctor would not dream of letting you have an ordinary boiled egg, he would give you an egg cooked like this, because it is so much more quickly digested.

I want to tell you how I cook a tough piece of meat. I want to get as much for my money as I possibly can. The other day I bought a tough piece—got six pounds for 30 cents, so you know that I am getting a very tough piece of meat, and it is my business to make it tender and palatable, and that is what I want to do. If I cook a tender piece of meat I cook it this way: I buy it the day before I use it and have it cut thick, an inch or two inches; I take it home and mix together slowly two tablespoons of olive oil and a tablespoon of lemon juice and put it on both sides of the meat. The next day, if I can have coal, I broil it. If I cannot, then I take two heavy, old-fashioned iron skillets and put them on the gasolene stove, one on each flame, and keep them perfectly dry until they are blue hot without anything in them. Take your steak and put it flat onto the first pan and let it stay there until it gets a nice, brown crust, then turn it right over into the next blue hot pan and finish cooking it there. Now, have your platter warm, put your steak on it, put on it butter that has been stirred with a little lemon juice, parsley, salt and pepper. That is a steak as perfectly cooked as you can get it at the Waldorf Astoria.

Now, when I buy instead of a steak a piece of meat that costs from four to eight cents a pound, I cannot cook it quickly like that. I begin it the day before. I take it home and about supper time I tie it all up so it will be a solid chunk, try to get a piece that does not have much bone in it, and then I heat a cup of water and one-half cup of vinegar and pour it over the meat. All night long the vinegar is disintegrating the fiber. In the morn-

ing pour it off; then take a heavy, old-fashioned iron kettle, porcelain lined, try out salt pork and fry this meat as quickly as you can, so as to make a shell or crust around the meat. As soon as it is fried all around, pour off that grease, then pour over it boiling water to half cover the meat, add seasoning—I use whole spices. Take white pepper, for instance, and pour boiling water over it, you can make a regular flour paste out of white pepper which has been adulterated. I believe in using herbs. I use onions very freely; they are a medicine as well as a food. We are told that General Grant actually telephoned to Washington once that he refused to move his army without onions.

Now, remember, in cooking that meat, I first made it tender, then fried a crust on it, then put boiling water on it and cover it tight to keep in all the flavor, let the steam cook it just as much as the water does. Keep it simmering, never let it boil. Now, when it is done, you will find the carving knife will slip right through it, the meat will be juicy, tender and nice. It has to cook a long while — four to six hours — and right away people think, "If you are going to spend all your money for wood and coal you might as well buy expensive meat and be done with it." In order to avoid the expense of fuel, I cook it on washing day, or ironing day, or baking days. In winter I put it on my coal stove in the sitting room.

COUNTY TRAINING SCHOOLS.

Miss Lura Burce, County Superintendent, Eau Claire, Wis.

(Read at the Round-Up Institute at Eau Claire, Wis.)

Not long ago someone in Wisconsin educational circles accidentally discovered that the conditions in the rural schools had not kept pace with the educational advancement in other lines. They had seemingly been neglected and almost forgotten in the planning and scheming and appropriating for higher education, and had gone on haphazard as it happened, with no other inspiration than an occasional added branch to the course of study, which the poor overburdened and often incompetent teacher struggled to master and find a corner for on her lengthy program. So, while the exterior appearance of our school system was fine to look upon, the backbone was growing weaker in comparison every year. I say the backbone, because I believe just as surely as the farmer is the backbone of our nation, the rural school is the backbone of our educational system. The majority of our best educators and best thinkers have obtained their early education in the district schools where, surrounded by the influences of nature, they early developed a power to think and an independence and strength that might never have been made evident under less favorable conditions. Statistics show that the great universities and colleges look to the farm to produce the material which, later developed, constitutes the brain power of the world.

The discovery of the rural conditions created some stir in educational circles, and men began to cast about for a remedy—something that would strengthen and stimulate, and in time prove an effectual cure. Consolidation was prescribed, but the idea took but slowly and people must first be educated to its value. Perhaps years must elapse before anything could be accomplished in that line, something must be done to take effect at once. It was reasoned that country school conditions could never be ideal so long as all grades and classes must be handled by one teacher, but it was evident that a teacher, especially trained for this work, and who was familiar with the best methods of grouping and classifying her pupils and who could take advantage of every minute, would greatly improve matters. That the average rural school teacher was not adequately prepared was generally admitted, so a training school was suggested. Teachers had to be trained for kindergarten, grade and high school work, but never before for rural schools. The idea! Why hadn't it been thought of long ago. The legislature was induced to make a small appropriation for the experiment. It was tried and proved so effectual that other appropriations were made in conjunction with the counties' aid, and other schools were established, until now seven are in operation in the counties of Buffalo, Dunn, Marathon, Manitowoc, Richland, Waupaca and Wood. Two more will be opened the coming year, one in Polk and the other we are so fortunate as to have secured for Eau Claire.

Aim of the County Training School.

A few words as to what we expect to do for our teachers may prove valuable to those interested in rural school work.

I believe that a position in the country schools is the hardest to fill and fill well, that our schools have to offer. The teacher must deal with pupils of all ages and deal wisely. She must be thoroughly familiar with many branches and have the kind of interest in each that will stimulate an interest in the pupil. She must be an executive of rare ability and must be able to lead the intellectual life of the community in which she teaches. Genius such as this is rarely found. A large per cent. of our teachers every

year go into the country schools without any previous knowledge of the school system. They must gain their experience and the country seems to be the popular place in which to gain it. The district must be experimented upon and more or less time and money wasted in the experiment. Often the teacher fails utterly, or makes such a fizzle of her work that she is always ever after ashamed to look upon that first term.

Our county proposes to furnish training for such as these and others at some expense and expects, in return, services which will be a credit to the schools. We believe it will be more than a money-saving proposition in the end.

A thorough course of professional work in all the third and second grade branches with a solid year of observation methods and actual practice in the grades with a class to teach, manage and be responsible for, cannot help but put the teacher in better condition to face the difficulties she has to meet. Indeed it is a course at which no grade teachers need to be ashamed to spend a year, and even some of our old teachers might gain a few new ideas and obliterate a few ruts by taking advantage of it.

Instructors who are familiar with every condition and know how to teach students how to teach, will take a personal interest in each student, and follow them when they go out to teach, lending a helping hand whenever necessary.

Requirements for Entrance.

The requirements for entrance will be very liberal the first year. All who have completed the common school course or its equivalent, or who hold any county certificate and are residents of the county, may enter without examination at the discretion of the board and without tuition.

Residents from other counties will be admitted on the payment of tuition as far as the capacity of the school will allow.

A Suggestive Course of Study.

The following course is only a suggestive one and simply shows what branches will be pursued. The order may be and probably will be greatly changed:

First Term: Reading, grammar, theory and psychology, arithmetic, penmanship.

Second Term: History, composition, manual, observation, arithmetic, physiology.

Third Term: History, methods and practice, geography, constitution, spelling.

Fourth Term: Literature, school management and practice, geography, agriculture.

Library reading and literary work throughout the year and algebra for those who can carry it. It is expected that arrangements can be made whereby our students may take advantage of the music, drawing, cooking and manual training offered by the Eau Claire High School.

The time required to complete this course will depend upon the former education and the aptness of the pupil. High school graduates may reasonably expect to finish in a year, but those less favored will find, since the work is entirely new, that it will be necessary to take a longer time. Common school graduates should finish in two years. Students may enter at the opening of any quarter, but it is always desirable to enter at the beginning of the year and remain until the close.

The diploma from this school entitles the holder to teach for three years and if successful, the holder may, before the expiration of the three years, have a second grade certificate issued and thus secure a license to teach for six years without examination.

Credit to the amount of one year's work is allowed graduates of the Training school, upon entering any State Normal, and such graduate is thereby enabled to finish the elementary course in one year.

Some of the Results Achieved.

Some one recently asked me how the work of these teachers compared with that of other teachers. I admit frankly that the County Training School teachers we have had from Dunn and Buffalo, prove the strongest

teachers we have without exception. I feel that I can place them anywhere and they will be successful. Perhaps we have been so fortunate as to receive only the good ones, but we have never had a failure sent to us yet. Boards are willing to pay better salaries for teachers whom they may depend upon to successfully manage their schools and there is always a demand for such experience.

While it is our aim to keep these teachers as long as possible in our country schools, yet when we shall see them called to a graded position or a principalship after two or three years with us, we will rejoice that they are doing so well and feel thankful that we have had their services while they were preparing for something higher.

Every effort is to be put forth the coming year to induce the country boys and girls to enter the school and I appeal to every farmer present to help in this mission. Our country girls make good, strong teachers, because they are familiar with conditions; are at home with country people, and are not afraid to exert themselves. They are willing workers and are anxious to gain new methods and new ideas, and are not apt to fall in ruts. We want them, and to get them we are willing the first year to admit them without examination on their common school diplomas. There is no tuition to be paid by the parents or the town, and every advantage is offered for the development of good, strong teachers.

Boys will be admitted as well as girls, and indeed it is our intention to encourage their attendance. There is always a demand for male teachers and most of our state graded schools require men at their heads. Even though the boy does not contemplate teaching as a life work, there is no reason why it should not be used as a stepping stone to something higher, provided it is made a good stepping stone.

Some of the Inducements Offered at Eau Claire.

Board is not high in our city and there are endless opportunities for both boys and girls to do light work in return for board. If we are so fortunate as to secure a course in domestic science, some might even do as Mr. Davis suggested last night—do their own cooking.

One of the best public libraries in the state is at the disposal of the students and a lecture course is offered every winter which includes the best lecture talent to be had for money. The Eau Claire people are cordial and hospitable and everything will be done by the board and faculty to make the work pleasant for the students and make them feel at home.

LAWS OF INTEREST TO WISCONSIN FARMERS.

Wisconsin Farmers' Institute Law.

Section 1. The Board of Regents of the State University is hereby authorized to hold Institutes for the instruction of the citizens of this state in the various branches of agriculture. Such Institutes shall be held at such times, and at such places as said board may direct. The said board shall make such rules and regulations as it may deem proper for organizing and conducting such Institutes, and may employ an agent or agents to perform such work in connection therewith as they deem best. The course of instruction at such Institutes shall be so arranged as to present to those in attendance, the results of the most recent investigations in theoretical and practical agriculture.

Sec. 2. For the purposes mentioned in the preceding section, the said board may use such sum as it may deem proper, not exceeding the sum of twelve thousand dollars in any one year, from the general fund, and such amount is hereby annually appropriated for that purpose.

Sec. 3. This act shall take effect and be in force from and after its passage and publication.

ABSTRACT OF THE DAIRY AND FOOD LAWS OF THE STATE OF WISCONSIN AS COMPILED BY THE DAIRY AND FOOD COMMISSIONER, J. Q. EMERY.

The term "food" as used in the laws of this state, includes all articles used for food or drink or condiment by man, whether simple, mixed or compound.

Manufacturers and dealers are notified that the following is only a brief statement of the scope and salient features of the Wisconsin dairy and food and drug laws. The complete laws are to be found in Bulletin No. 6, and in a pamphlet that may be had on application. Manufacturers, dealers, and consumers of food products should be familiar with these laws.

General Law on Adulteration of Foods.

Penalty for Sale of Adulterated Articles of Food. (Section 4600, Statutes of 1898, as amended by Chapter 207, Laws of 1905.) Any person who shall, by himself, his servant or agent or as the servant or agent of any other person, sell, exchange, deliver or have in his possession with intent to sell, exchange, offer for sale or exchange any drug or article of food which is adulterated shall be fined not less than twenty-five dollars nor more than one hundred dollars, or be imprisoned in the county jail not less than thirty days nor more than four months. The term "drug," as used in this section, shall include all medicines for internal or external use, antiseptics, disinfectants and cosmetics. The term "Food," as used herein, shall include all articles used for food or drink *or condiment* by man, whether simple, mixed or compound.

What Constitutes Adulteration of Food. (Section 4601, Statutes of 1898, as Amended by Chapter 133, Laws of 1903, as amended by Chapter 207 of the Laws of 1905.) An article shall be deemed to be adulterated within the meaning of the preceding section:

1. In the case of drugs: First, if, when sold, or offered or exposed for sale or had in possession with intent to sell, under or by a name recognized in the United States pharmacopoeia, it differs from the standard of strength, quality or purity laid down in the latest current edition thereof; second, if, when sold, or offered or exposed for sale or had in possession with intent to sell, under or by a name not recognized in said pharmacopoeia, but which is found in the pharmacopoeia of some other country, the national formulary or other standard work on materia medica, it differs materially from the standard of strength, quality or purity laid down in the latest current edition of such work; third, if its strength, quality or purity falls below the professed standard under which it is sold.

2. In the case of food: First, if any substance or substances have been mixed with it, so as to lower or depreciate or injuriously affect its strength, quality or purity; second, if any inferior or cheaper substance or substances have been substituted wholly or in part for it; third, if any valuable or necessary ingredient has been wholly or in part abstracted from it; fourth, if it is an imitation of, or sold under the name of, another article; fifth, if it consists, wholly or in part, of a diseased, infected, decomposed, putrid, tainted or rotten animal or vegetable substance or article, whether manufactured or not; sixth, if it is colored, coated, polished or powdered, whereby damage or inferiority is concealed, or if by any means it is made to appear better or of greater value than it really is; seventh, if it contains any added substance or ingredient which is poisonous, injurious, or deleterious to health, or any deleterious substance not a necessary ingredient in its manufacture; provided, that articles of food which are labeled, branded or tagged in a manner showing their exact character and composition and approved by the dairy and food commis-

sioner of the state, and not containing any poisonous or deleterious ingredient shall not be deemed adulterated in the case of mixtures or compounds sold under their own distinct names or under coined names and which articles, if substituted, are not in imitation of, or sold under, the name of any other article of food; and provided further, that nothing in this act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods to disclose their trade formulas, except so far as necessary to secure freedom from adulteration, imitation or fraud.

Rulings Made By the Commissioner.

Artificial Coloring.—Artificial coloring, though it be harmless, must not be used to conceal damage or inferiority or to make food products appear better or of greater value than they really are.

Baking Powder. — Baking powders containing alum in any form or shape must have its presence distinctly shown by a label on the outside and face of which is printed: *"This Baking Powder Contains Alum."* The label must be printed in black ink, in legible type, not smaller than brevier heavy gothic caps, and must give the name and address of the manufacturer in type of the same kind.

Candy.—Candy must be free from inert mineral matters and must not be colored with substances deleterious to health.

Catsup—Catsup must be labeled so as to show its true character and composition, as "Tomato Catsup," "Mushroom Catsup," "Walnut Catsup," etc., and must not contain preservatives or coloring matter deleterious to health. If harmless preservatives are used, that fact, and the name of the specific substance must be disclosed on the label. The use of artificial coloring will be contested.

Cheese — The Dairy and Food Commissioner is authorized to issue to the owner or manager of each factory making *Full Cream Cheese* a stencil containing the number of the factory and the state brand, *"Wisconsin Full Cream Cheese."*

The manufacture and sale of filled cheese is prohibited.

The manufacture and sale of skimmed cheese is prohibited, except when such cheese is made ten inches in diameter and nine inches in height.

Chocolate and Cocoa—Chocolate and Cocoa, when made only from cocoa mass, sugar and glycerine, may be sold under the name "Prepared Cocoa" or "Sweet Chocolate."

Coffee—Coffee sold as such must be true to name. It must not be coated or polished to conceal inferiority. Substitutes containing no coffee cannot be sold as coffee compounds, but may be sold under their true or coined names. Compounds of coffee and chicory, or of coffee and any harmless substitute allied to it in either flavor or strength and not used simply as an adulterant, may be sold when labeled "Coffee and Chicory Compound" or "Coffee and —— Compound," etc.

Canned Goods—Canned goods must be distinctly labeled with grade or quality of the goods, together with the name and address of the seller or manufacturer.

Cream of Tartar—Cream of Tartar must be pure and true to name. All compounds are unlawful.

Extracts—Artificial extracts can be manufactured and sold only in cases where it is not possible to produce an extract from the fruit itself. Extracts of this case must be distinctly labeled as "Artificial Extracts."

Extract of Lemon, Essence of Lemon or Spirits of Lemon, sold as such, must contain at least five per cent. of pure oil of lemon dissolved in ethyl alcohol.

Such mixtures or compounds as "Water Soluble Lemon Flavor" or "Terpeneless Lemon Flavor," made from lemon peel or from oil of lemon, or from both, must not be sold as "Extract of Lemon" or "Essence of Lemon" or "Spirits of Lemon;" but if of equivalent strength and labeled, branded or tagged in a manner showing their exact character and composition and approved by the dairy and food commissioner of the state, and not containing any poisonous or deleterious ingredients will be recognized as legitimate substitutes and when sold as articles of food under their own distinct names as stated above and not under the name of any other article of food, such

sale will not be contested by this commission as unlawful.

Extract of Vanilla must be made wholly from vanilla beans, and must contain no artificial coloring. The color of vanilla extract is considered an indication of its strength and artificial coloring in such case would be used for the purpose of concealing inferiority and of making the article appear better than it really is.

When other flavoring substances are used, such as Vanillin, Coumarin or Tonka, the extract must be labeled so as to show the purchaser its true character, as, "Compound Extract of Tonka and Vanillin." The label "Compound Extract of Vanilla" will not be deemed sufficient notice of the character and composition of the article. In all cases, it is to be understood that when an extract is labeled with more than one name, the type used is to be similar in size, and the name of any one of the articles used is not to be given greater prominence than another.

Farinaceous Goods — Farinaceous Goods must be true to name. Barley, Hominy, Cracked or Rolled Wheat or Oats, Tapioca and like articles, must be pure and unadulterated. If mixed or compounded their true or coined name. Packages containing mixtures or compounds of this kind should be labeled with the name and address of the manufacturer or compounder thereof.

Jellies—Artificial Fruit Jellies, Jams, Preserves, Fruit Butter, so-called "Pie Filling," or other similar mixtures or compounds, made or composed, in whole or in part, of Glucose, Dextrin, Starch or other substances, must not be colored in imitation of natural fruit products; but if uncolored, may be sold for what they are when labeled in a manner showing their exact character and composition and approved by the dairy and food commissioner of the state and when they are free from ingredients deleterious to health. Such artificial mixtures or compounds must be labeled with (first), the word "Compound," (second), the word "Glucose," and (third), the name of the fruit or dextrin, or starch, or other substance entering into the artificial product. To illustrate: In the case of artificial jelly consisting of glucose with an apple base, the label should be "Compound Glucose Apple Jelly." If the fruit is currant, the label should be "Compound Glucose Currant Jelly." If the base is starch, the label should be "Compound Glucose Starch Jelly." In case of other mixtures or compounds, as mentioned above, the label should be "Compound Glucose Starch Pie Filling," "Compound Glucose Apple Jam," etc., according to their true character and composition.

Substitute mixtures or compounds cannot lawfully be sold in imitation of or under the name of any other article of food.

Lard—Substitutes for lard must not be sold under the name of lards. Compounds containing lard can be sold when labeled in a manner showing their true character and composition and approved by the dairy and food commissioner of the state, such as "Compound Lard and ———."

Milk—All milk offered for sale or sold or delivered to creameries or cheese factories must be from clean, healthy cows, of clean, pure and wholesome character, free from preservatives or any foreign substance, and must contain not less than three per cent butter fat.

Producers and dealers in milk and cream are especially warned against the use of preservatives.

The preparations for keeping milk and cream sweet that are widely advertised in this state as being harmless, have been condemned by leading authorities, both in this country and in Europe, as being prejudicial to the public health.

Their use is prohibited by a plain statute which fixes a minimum penalty of $25 for its violation.

Preservatives are used to avoid the effects of careless and unclean methods.

Milk and cream will remain sweet without the use of poisonous drugs long enough for sale and consumption if produced from clean cows, in clean barns, by clean men, using clean utensils.

The health of invalids and of children is of more importance to the state than the prosperity of manufacturers and dealers in the makeshifts of uncleanliness.

Mustard—Dry mustard must be pure.

Prepared mustard must be free from starch or adulterant of any kind, and, if consisting of mustard, vinegar, and spices, may be sold when labeled "Prepared Mustard."

A preparation of mustard, vinegar, spices and enough filling or starch to make a mustard of mild flavor to meet a legitimate demand which undoubtedly exists, may be sold when labeled "Prepared Mustard Compound." Harmless coloring matter may be used in preparations of mustard only to secure uniformity of appearance.

Oleomargarine—Oleomargarine which shall be in imitation of yellow butter can not be lawfully sold. Oleomargarine free from coloration or ingredient that causes it to look like butter can be manufactured and sold under its own name when properly labeled. Each tub, package and parcel must be marked by a placard bearing the word "Oleomargarine" printed in plain, uncondensed gothic letters not less than one inch long, and such placard shall contain no other words thereon.

All stores and places of business from which oleomargarine shall be sold must have conspicuously posted a placard to be approved by the dairy and food commissioner, containing the words. printed in letters not less than four inches in length, "Oleomargarine Sold Here."

It is unlawful for hotel, restaurant or boarding-house keepers to furnish their guests with butter substitutes without notifying such guests that the substitutes so furnished are not butter.

A bill of fare furnished guests and containing a statement that oleomargarine is used will be deemed a sufficient notice.

No imitation butter or cheese can be used in any of the charitable or penal institutions of this state.

Spices—All spices must be pure. Any mixture of any foreign article with spice is an adulteration. An adulteration of spices cannot be remedied by the label "Compound."

Labels—Labels on mixtures and compounds should disclose their true character and composition.

CHAPTER 374, LAWS OF WISCONSIN, 1905.

An Act Relating to Legal Fences.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. There is hereby added to the statutes of 1898 a new section to be known as section 1390a, which shall read as follows: Section 1390a. No fence constructed or rebuilt after the passage of this act shall be deemed a legal and sufficient fence unless the same shall be constructed or rebuilt in either of the following manners:

1. A fence made of strong woven wire, the strands to be not less than No. 12 wire; cross wires or meshes to be not less than No. 16 wire. If cross wires are used they are to be not more than twelve inches apart, and if meshes, they are not to exceed eight inches square; the height to be not less than twenty-six inches, with three barbed wires at the top, the top wire being not less than fifty inches from the ground; the posts to be not more than sixteen feet apart.

2. A fence made of strong woven wire, the strands to be not less than No. 12 wire; cross wires or meshes to be not less than No. 16 wire. If cross wires are used they are to be not more than twelve inches apart, and if meshes, they are not to exceed eight inches square, the height to be not less than thirty-six inches, with two barbed wires at the top, the top wire being not less than fifty inches from the ground; the posts to be not more than sixteen feet apart.

3. A fence made of strong woven wire, the strands to be not less than No. 12 wire; cross wires or meshes to be not less than No. 16 wire. If cross wires are used they are to be not more than twelve inches apart, and if meshes, they are not to exceed eight inches square; the height to be not less than forty-six inches, with one barbed wire at the top, the top wire being not less than fifty inches from the ground; the posts to be not more than sixteen feet apart.

4. A fence made of strong woven wire, the strands to be not less than No. 12 wire; cross wires or meshes to

be not less than No. 16 wire. If cross wires are used they are to be not more than twelve inches apart, and if meshes, they are not to exceed eight inches square; the height to be not less than fifty inches, with posts not more than twenty feet apart.

5. A fence not less than fifty inches high consisting of boards firmly fastened to posts well set, not more than eight feet apart, the space between the ground and bottom board and each space between the boards to the height of thirty inches being not more than six inches.

6. A fence not less than fifty inches high, consisting of two boards and three barbed wires firmly fastened to posts well set not more than eight feet apart, the bottom board being not more than six inches from the ground and the space between the bottom board and the second board being not more than six inches, and the space between the second board and the first wire being not more than six inches.

7. A fence consisting of a combination of wire and pickets with posts well set not more than sixteen feet apart and connected by three or more wires not less than No. 12, with pickets not less than four feet long woven in or fastened thereto, and set not more than six inches apart.

8. All fences consisting of rails, boards or stone walls or any combination thereof, and all brooks, rivers, ponds, creeks, ditches or hedges, which shall in the judgment of the fence viewers, within whose jurisdiction the same may be, be considered equivalent to either of the fences herein mentioned.

All measurements herein mentioned shall be made at the place of attachment in all cases.

Section 2. This act shall take effect and be in force from and after its passage and publication.

Approved June 14, 1905.

CHAPTER 116, LAWS OF WISCONSIN, 1905.

An Act to Regulate the Public Service of Stallions in This State.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. Every person, firm or company standing or traveling any stallion for profit or gain in this state shall cause the name, description and pedigree of such stallion to be enrolled by Department of Horse Breeding of the College of Agriculture, University of Wisconsin, and procure a certificate of such enrollment, from said department, which shall thereupon be presented to and recorded by the register of deeds of the county in which said stallion is used for public service.

Sec. 2. In order to obtain the license certificate herein provided for, the owner of each stallion shall make oath before a notary public that such stallion is, to the best of his knowledge, free from hereditary, contagious or transmissible unsoundness or disease, or, in lieu thereof, may file a certificate of soundness, signed by a duly qualified veterinarian, who shall be a regular graduate of a recognized veterinary college, and shall forward this affidavit or veterinarian's certificate, together with the stud book certificate of registry of the pedigree of the said stallion and other necessary papers relating to his breeding and ownership to the Department of Horse Breeding of the College of Agriculture.

Sec. 3. The officers of the Department of Horse Breeding of the said College of Agriculture, whose duty it shall be to examine and pass upon the merits of each pedigree submitted, shall use as their standard for action the stud books and signatures of the duly authorized presidents and secretaries respectively of the various horse pedigree registry associations, societies or companies recognized by the Department of Agriculture, Washington, D. C., and shall accept as pure-bred, and entitled to a license certificate as such, each stallion for which a pedigree registry certificate is furnished bearing the signature of the president and secretary of a government recognized and approved stud book.

Sec. 4. The owner of any stallion standing for public service in this state shall post and keep affixed during the entire breeding season, copies of the license certificate of such stallion, issued under the provisions of the next succeeding section, in a conspicuous place both within and upon the outside

of the main door leading into every stable or building where the said stallion stands for public service.

Sec. 5. The license certificate issued for a stallion whose sire and dam are of pure breeding and the pedigree of which is registered in a stud book recognized by the Government Department of Agriculture, shall be in the following form:

University of Wisconsin.
College of Agriculture.
Department of Horse Breeding.

CERTIFICATE OF PURE BRED STALLION NO. ——.

The pedigree of the stallion (Name)——. Owned by ———
Described as follows:
(Color)———(Breed)———
Foaled in the year ——, has been examined at the College of Agriculture, and it is hereby certified that the said stallion is of PURE-BREEDING and is registered in a stud book recognized by the Department of Agriculture, Washington, D. C.

(Signature)————————
Dean of the College of Agriculture.

The license certificate issued for a stallion whose sire or dam is not of pure breeding shall be in the following form:

University of Wisconsin.
College of Agriculture.
Department of Horse Breeding.

CERTIFICATE OF GRADE STALLION NO. ——.

The pedigree of the stallion (Name)——. Owned by ———
Described as follows:
(Color)————
Foaled in the year ——, has been examined at the College of Agriculture and it is found that the said stallion is NOT OF PURE BREEDING and is, therefore, not eligible for registration in any stud book recognized by the Department of Agriculture, Washington, D. C.

(Signature)————————
Dean of the College of Agriculture.

The license certificate issued for a stallion whose sire and dam are pure bred, but not of the same breed, shall be in the following form:

University of Wisconsin.
College of Agriculture.
Department of Horse Breeding.

CERTIFICATE OF CROSS-BRED STALLION NO. ——.

The pedigree of the stallion (Name)——. Owned by ————.
Described as follows:
(Color)————
Foaled in the year ——, has been examined at the College of Agriculture and it is found that his sire is registered in the ———— and his dam in the ————.

Such being the case, the said stallion is not eligible for registration in any stud book recognized by the Department of Agriculture, Washington, D. C.

(Signature)————————
Dean of the College of Agriculture.

Sec. 6. Every bill, poster, or advertisement issued by the owner of any stallion enrolled under this act, or used by him for advertising such stallion, shall contain a copy of its certificate of enrollment.

Sec. 7. A fee of $2.00 shall be paid to the horse breeding department of the college of agriculture, University of Wisconsin, for the examination and enrollment of each pedigree and for the issuance of a license certificate, in accordance with the breeding of the stallion as above provided.

Sec. 8. Upon a transfer of the ownership of any stallion enrolled under the provisions of this act, the certificate of enrollment may be transferred to the transferee by the department of horse breeding of the college of agriculture upon submittal of satisfactory proof of such transfer and upon payment of the fee of 50 cents.

Sec. 9. Violation of any of the provisions of this act shall be punished by a fine of not exceeding fifty dollars.

Sec. 10. This act shall take effect and be in force from and after January 1st, 1906.

Approved April 22, 1905.

An Act Relating to Naming Farms, Statutes of 1901.

Submission of question at town meeting. Section 1. The town clerk, upon a petition signed by ten per cent of the qualified electors of his town filed with him at least thirty days before the annual town meeting, shall include in his notice of such meeting the following question to be voted on: "Shall the farms of this town be

named?" The vote shall be taken by ballot. Those favoring the proposition shall vote "Yes" and those opposing "No."

Duty of board if question carries. Sec. 2. If the proposition carry, the town board shall, within thirty days, adopt a by-law providing for the selection of names by the owners of farms, the registry thereof with the clerk, the size, style of, and method of placing proper signs upon farms, and for the naming of and placing proper signs on farms which the owners thereof neglect to name.

Liability of owner and failure to comply. Sec. 3. Within thirty days after receiving written notice from the town clerk to comply with the provisions of said by-law, any owner or occupant of a farm failing so to do shall be liable to a penalty of ten dollars and costs, to be recovered in an action brought in the name of the town. The word farm as used herein shall be construed to mean such lands as are actually occupied for agricultural purposes by the owner or his tenant.

LAW RELATING TO OBNOXIOUS AND INFECTIOUS ANIMALS RUNNING AT LARGE.

Section 1482 of the Statutes of 1898, as amended by the laws of 1903.

No stallion over one year old, nor bull over six months old, nor boar, nor ram, nor billy goat over four months old, shall run at large; and if the owner or keeper shall for any reason suffer any such animal so to do he shall forfeit five dollars to the person taking it up and be liable in addition for all damages done by such animal while so at large, although he escapes without the fault of such owner or keeper; and the construction of any fence enumerated in Section 1390 shall not relieve such owner or keeper from liability for any damage committed by an animal of the enumerated class upon the enclosed premises of an adjoining owner.

CHAPTER 446, LAWS OF WISCONSIN, 1905.

Law Relating to State Aid to Fairs.

An Act to amend Section 1463 of the statutes of 1898, as amended by chapter 274 of the laws of 1901, and section 1464 of the statutes of 1898, so as to render state aid to all agricultural fairs, definite and uniform.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. Section 1463 of the statutes of 1898, as amended by chapter 274 of the laws of 1901, is hereby amended so as to read as follows: Section 1463. There shall be paid within ten days after the first day of February, out of the state treasury, to each organized agricultural society, association, or board in the state, which shall have substantially complied with the following conditions, forty percentum of the total amount of premiums thereby paid at its annual fair for the preceding year, provided that in computing the amount upon which such percentum is to be paid, not more than one-half thereof shall have been paid for trials or exhibitions of speed, or other contest, for which published premiums have been offered. On or before the first day of February, in each year, the president and secretary of each society, association, or board, claiming state aid, shall file with the secretary of state a sworn statement of the actual amount of cash premiums and purses paid at the fair of the preceding season, which premiums and purses must correspond with the published offers of premiums and purses, and a further statement that at such fair all gambling devices whatsoever, and the sale of intoxicating liquors had been prohibited and excluded from the fair grounds, and all adjacent grounds under their authority or control. Such statement shall be accompanied by an itemized list of all premiums and purses paid, upon which such forty percentum payment is claimed, a copy of published premium list and speed list of fair, and a full statement of receipts and disbursements for the past year, duly verified by the secretary. Copies of such statements shall be deposited with the secretary of state and the secretary of the state board of agriculture. Such money shall be paid to the treasurer of the society, association or board, upon his receipt, countersigned by the secretary. Provided, that

the amounts to be paid to any such organized agricultural society, association or board, during any year, shall not exceed the following amounts, to-wit—to the State Board of Agriculture the sum of ten thousand dollars, to the Northern Wisconsin State Fair or the La Crosse Inter-State Fair Association the sum of five thousand dollars each, and to any county agricultural society or other association or board above mentioned, the sum of one thousand and seven hundred dollars each.

Sec. 2. Sections 1458c of the statutes of 1898, 1458d of the statutes of 1898, as amended by chapter 356 of the laws of 1901, and chapter 337 of the laws of 1901, as amended by chapter 290 of the laws of 1903, are hereby repealed.

Sec. 3. Section 1464 of the statutes of 1898 is hereby amended so as to read as follows: Section 1464. All moneys received by any such society, association, or board, either from the state or any other source, after paying the necessary incidental expenses thereof, shall be paid out annually for premiums awarded, in such sums and in such way and manner as its by-laws, rules and regulations shall direct, on such live animals, articles of production, agricultural implements and tools, domestic manufactures, mechanical implements and productions as are the growth and manufacture of the district which such society, association or board represents, but live stock, the growth of any other county, state or country, may receive the same premiums as those which are the growth of the district where fair is located, should the society, association or board governing so decide.

Sec. 4. All acts or parts of acts in conflict with the provisions of this act are hereby repealed.

CHAPTER 162, LAWS OF WISCONSIN, 1905.

Wisconsin Live Stock Sanitary Laws.

An Act relating to the live stock sanitary board, and amendatory of sections 2, 5 and 6 of chapter 440, laws of 1901.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. Section 2 of chapter 440 of the laws of 1901 is hereby amended so as to read as follows: Section 2. It shall be the duty of the state live stock sanitary board to protect the health of domestic animals of the state; to determine and employ the most efficient and practical means for the prevention, suppression, control, or eradication, of dangerous, contagious or infectious diseases among domestic animals; and for these purposes it is hereby authorized and empowered to establish, maintain, enforce and regulate such quarantine and other measures relating to the movement and care of animals and their products, the disinfection of suspected localities and articles and the disposition of animals, as it may deem necessary, and to adopt from time to time, all such regulations as may be necessary and proper for carrying out the purposes of this act. Provided, however, in the case of slowly contagious diseases, only suspected or diseased animals shall be quarantined, and in case of bovine tuberculosis or actinomycosis, the owner shall be granted the option of retaining the animals in quarantine, under such restrictions as the board may prescribe or of shipping them under the auspices and direction of the board to some abattoir designated by it for immediate slaughter under United States government inspection. In case of the slaughter of animals under the provisions of this section the owner shall receive the net proceeds of the sale thereof and shall have no further claim against the state on account of such slaughter.

Sec. 2. Section 5 of chapter 440 of the laws of 1901 is hereby amended so as to read as follows: Section 5. All claims against the state arising from the slaughter of animals as above provided, shall be made by filing with the secretary of state a copy of the state veterinarian's notice to the justice of the peace, and the return of the appraisers to the justice, which notice and return shall be certified by him. The secretary of state shall examine these, and if satisfied that the amount awarded is just and that the owner of the animal slaughtered is entitled to indemnity, shall issue his warrant for two-thirds of the sum named in such return; but if he shall have reason to

believe that the appraised value is greater than the real value of such animals, he shall pay such owner such less sum as he may deem just, provided, that the right to indemnity shall not exist, nor shall payment be made in either of the following cases: First. For animals owned by the United States, this state or any county, city, town or village in this state. Second. For animals brought into this state, contrary to the provisions of this act, or where the owner of the animal or the person claiming compensation has failed to comply with the provisions of the same. Third. When the owner or claimant, at the time of coming into possession of the animal, knew or had good reason to believe it to be afflicted with a contagious or infectious disease. Fourth. When the animal slaughtered was diseased at the time of its arrival in this state. Fifth. When the owner shall have been guilty of negligence, or has wilfully exposed such animals to the influence of a contagious or infectious disease. Sixth. When the animal slaughtered shall have been brought into the state within one year prior to such slaughter, unless the owner or person in charge shall produce the certificate of a duly qualified veterinary surgeon who is a graduate of a reputable veterinary college, issued within ten days of the date of importation, showing such animal to be free from tuberculosis at the time of its arrival in the state.

Sec. 3. Section 6 of chapter 440 of the laws of 1901 is hereby amended so as to read as follows: Section 6. The state live stock sanitary board shall be allowed for experimental and such other purposes as shall be deemed necessary by said board, with the consent and approval of the governor, a sum not to exceed five hundred dollars annually, which bill of expenditures shall be audited and approved by the governor. It shall from time to time issue such bulletins of information as it may deem advisable, which with the biennial report of the board to be made to the governor shall be printed by the commissioners of public printing, the bulletins in such number as the governor may approve, and one thousand copies of the report of this board, five hundred of which shall be bound. The state veterinarian is hereby authorized to call to his assistance, as may be necessary in the performance of his work, duly qualified veterinary surgeons, who shall be paid for their services at the rate of seven dollars per day and their actual expenses for the time they are actually employed as assistants. Their accounts shall be audited upon itemized vouchers, certified to by the state veterinarian and approved by the governor, but no person shall be considered a veterinary surgeon, within the meaning of this act, who is not a regular graduate in good standing of some recognized veterinary college in the United States, Canada or Europe. The appraisers herein provided for, shall receive two dollars for each day actually employed as such, which amount shall be paid out of the county treasury, upon the certificate of the justice by whom they were summoned. The justice of the peace and other officers who may perform any duty hereunder shall have the same fees as are allowed by law in criminal proceedings in justice courts, and shall be paid by the county in which their services are performed.

Sec. 4. This act shall take effect and be in force from and after its passage and publication.

Approved May 3, 1905.

CHAPTER 215, LAWS OF WISCONSIN, 1903.

Pertaining to the Duty of Local Boards of Health and Powers of Veterinarian.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1492a of the statutes of 1898, is hereby amended so as to read as follows: Section 1492a. The various town, village and city boards of health shall take cognizance of the existence of contagious and infectious diseases among animals, report all cases thereof coming under their observation in their respective localities to the state veterinarian and co-operate with him to prevent their spread; any such board, or the health officer thereof, may order that any animal affected or suspected of being affected, with any such dis-

ease or which has been exposed thereto, shall be quarantined, and the removal thereof from any premises where it may be ordered to be kept shall be forbidden. If any such board shall be unable to determine the nature of any disease prevailing among animals they may request the state veterinarian to investigate the same. Said veterinarian may quarantine premises upon which is a domestic animal afflicted with a contagious or infectious disease or that is suspected to be so afflicted or that has been exposed to such disease, and forbid the removal of any such animal or any animal susceptible to such disease therefrom by serving a written order upon the occupant or owner of such premises, and by posting a copy of such order at the usual entrance thereto; and if any such disease shall become epidemic in any locality he shall immediately notify the governor, who may thereupon issue a proclamation quarantining such locality, and forbidding the removal therefrom of any animal of the kind so diseased or of any kind susceptible to such disease without the written permission of the state veterinarian. Any person who shall remove, or allow the removal, without such permission, of any animal quarantined under the provisions of this section, shall be punished as provided by law, be liable to all persons injured thereby for the damages sustained, and forfeit all right to the indemnity which he might be entitled to under section 1492b. And shall be deemed guilty of misdemeanor and upon conviction thereof punished by a fine of not less than twenty-five dollars ($25.00) nor more than two hundred dollars ($200.00) or by imprisonment in the county jail for not less than thirty days. "If the local health officer, or local board of health shall fail or refuse to co-operate with the state veterinarian or the live stock sanitary board in matters relating to the control and eradication of any contagious disease such as is involved in the quarantine or disposition of affected animals, or disinfection of infected premises, he or they shall be removed from office by the person or persons having power to make this appointment. The place shall be immediately filled by said appointive power."

Sec. 2. This act shall take effect and be in force from and after its passage and publication.

Approved May 9, 1903.

CHAPTER 272, LAWS OF WISCONSIN, 1905.

An Act Relating to the Importation of Cattle.

The people of the State of Wisconsin, represented in Senate and Assembly, do enact as follows:

Section 1. The importation of cattle into the state for breeding or dairy purposes is hereby prohibited, excepting when such cattle are accompanied by a certificate of inspection made by a duly qualified veterinary surgeon who is a graduate of a recognized veterinary college in the United States, Canada or Europe. Such certificate shall show, that at the time of said inspection and within six months prior to shipment, said cattle had been subjected to tuberculin test and were free from tuberculosis or any other contagious disease of a malignant character, or in lieu of such an inspection certificate as above required, cattle may be shipped in quarantine to their destination within the state, there to remain in quarantine under the direction of the local health officer until properly examined, at the expense of the owner, by an inspector duly appointed by the state live stock sanitary board.

Sec. 2. In case animals are inspected outside the state, duly certified certificates of inspection, giving in full the temperature records of the tuberculin test, must be prepared in triplicate, one of which is furnished the shipper, one furnished the transportation company hauling the cattle, and one forwarded immediately to the state live stock sanitary board at Madison, Wisconsin. The expense of such inspection and certificate shall be paid by the owner of such cattle.

Sec. 3. In case any cattle (including dairy cows, neat cattle for breeding, feeding or for temporary show purposes) are not accompanied with a duly certified certificate of inspection, the railroad company accepting such animals for shipment must immediately notify the secretary of the live

stock sanitary board at Madison, Wisconsin, giving the name of the consignee, the number of animals shipped and the destination of the same, and the time of shipment from the starting place. The owner or shipper of such stock shall also notify the secretary of the live stock sanitary board at Madison, Wisconsin, of such shipment, stating that said animals have not been examined prior to their delivery to the transportation company transporting the same. Such statement shall be certified to before a notary and shall include a statement of the number of animals shipped and full description of the same, and the use for which they are immediately intended.

Sec. 4. The live stock sanitary board shall upon the receipt of such notification, notify the local health officer of such quarantine. In case the owner certifies that such animals are immediately and only intended for feeding or temporary show purposes, the sanitary board will order their release from quarantine, but, in the case of animals intended for breeding or dairy purposes which are not furnished with a properly certified certificate of inspection, the same shall be duly examined by an inspector appointed by the board. If after such examination said animals shall be found to be free from disease, the same shall be released upon the payment by the owner of the expenses of such quarantine and examination. If upon such examination said animals, or any of them, shall be found to be affected with tuberculosis, or any other contagious or infectious diseases, then and in such an event, the Wisconsin state live stock sanitary board shall quarantine such animals and the same shall be disposed of in the manner provided in chapter 440 of the laws of Wisconsin of 1901, and the laws supplementary thereto and amendatory thereof, except that in no event shall the owner or shipper of such animals receive any indemnity from the state in case such animals are slaughtered, or the owner may re-ship affected animals to party or parties from whom the same were purchased. The expense of such quarantine, of the examination of such animals and subsequent disinfection of quarantined yards where disease is found to exist shall be paid by the owner or shipper of said cattle, the cost of such examination not to exceed seven dollars ($7.00) per day and expenses.

Sec. 5. The provisions of this act shall not apply to persons transferring cattle through the state on cars to points beyond the state, or to persons living near the st e line and owning land in adjoining states, and who may drive said cattle to and from said land for pasturage.

Sec. 6. Animals brought into the state for purposes of exhibition at county, state or other fairs, if sold within the state, must be subjected to the same test as breeding or dairy animals. Transportation companies unloading cattle in this state, which are not accompanied by a certificate of inspection as above designated, except as provided in section 3 of this act, shall be subject to a penalty of not less than fifty dollars nor more than two hundred dollars for each car so unloaded in this state, such penalty to be recovered at the suit of the state, brought by the attorney general.

Sec. 7. Any person or persons bringing into this state cattle that are not accompanied by a certificate of inspection as hereinbefore provided for, or failing to comply with the provisions of section 3, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than fifty dollars, nor more than two hundred dollars.

Sec. 8. This act shall take effect and be in force from and after its passage and publication.

Approved May 31st, 1905.

An Unsanitary Barn and Diseased Carcasses after the Post Mortem. In this Herd Disease was Neglected until 79 out of 82 Animals were Badly Diseased.

DIRECTIONS REGARDING DISINFECTION IN THE CARE OF CONTAGIOUS DISEASES IN ANIMALS.

Bulletin of Wisconsin Live Stock Sanitary Board.

The presence of most contagious diseases among stock requires that the affected premises shall be thoroughly and properly disinfected in order to destroy the seeds of the disease that are generally capable of retaining their vitality outside of the affected animal for a varying period of time.

Section 3, of Chapter 440, Laws of Wisconsin, 1901, further provides that the owner of slaughtered animals shall receive no compensation for the same until the Live Stock Sanitary Board is satisfied that the infected premises have been disinfected in such a manner as to prevent the further spread of disease.

The reason for this law is evident when the fact is known that in several instances the state has been called upon to slaughter at different times animals affected with tuberculosis that were kept on the same farm. A herd has been supposedly freed from tuberculosis only to have it break out anew at some subsequent date. If no new animals have been brought into the herd, by which the disease could have been introduced, the most probable origin of the second infection is that the barns contained the virus of the disease and if such was not thoroughly destroyed, the remaining healthy animals might easily acquire the disease.

General Principles of Disinfection.

To disinfect is to destroy infectious matter, and this can only be done by bringing the disinfecting agent in direct contact with the disease germ, under such conditions as to kill the same. It therefore follows that one must know where such disease matter is liable to be found, if he is to concentrate his efforts most economically where they are most needed. It is not generally true that disease-breeding matter is scattered promiscuously and more or less uniformly over a relatively large area. Usually, the seeds of disease are to be found in greater numbers in the immediate neighborhood of the animal and in some cases practically confined to the animal itself. Here it is that the most stringent treatment should be given. Stalls, feed boxes and mangers are much more likely to harbor the disease germ than portions of the stable more remote from the animal.

Liquid and Gaseous Disinfectants.

Germ-destroying substances are generally applied most successfully in a liquid condition where contact with the disease germ is more complete and enduring. There are, however, some excellent gaseous disinfectants that are very efficient when properly applied. A condition that is prerequisite to the successful use of these is that the space to be treated be tightly closed, so that the gas cannot escape. In barns and stables, as often constructed, there are generally so many cracks and openings that it is impossible to confine the gas sufficiently, so that it necessitates the use of liquid substances. There are a considerable number of chemicals that may be employed for this purpose; and the market is also flooded with numerous proprietary compounds, the disinfecting action of which generally depends upon the addition of some well-known substance that can usually be purchased at lower prices in the market.

Disposal of Carcasses of Diseased Animals.

In the case of some communicable diseases (those contracted only through bites or wounds, as hydrophobia or lockjaw, or those which are slowly transmissible, as tuberculosis or lumpy jaw) there is practically no danger from the carcass if it is disposed of by ordinary burial. In all these cases save lockjaw the animal may be skinned and the pelt saved.

With those diseases that affect the blood or muscular tissues, as anthrax, and black leg in cattle, hog cholera, etc., much greater care should be observed in the disposal of carcasses. Where sheep or cattle are affected, the skin should not be removed under any circumstances, as it is highly conta-

gious and furthermore renders the satisfactory disposal of the carcass more difficult. The carcass should be buried unopened at a depth of several feet, so that it cannot be dug up by dogs or other animals. It is important that the animal be not dragged over the surface of the ground to the place of burial. The ground where carcass of animal lay should be well covered with brush and straw and then burned, or it may also be covered with quicklime. It is also possible to destroy the contagion in a carcass by burning the animal, but if this is resorted to, care should be taken to consume the whole carcass.

Treatment of Affected Pastures.

Only in the case of diseases affecting more or less the entire blood system, as anthrax, black leg, hog cholera or swine plague, is it necessary to regard the pastures used as likely to transmit contagion. The germs of such diseases as hydrophobia, lockjaw, lumpy jaw and probably glanders are either unable to live in a dried condition, or else are so unlikely to be spread over fields and pastures as to render the danger from this source practically negligible. Where pastures are affected with organisms belonging to the first class, it is exceedingly difficult to satisfactorily handle them. With such diseases as anthrax and black leg, stock should be excluded from affected fields, which may however be tilled.

Disinfection of Infected Buildings (Barns, Stables, Pens, Etc.).

The proper way to thoroughly disinfect animal quarters will depend upon the disease, and the condition of the buildings to be treated. Inasmuch as some disinfectants are highly poisonous, it is impossible to use them in places like mangers, stalls, etc., that are accessible to stock, unless the poisonous chemical is subsequently removed. As a preliminary step to any disinfecting process, it is necessary to remove all litter, bedding and manure so that the disinfectant can come in direct contact with the surfaces to be treated. All loose, broken or decayed lumber, such as floor planking, mangers, feed boxes, etc., should be removed.

The most efficient disinfectants for general purposes are corrosive sublimate, carbolic acid, chloride of lime, formaldehyde.

Corrosive Sublimate—This is highly poisonous to man and beast and hence especial care must be taken in its use. It will kill bacteria in dilute solutions, one part to five hundred (one ounce to four gallons of water) being strong enough for ordinary purposes. The chemical corrodes metals quickly; hence it must be mixed in wooden pails, tubs, or barrels. It can best be applied to surfaces with a brush or broom, or with spraying machines that have no metallic parts. This agent is especially applicable to the treatment of barn and stable interiors, but on account of its poisonous properties, mangers, feed boxes, and the like must be thoroughly scrubbed after being disinfected with the sublimate solution.

Carbolic Acid—This substance may be used either in the form of crude carbolic acid or the purified product. Its action is less intense than corrosive sublimate and there is much less danger with stock from its use, because of its penetrating odor. Pure carbolic acid dissolves readily in water, and should be used for barn disinfection in proportions of about one part to fifty parts of water. This can be applied with brush, broom or spray. The crude acid is much cheaper, but is much more difficult to use because it does not dissolve readily in water. In using the crude acid, it should be treated first with equal parts of sulphuric acid to thoroughly dissolve the same, after which it can be diluted in the proper proportion. It is necessary to use caution in mixing the sulphuric acid as much heat is evolved. The full disinfecting strength of the solution will be retained if the sulphuric acid is added slowly, stirring in the meantime the solution. If the pail or vessel in which the acids are mixed is placed in a tub of water, the heat will be readily absorbed.

Chloride of Lime—This disinfectant is also applied in liquid form, one pound of the fresh material being used to three gallons of water. Its efficiency depends upon the liberation of chlorine gas. It is relatively cheap, and at the same time an efficient germicide.

Formaldehyde — This comparatively new disinfectant has proven to be very efficient. It is sold generally as a colorless liquid under the name formalin, or formalose, which is really water saturated with about 40 per cent of the gas. It can be applied either as a liquid or a gaseous disinfectant. A very effective and simple way of using it in the gaseous form is to spray it on to suspended sheets, using about six ounces to every 1,000 cubic feet of space.

Sulphate of Iron (copperas) is a good deodorizant, and when applied in strong solutions is a disinfectant. It should be applied as a saturated solution. This substance is non-poisonous and on this account is of value in the treatment of mangers, stalls, gutters, drains, etc.

Whitewash is frequently used with success in combatting disease bacteria, not so much on account of its disinfecting action as by reason of its other advantages. If prepared from freshly slaked lime, it possesses considerable disinfecting value, but none if the lime is air slaked. If chloride of lime is added to whitewash in the proportion of one pound to three gallons it increases the germ-destroying property. The disinfecting action is more intense if the whitewash is applied hot than cold.

Whitewash should be used in stables at frequent intervals. It is a remarkably good purifier, absorbing foul odors. It reflects light perfectly, thereby improving the illumination in barns, particularly basement structures. By virtue of its incrusting effect it holds bacterial life in place and under conditions where their action is minimized.

Quicklime is of especial value in the treatment of hog pens where hog cholera has obtained a foothold .

Duties of Local Health Officer.

In accordance with the regulations of this Board, it shall be the duty of the local Health Officer or the Town Chairman to see that the disinfection of any affected premises is carried out in a thorough and efficient manner and that a report of such disinfection be made to the secretary of this Board.

A LESSON IN BOVINE TUBERCULOSIS.

Bulletin of Agricultural Experiment Station and Live Stock Sanitary Board.

H. L. Russell.

Some principles are so fundamentally necessary to success that they must be presented over and over again in order that they may be thoroughly impressed upon the public. The maintenance of soil fertility, the preparation of a properly balanced ration for the rational feeding of stock, the safeguarding of the health of animal life, are questions concerning which information is ever wanted and ever needed. Appreciation of these principles has come to be more fully recognized in later years and is the basis of modern scientific farming.

How best can these principles be taught? Not as abstract propositions, but through the medium of tangible, definite illustrations that convey to the mind in a concrete way the effect which is produced by the operation of certain causes.

A Lesson Worth Learning.

For years it has been recognized that the most common way in which the dreaded plague, tuberculosis, or consumption, is spread among live stock is through the purchase of animals which already contain the seeds of the disease in a dormant, latent form. These animals generally show no physical signs of the trouble, but the disease is nevertheless there, slowly but persistently developing, and in due course of time, the seeds of infection pass from the originally affected animal to others. Even before symptoms become apparent, the bacilli of the disease may be thrown off from the lungs and thus find their way into the surrounding air, later to be inhaled into the systems of other animals. So infection passes slowly from one animal to the next, the originally affected ones

in the meantime becoming gradually worse. It may be years before this slow, insidious development of the disease is evident, and herein lies the chief danger of the trouble. If tuberculosis ran its course with the rapidity of black leg or hog cholera it would be feared as much. The violence of the outbreak would arouse to immediate action every one whose animals were endangered, but it is always introduced into the herd unawares, developing as it were under cover, and the true condition of affairs is not revealed until the disease is so well established that its eradication requires stringent and strenuous treatment.

"Buying In" the Disease.

Very frequently the introduction of the disease into a herd is brought about through the laudable attempt to raise the general character of the herd by "breeding up" the same with blooded stock. Little does a man think when he buys animals for this purpose that he is possibly bringing into his herd an enemy that may defeat his best endeavors. Our records show numerous cases of this sort. If only a little foresight is exercised, all trouble may be avoided. Often failure to determine the actual condition of affairs is due to ignorance of the matter, but the penalty paid for ignorance is just as heavy and burdensome as that paid for carelessness or neglect. Even where the attention of stock raisers is specifically directed to this danger, they frequently ignore the matter. Dr. Austin Peters, chief of the Massachusetts Cattle Commission, cites a striking case* of this indifference. In a considerable number of cases in the recent outbreak of foot and mouth disease in Massachusetts, entire herds were sacrificed as a precautionary measure. Where the farms were restocked there was an exceptionally favorable opportunity to start with herds known to be healthy, especially so far as tuberculosis was concerned; yet he found less than one-fourth of the farmers availing themselves of the knowledge that has been demonstrated over and over again as to the necessity of insuring freedom from this most serious menace to the cattle industry. *No one should purchase animals for his herd without first subjecting them to the tuberculin test to assure* himself that they are free from this disease. This lesson perhaps can be emphasized in no better way than by an illustration which has very recently come to our notice.

A Tangible Illustration.

Last October a public sale was held in one of our southern counties, in which 46 head of cattle were disposed of. The farm on which the stock was kept had been run by a tenant and

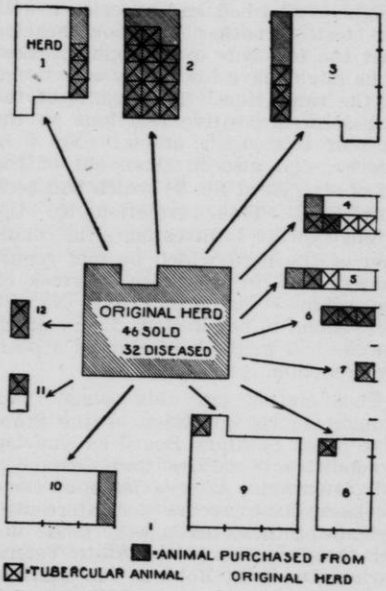


Fig. 1.—DISSEMINATION OF TUBERCULOSIS BY PUBLIC AUCTION.

This herd of 46 cattle was sold to 12 persons. Of these animals, 32 have since responded to the tuberculin test. Every man but one who purchased animals from this herd thus unwittingly introduced the seeds of this dreaded scourge into his own herd. Is it any wonder that the disease does not die out of its own accord under such circumstances?

*Report of Mass. Board of Agriculture, 1903, p. 284.

this method was taken to divide up the interest of the tenant and landlord. These 46 head were purchased by twelve persons, eleven of whom lived in the immediate vicinity. The landlord wishing to retain what he thought were the most valuable animals, had a friend buy in for him 18 head, while the tenant bought 3 for himself, and the remainder were disposed of in lots of one to six animals to each purchaser. The affair was a transaction which often occurs and naturally excited no especial attention.

One of the parties who had purchased six of these animals decided in February to have his herd tested for tuberculosis, which was done by a neighbor who had had experience with the test. Another neighbor, hearing that the test was to be applied, asked if he might have his family cow tested at the same time. The results of the test showed positive reactions in the case of this single animal (No. 7 in figure), and also in three out of the lot of six (Herd No. 3) which had been purchased. This revelation led the original owner to investigate the condition of the herd which he had repurchased, and in this case fourteen of the original eighteen (Herd No. 2) were found to be affected. Every milch cow he had in the herd showed a positive reaction.

The matter at this stage was brought to the attention of the State Live Stock Sanitary Board as showing a condition of affairs that demanded full attention. After a lapse of some weeks so as to secure normal results, re-tests of these herds were made under the direction of the State Veterinarian, Dr. E. D. Roberts. In addition all the herds were tested into which any animals had been introduced that were present in the original herd which was sold. The results of the various tests are shown in the following table and also graphically in Figure 1. Since this cut was prepared, another herd (No. 13) has been found into which 9 animals had been introduced from this original herd some time previous to its final dispersal. In this case, the single animal that reacted was the only one that had lately been brought into the herd.

Table I. *Dissemindtion of tuberculosis into various herds by purchase of stock.*

Herd.	Total No. animals in different herds.	No. animals from original herd.	Total No. of tuberculin reactions.	No. of tuberculin reactions in animals purchased.
1.....	21	5	3	3
2.....	18	18	14	14
3.....	38	6	3	3
4.....	8	3	4	2
5.....	5	2	2	1
6.....	3	3	3	3
7.....	1	1	1	1
8.....	15	1	1	1
9.....	32	1	1	1
10.....	18	3	0	0
11.....	2	1	1	1
12.....	2	2	2	2
13.....	22	9	1	1

It is evident from the above data that the originally affected herd was very badly diseased, as thirty-three out of the total number of animals (55) disposed of at the sale and before, responded to the tuberculin test. It must be remembered that none of these animals showed any appearance of the disease. No one even questioned their healthy appearance at the time of purchase, and the fact that the owners themselves bought back the larger proportion of the herd is good evidence that they had no idea that the disease was present. Could a more forceful lesson be had of how unwittingly purchasers may thus sow the seeds of destruction in their own herds?

Caught in the Nick of Time.

It is exceedingly fortunate that the first test happened to be made so soon after the sale of this herd, for the disease had apparently just begun to spread through the individual herds and strike other animals. In several of the herds (Nos. 2, 6, 7, and 12) it was impossible for further spread to occur, as the animals purchased made up the total number in each lot. Consulting the diagram, it will be observed that in Herd 4 of three animals purchased from the diseased herd, two

were shown by the test to have tuberculosis, and of the other animals in this herd two were shown to be likewise diseased. In Herd 5, where two animals were purchased from the diseased herd, one was found to be tuberculous, and of the other members one was tuberculous. Thus it turns out that in Herds 4 and 5 there were three tuberculous animals which had not come from the original diseased herd. It is reasonable to assume that in these cases the disease had been communicated through the purchased animals. The use of the tuberculin test thus caught these herds in the nick of time before the disease had made much headway. The purchased diseased stock had been in these herds from October to February and in this time infection had begun to spread. This illustrates the insidiousness of this malady. Undoubtedly if these respective herds had been left to themselves, it might have been years before the disease would have made such progress as would have enabled it to be detected by ordinary physical means. In the meantime, the disease would have spread through these thirteen herds to a greater or less extent, and from them animals would also have been sold which would have disseminated the scourge to others. Is it any wonder that a tuberculous herd in a dairy region is a real menace to the neighborhood, inasmuch as incipiently affected animals may be scattered over a wide range? The danger is undoubtedly greater in the case of pure bred or high grade herds, as these are naturally the ones from which most transfers are made. It, therefore, behooves every purchaser of cattle, especially dairy animals, to know for a certainty that the stock he buys is absolutely free from all taint of this malady.

Original Herd Not Badly Diseased When Sold.

Doubtless the original herd when dispersed was not in a condition where many of the animals were actively distributing contagion, i. e., throwing off tubercle bacilli from their lungs. Data which bear upon this point are presented from the post-mortem records of Dr. Clark, who slaughtered most of the animals under the direction of the State Veterinarian. These examinations were made in April of this year, and in most of the animals killed, the disease had made only slight headway. In the herd in which fourteen reacting animals were killed, two had bad lung lesions, and one showed evidence of the disease in the udder, while in the remaining eleven the mediastinal glands of the throat were the only tissues affected. In the two herds in which other than the newly purchased animals had reacted, the disease was not advanced in but one case. It is, of course, unsafe to judge of the relative liability of spreading the infection by the gross appearance of the lesions, but it presumably follows that animals showing only slight development of the disease would not be markedly active in its spread. But it is only a question of time before the disease passes from the dormant to the active type. Sooner or later the malady spreads throughout the animal, becoming more and more generalized, and increasing the liability of an infectious milk supply as well as the probability of throwing off tubercle bacilli in the material from the affected lungs and adjacent glands.

The Lesson.

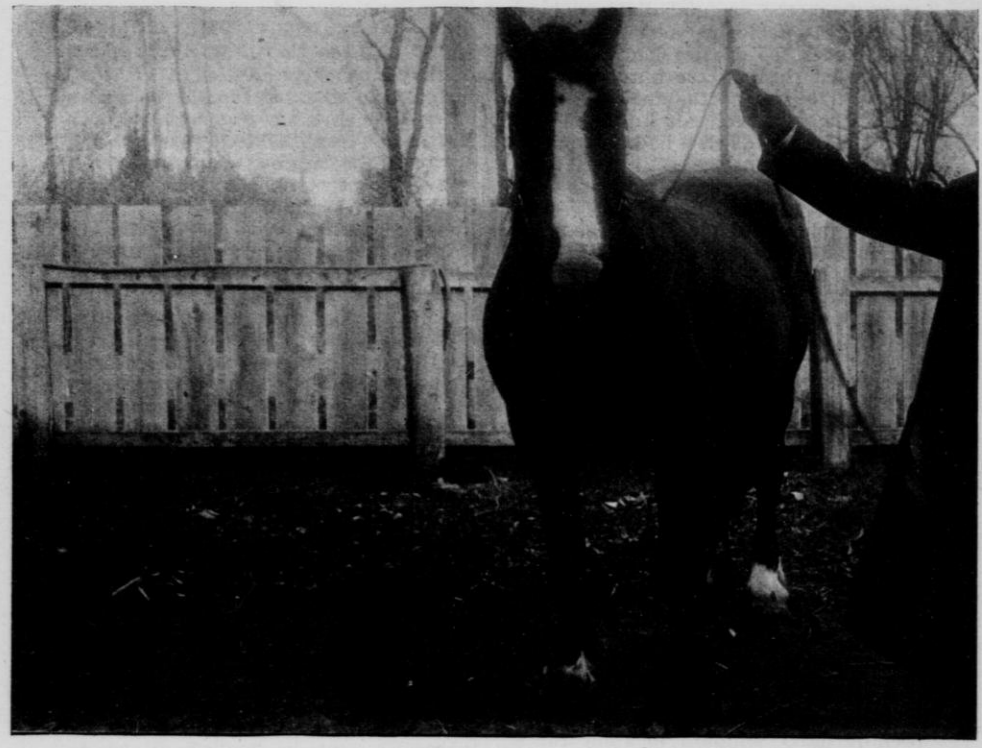
1. Tuberculosis may be widely distributed in a herd, yet not be recognized.

2. The slow, insidious way in which it develops makes it a greater menace than a more rapidly acting disease.

3. Never bring an animal into the herd, even for a short time, unless the tuberculin test is applied so as to know for a certainty whether the seeds of this dreaded scourge are lurking in an apparently healthy body.

4. If the purchasing public will insist on buying animals on the basis of the tuberculin test, this malady will be rooted out quicker than in any other practical way.

5. The tuberculin test can be so readily applied, that no one should longer ignore its use in his herd.



Annie Rooney, No. 18136. Sweepstakes Percheron Mare, Wisconsin State Fair, 1905. Owned by G. N. Mihills, Fond du Lac, Wis.

THE REPRESSION OF TUBERCULOSIS OF CATTLE BY SANITATION.

An account of a special investigation to determine the influence of good and bad stabling conditions on the spread of tuberculosis.

Leonard Pearson, B. S., V. M. D., State Veterinarian.

(Excerpt from the Report of the Department of Agriculture of Pennsylvania, 1900.)

Summary.

The purpose of this investigation, which was made under the auspices of the State Live Stock Sanitary Board at the Veterinary Department of the University of Pennsylvania, was to measure the effect of good and bad stabling conditions on the progress of tuberculosis in two herds.

For the purpose of investigation, two herds were established of six cows each. Four cows in each herd were healthy and two cows in each herd were tubercular. One herd was kept in a roomy, light, clean and well ventilated stable. The stalls and partitions between the mangers in this stable were so constructed that the cows were kept apart from each other.

The other stable was small, close, poorly ventilated, rather dark and not especially clean. The cows here were not separated by stall partitions, and they were all fed from the floor of the passageway in front of their stalls.

This experiment continued for 513 days, or about 17 months, and at the close it was found that two of the originally healthy animals kept in the large, light stable had contracted tuberculosis and the other two of the originally healthy cows continued sound. Of the four originally healthy cows in the small, dark stable all had contracted tuberculosis. The progress of the disease in each infected animal in the dark stable was greater than in the infected animals in the light, airy stable.

It is concluded from this experiment that:

1. Good sanitary conditions, cleanliness and the comparative isolation afforded by separate mangers and by stall partitions, have a decided effect in restricting the spread of tuberculosis in an infected herd.

2. A poorly ventilated and poorly lighted stable, and one in which the cattle come into direct contact, as is the case when there are no partitions between the stalls and mangers, is favorable to the spread of tuberculosis in an infected herd.

3. However good the construction and sanitary conditions of the stable, and however good the care of the animals may be, the spread of tuberculosis cannot be altogether prevented if tubercular cattle and healthy cattle are kept in the same stable.

The experiment under consideration was commenced on the 6th of June, 1898. I shall first describe the building in which the experiment was carried on, then the cattle used, and, finally, the care received by these animals and the results of their exposure.

The two stables that are described here are under the same roof, but in entirely different parts of the building. They are separated from each other by a solid brick wall. The doors of the stables are on opposite sides of the building so that the effect is the same as though they had been placed about 100 feet apart, this being the distance that it is necessary to go, out of doors, to pass from one stable to the other.

The larger stable is 33 feet 10 inches long and 23 feet and 10 inches wide. The height at the rear wall is 10 feet and 6 inches and at the front wall 11 feet and 9 inches. The capacity of this room is 8,970 cubic feet. The windows are placed close together on the west, south and east sides. There are no windows or doors in the north wall, as this is the solid brick partition dividing the stable from the rest of the building. The total glass area of the windows amounts to 200 square feet. There are two doors, one on the east and the other on the south side. The doors are 4x8 feet in size and each is divided into an upper and lower half, the upper half of each being kept open during warm weather, thus adding 32 square feet through which light is admitted.

This stable is ventilated by four sheet iron tubes, 18 inches in diameter, one of which is placed in each corner,

and by an opening on the east side to permit the entrance of air. Each ventilating shaft starts one foot from the floor, passes out through the roof and is surmounted by a metal ventilating cap. On the side of each shaft and close to the ceiling there is an opening one foot wide and two feet long which may be closed by a slide. This is used in warm weather to remove warm air from the top of the stable, but in cold weather it is always closed. When this opening is closed, air enters the ventilators close to the floor.

The opening in the east door is a transverse slot 3 feet long and 10 inches high, 8 inches from the bottom of the door. This can be closed by a slide that falls from the top. On the inside of the door and in front of the slot there is a box that is closed on all sides, excepting the top. This box projects 4 inches from the face of the door. When the slide guarding this slot is pulled up, air enters from without and passes into the box, emerging from it at the top, passing in an upward direction. After many careful observations made for the purpose of determining the speed and direction of the air currents under different conditions, it was found that when all of the doors and windows were closed and the inlet for air on the east door was open and the air shafts were open only at the bottom, air passed out from the bottom of the stable through the ventilating shafts. When a door or window was open, air passed out at a higher level, through the door or window, and a downward current was established through the air shafts. By this system the coldest and the foulest air in the stable is constantly removed from near the floor and the purer, warmer air in the upper part of the stable is conserved. The air of the stable is always very pure and scarcely any animal odor can be noticed and, although there is about 1,500 cubic feet of air space for each cow, the stable was warm and comfortable and did not freeze in the most severe weather, excepting once when the temperature out of doors was several degrees below zero.

The walls of this stable are made of brick and coated with cement, thus making a very smooth surface. The ceiling is plastered on laths and painted. The floor is of cement. The six stalls are arranged in a row through the center of the stable, the cows facing toward the east. The stalls are 4 feet wide and 5 feet long. The manure gutter is 16 inches wide and 6 inches deep. The mangers are cement basins, the walls of which rise 4 inches above the level of the floor, the bottom of each manger being level with the floor. These cement basins extend in a row in front of the stalls, each being as long as the stall is wide and 2 feet broad. The mangers are separated from each other by ridges of cement 4 inches high and by wooden partitions described below.

The cows are fastened in swinging stanchions that are held in place by a few links of chain at the top and at the bottom. Between the cows' heads and separating the mangers are wooden partitions made of well-matched boards, planed and painted. These are 4½ feet high and 2½ feet broad. In front of each manger there is a partition 2 feet high. Stall partitions separate the cows. These are 4½ feet high at the front and 3½ feet high at the rear and extend back three feet and 2 inches. All of the woodwork of the partitions and mangers is secured in place by hooks and dowels and can be readily removed, so that it can be cleansed very thoroughly. The passageways in front of the mangers and behind the manure gutter are 7½ feet wide. There is also a passageway 4 feet wide at each end of the row of stalls. No feed is stored in this room.

The other stable is 25 feet 10 inches long, 12 feet wide and 11 feet high. For the purpose of this experiment a temporary scaffold or ceiling was constructed of loose boards with spaces between, and upon this, straw was piled; this brought the ceiling down 3 feet or within 8 feet of the floor. With this arrangement the available air space was equivalent to about 3,000 cubic feet. There are two windows on the west side of this stable, but as these were boarded up during the experiment, they may be disregarded. The light that entered the stable, passed through 10 square feet of glass in a window

beside the door at the north end and this window was closed excepting when men were working in the stable and during hot weather. That is, the window was closed about one-half of the period of the experiment. This stable was ventilated through two transoms, each 2½ feet wide by 1 foot high. These transoms were partly closed during the coldest weather. In the summer the upper part of the door was left open. The area of this half-door space is 16 square feet. The walls of the stable are of rough bricks. The floor is of clay and cinders 10 inches deep and well compacted. The cows were confined in a row of stanchions extending from the south end of the stable to within 4 feet of the north end. That is, a space of 21 feet 10 inches was allowed for the six cows. There is a feeding passageway in front of the rows of stanchions 3 feet 6 inches wide, which is planked, and the cows are fed from this common floor, excepting the cow in stall No. 6.

There was but one partition in the stable to separate a cow from her neighbor and to isolate her feeding place. A solid partition 5½ feet high of matched boards was constructed to shut off stall No. 6—the last one of the row. This was done to see whether such isolation would amount to anything in the way of protecting the cow from infection under the conditions that prevailed in the dark stable. This partition extended forward to the wall in front of the cows and a door in it had to be opened to feed the cow in stall No. 6.

The eight healthy cows used in this experiment were purchased from a drover who had just brought them from Ohio. Each cow was tested by Dr. Michener on the 2nd and 3rd of May, 1898, and again by Dr. Shaw on the 18th and 19th of May, 1898. The dose of tuberculin used for the second test was twice the usual quantity. None of the cows reacted at either of these preliminary tests. During the process of the experiment, they were tested on the 26th and 27th of September, 1898, and following this no test was made until the 17th and 18th of October, 1899.

The eight healthy cows were divided into two lots as nearly equal in all respects, as possible, and one lot of four cows was placed in the light stable while the other was placed in the dark one. The healthy cows were so distributed that they occupied stalls at the ends and at the middle of the row in each stable. This left two stalls in each stable, next to the end of each row, for tubercular cows.

This arrangement is indicated as follows (the letter T stands for tubercular cow and H for healthy cow):

Order of cows.....	H T H H T H
Number of stalls.....	1 2 3 4 5 6

It will be observed that each healthy cow stood next to a cow with tuberculosis.

The tubercular cattle used in this experiment were animals that had been condemned and were kept for a time for this purpose before they died or were destroyed. Eight tubercular cows were used at different times during this experiment, but not more than four, two in each stable, were used at any one time. The stage of infection in these animals varied in intensity from mild incipient lesions to advanced generalized disease.

One tubercular cow, No. 5986, was used throughout the entire experiment. This cow was thought, when she was first obtained for this work, to be afflicted with tuberculosis in a very advanced stage. Her weight on June 6, 1898, was 775 pounds. She was very thin and coughed a great deal. During the progress of the experiment she gained 130 pounds, and weighed, just before she was killed on December 9, 1899, 909 pounds. Sputum was collected from this cow and examined by Dr. Ravenel, who found tubercle bacilli in vast numbers in every sample examined. About one year before the death of the cow, that is, December, 1898, the udder became noduled. The hard nodular areas within the udder increased in size until, finally, one-half of the udder was hard and swollen. This cow yielded milk of terrific virulence containing vast numbers of tubercle bacilli. Upon post mortem examination, it was found that two-thirds of the lung tissue was the seat of

lesions of tuberculosis. Cheesy areas were also present in the post pharyngeal lymphatic glands, which were much enlarged. Some of the mesenteric lymphatic glands were from 5 to 8 inches in length and 3 inches thick, being full of cheesy debris. The udder and the supra-mammary lymphatic glands were extensively tubercular.

It was rather surprising that this cow should have gained 130 pounds during the 523 days that she was under observation; but it is even more surprising to know that all the other tubercular cattle in the experiment gained in weight while the experiment was under way. For example, cow No. 7921, Jersey, 3 years old, was brought into the experiment as one of the infected cows on June 23, 1898. At that time she was thin, the coat was harsh and dry, the skin tight and she coughed considerably. Her weight was 705 pounds. She was kept in the experiment 139 days and gained 140 pounds, practically 1 pound a day. This cow was killed on the 1st of December, 1898, and it was then found that both lungs were thick and incrusted with lime salts. The surface of each lung was pretty thickly covered with tubercular growths, many of which seemed to be of quite recent formation. The anterior and posterior mediastinal glands contained old tubercular abscesses with thick walls. Many tubercular growths were also found on the peritoneum, and these lesions seemed to be of recent development.

Cow No. 7605 was obtained at the beginning of the experiment. She was a red and white cow, 9 years old. She weighed at the beginning 731 pounds, and on November 3, 863 pounds; that is, she gained 132 pounds in 122 days. This cow was not extensively tubercular, lesions being confined to small areas in the lungs.

The other tubercular cattle used in the experiment gained somewhat in weight. All of these cows when brought into the experiment, were regarded as advanced cases. They had reacted to the tuberculin test, they showed physical signs of tuberculosis, and they were all out of condition and losing weight. After they were brought into the experiment, if they were milking, they were dried off as rapidly as possible and were well fed. This appears to be the reason for their gain in weight during all but the very last stages of the disease.

In order that the exposure of the cattle in the light and in the dark stable might be as nearly equal as possible in respect to the number of tubercular bacilli discharged into the stable by tubercular cattle, and to prevent any irregularity that might arise from the presence of more advanced cases in one stable than in the other, the tubercular cows were changed every ten days from one stable to the other. That is, every ten days the two tubercular cows in the light stable were transferred to the dark stable, and the two tubercular cows in the dark stable were transferred to the light one. As the dark stable was dusty and the cattle in it were not groomed, the tubercular cows from that stable were sponged off with a solution of creolin before they were placed in the light stable.

The food of the two lots of cattle was the same. They were given rations composed of corn, bran, oats, linseed cake and mixed hay. The nutritive ratio was approximately 1 to 6.5. Each cow was allowed about 8 pounds of grain a day and the cattle in the two stables were fed precisely alike.

The cows were confined all of the time, excepting when they were led out of the stable once a week to be weighed. The confinement did not appear to harm any of the cattle by causing injury to their legs or feet, excepting in the case of cow No. 6520 in the dark stable which was troubled some with hoof ail and required treatment, now and then, to keep this disease in check.

Both lots of cattle were cared for by the same men, but special overshoes and overgarments were worn in the dark stable and these were kept outside of the door of that stable. In attending to the stable work, the men first fed and milked the cows in the light stable and cleaned out the manure and afterwards attended to the cattle in the dark stable.

The light stable was kept scrupulously clean at all times. Not only

was the manure cleaned out three times a day, but the stall partitions and mangers were washed off with a disinfectant every day. The whole stable, including the floors, walls, ceiling, windows, mangers, and all of the wood work were scrubbed with water and soap once a week. The walls were kept white with magnite ("water paint"). The ceiling, window frames, doors, partitions between the stalls and mangers and the posts were kept freshly painted; a new coat of paint being applied whenever there was any cracking or peeling. The floor of the light stable, before it was swept, was sprinkled with saw dust wet with an antiseptic solution. In sweeping, a floor brush was used in place of the ordinary broom for the reason that it could be used without making so much dust.

For bedding, planer shavings were used. These are very clean and less dusty than any other kind of bedding. It was found that some of the shavings were knocked into the mangers by the cows and it was necessary to clean the mangers before feeding. For this purpose, brushes of straw were used, one for each cow. These brushes were kept in front of the stalls to which they belonged and each brush was used for cleaning the manger of but one certain cow.

The cows were watered from buckets. The buckets were marked with numbers corresponding to the numbers of the stalls. In this way each bucket was reserved for the use of an individual cow and was not used for any other. The cows in this stable were groomed carefully. Two sets of curry combs, brushes, etc., were employed; one set for the two tubercular cows and the other set for the four originally healthy cows. These sets of utensils were kept in separate boxes outside of the stable.

In the dark stable the cows were cared for in a less careful way, excepting in the matter of feeding and watering. The food was of the same quantity and quality as that used in the light stable, and for watering separate buckets were used, as in the other stable. The manure was removed twice daily. The cows were bedded with straw, and they were groomed only at long intervals. The scaffolding, in the top of the stable loaded with straw, made an uneven surface upon which spiders spun their webs. In the course of time long festoons of dusty cobwebs collected and were permitted to remain.

It will be seen that in the light stable everything was done to avoid a dusty atmosphere and to make it impossible for tubercle bacilli to accumulate. In the dark stable a dusty atmosphere was favored and the accumulation of organisms was permitted.

During the summer the stables were shielded by awnings, which were lowered only while the sun was shining upon the part of the stable that could be protected by them. The awnings were not used excepting on hot days. On the whole, the stables were very comfortable both in summer and winter.

The cows in the dark stable gained more in weight than those in the light stable. The total gain for the four originally healthy cows in the light stable, during the entire period of the experiment, was 566 pounds, and of the four originally healthy cows in the dark stable it was 612 pounds. The cows in the light stable had a decidedly vigorous appearance, while those in the dark stable were comparatively sluggish and dull.

As to the results of the exposure carried out under these conditions, it will be observed that when the first tuberculin test was made, 82 days after the beginning of the experiment, one of the four originally healthy cows in the light stable and two of the originally healthy cows in the dark stable reacted, so that up to that point 25 per cent. of the exposed animals in the light stable had contracted tuberculosis and 50 per cent. of the animals in the dark stable had contracted tuberculosis. When the tuberculin test was applied October 17 and 18, 1899, fifteen months after the beginning of the experiment, it was found that two of the four originally healthy cows in the light stable reacted and all of the originally healthy cows in the dark stable reacted, so that at this time 50

per cent. of the exposed animals in the light stable were infected and 100 per cent of the exposed animals in the dark stable were infected.

By reference to the description of the individuals used in the experiment, it will be observed that the lesions found in the cows infected in the dark stable were more widespread and more extensive than in the cows infected in the light stable.

There were several ways by which the tubercle bacilli may have passed from the tubercular to the healthy cows in the dark stable. There were no partitions between the cows' heads nor between their stalls. They could breathe upon each other, cough upon and toward each other and lick up food from surfaces that had been fed from and coughed upon by tubercular cows. From the distribution of the lesions in the cows that became infected, it seems probable that some of them had acquired infection by swallowing tubercle bacilli, and others by inhaling them. This, however, is a matter upon which it is difficult to form an opinion, because the age of a tubercular lesion can not be determined accurately. In this stable, tubercle bacilli floated in the air as dust. The rough surfaces, the straw ceiling, the cobwebs, all served as resting places for dust, whence it could be dislodged into the atmosphere by a gust of air or by the movements of the animals and thus once more come within the reach of the cattle. Fragments of food, etc., were allowed to collect on the feeding floor and on the wall in front of it. As these masses, together with the material expectorated by tubercular cows in coughing, were dried and pulverized, they entered the air as dust and could then be inhaled or swallowed. That tubercle bacilli were carried in the air in the dark stable was shown by the infection of the cow in stall No. 6, which was cut off from direct contact with the tubercular cow in the next stall. The same thing is shown more clearly by the infection of a guinea pig kept for four months in a cage suspended from the ceiling in the middle of the stable. The guinea pig died of tuberculosis. The lesions were distributed throughout both body cavities.

In the light stable the cows were separated by partitions between their stalls and their mangers. They could not come into direct contact with each other. The food of one cow could not be contaminated by another cow by coughing upon it. No accumulation of dirt of any sort was permitted. It seems, therefore, that in this case infection must have been carried by tubercle bacilli suspended in drops of moisture sprayed from the respiratory passage by violent expiration, as in coughing. Guinea pigs kept in a cage suspended from the ceiling of this stable remained sound.

To test the virulence of the sputum of infected cows, Dr. Ravenel made some examinations of samples collected in nose-bags suspended from the muzzles of the tubercular cattle. He reports: "Of thirty-four examinations carried out on five different animals, tubercle bacilli were detected by microscopic examination twenty times. The number of bacilli found varied greatly, but one of the five animals constantly coughed up tenacious mucous in which the numbers approached those seen in human sputum in very advanced cases." By this method he was able to detect tubercle bacilli in the expectorations or saliva of every tubercular cow on which it was tried.

Since this stable was always so free from dust and as nearly perfectly clean as it could possibly be kept, no other explanation of the transference of infectious materials has occurred to me. If the tubercle bacilli were distributed in this way, it would appear that all of the cows in the stable were exposed to them and approximately to the same extent because, necessarily, as many tubercle bacilli were discharged in the vicinity of one cow as in the vicinity of another. But when they are projected into the atmosphere of a large, well ventilated stable (that is, one in which there is frequent renewal of air), the number of tubercle bacilli that can come within reach of an individual cow must be comparatively small. It is probable, therefore, that of the four originally healthy cows in the light stable, each was exposed to

approximately the same number of tubercle bacilli, but in two of these cows this number of germs was not sufficient to produce infection. Two cows were able to resist and to destroy the limited numbers of tubercle bacilli that entered their bodies. It may be that they would have become infected if the experiment had continued longer. Whether they would have yielded to the attacks of the same number of organisms had they been confined in a badly ventilated, dark stable, is an interesting question. This question cannot be answered by the result of this experiment, because the cows that were confined in the dark, badly ventilated stable were also exposed to more tubercle bacilli, since they were in more direct contact with the diseased cattle that were excreting them.

There can be no doubt, however, that the cows in the light stable were, at the close of the experiment, possessed of more vigor and strength than those in the dark one. This was shown clearly by their bright appearance and the activity and strength of their movements when they were led out of the stable to be weighed.

It is to be observed that the cows in the dark stable put on more weight with the same feed than did those in the light one. The gain made by the four originally healthy cows in the light stable during the experiment was 566 pounds, and the gain made by the four originally healthy cows in the dark stable was 612 pounds. It is common to regard an animal increasing in weight as an animal that is healthy, but that this is not always the case is shown clearly by this experiment, wherein the animals that were most extensively diseased increased in weight more rapidly. This fact comes out very strikingly when we compute the gains made during the different periods of the experiment. During the last period, that is, from June, 1899, to November, 1899, we find that the four originally healthy cows in the light stable gained 212 pounds and the four originally healthy ones in the dark stable gained 321 pounds. That is, the total gains made by four cows all of which were markedly tubercular was 51 per cent. more than the gains made by four cows fed in the same way and only two of which were tubercular. During the last four months of the experiment the two cows that had contracted tuberculosis in the light stable gained 127 pounds and the two cows remaining healthy in the same stable, receiving the same food, gained 85 pounds.

It seems probable that an animal afflicted with tuberculosis is, in some stages of the disease, more inclined than a healthy animal to lay on fat. This tendency is sometimes marked until a rather advanced stage of the disease.

The question may be asked, could not the disease become latent in the two cows infected in the light stable, in view of their good hygienic surroundings? In answer to this question, it may be said that these conditions were not sufficient to prevent these animals from becoming infected, nor to prevent the disease from reaching a certain and considerable development. There is, therefore, no reason to suppose that the same conditions continued could check the disease after it was well established.

As to what would have occurred if the animals had been given exercise out of doors, we cannot foresee. Of course, it is well known that fresh air is one of the best remedies for consumption. However, the cows in the light stable had plenty of fresh air. They had practically as much oxygen as they could have gotten out of doors and were protected from the weather. The only thing that they were deprived of was exercise. Exercise was not allowed because it was the purpose of the experiment to compare stable conditions, and it was desired to know just what results would follow the stabling together of tubercular and healthy cattle under certain conditions, apart from other influences.

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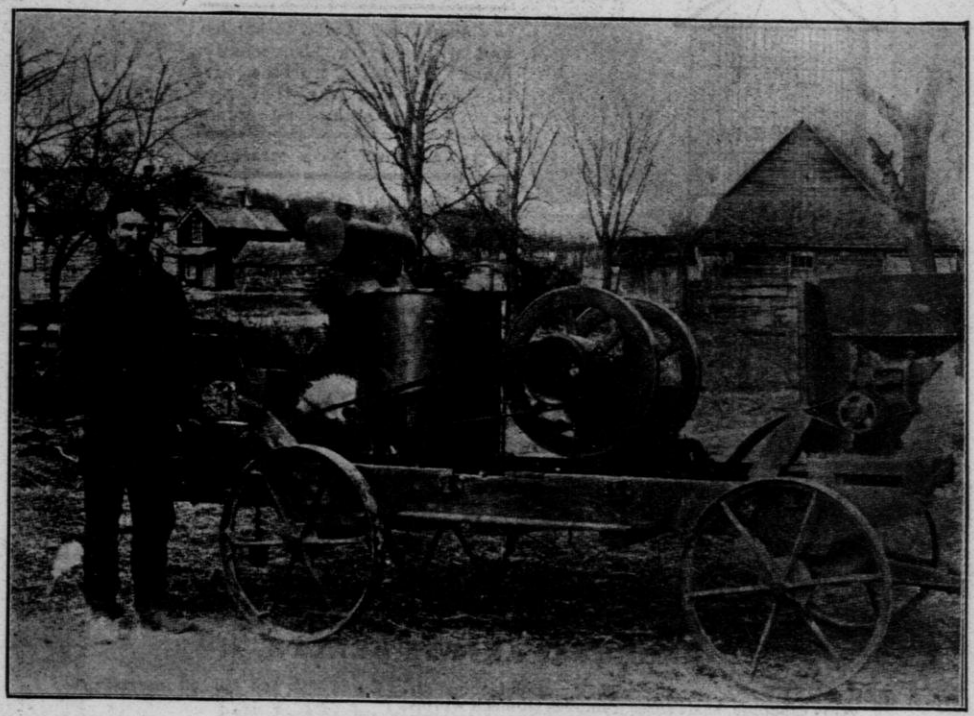

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