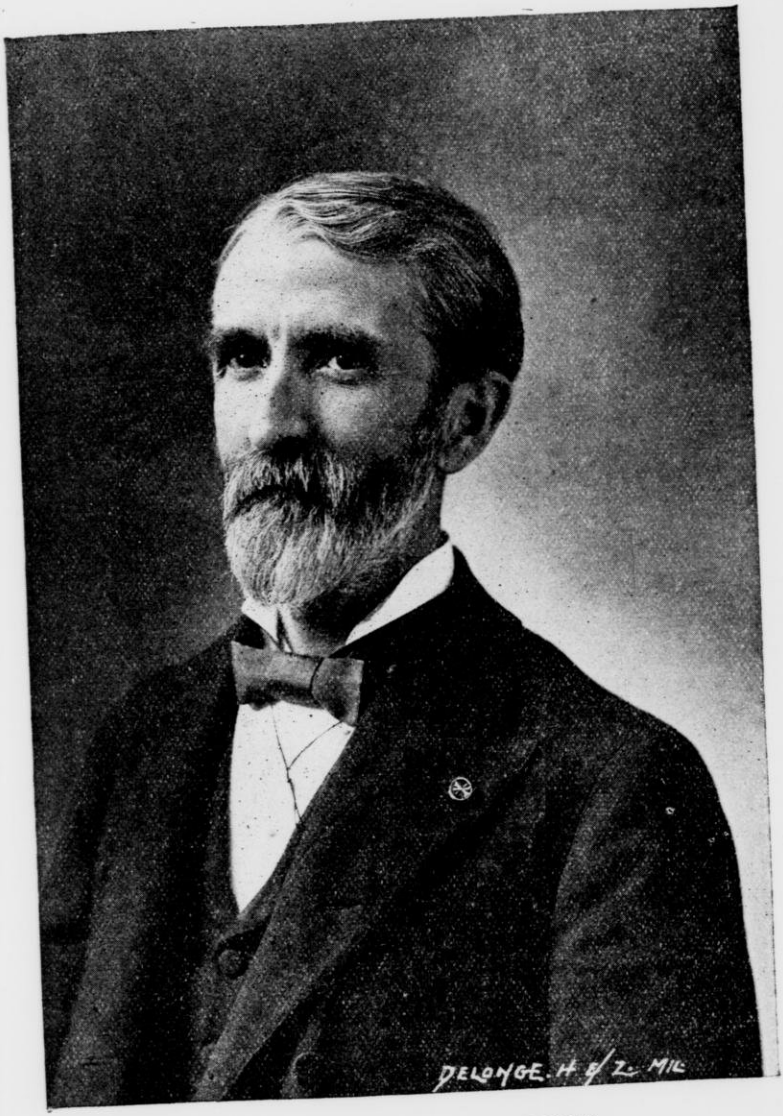
Wisconsin Farmers' Institutes : a hand-book of agriculture. Bulletin No. 11 1897

Wisconsin Farmers' Institutes
Madison, WI: The Democrat Printing Co., 1897

https://digital.library.wisc.edu/1711.dl/36H74WJQE432G9B

"The Farmers' Institute has been found to be a cheap, practical and available arrangement at which agricultural knowledge can be presented, explained and discussed. Here each farmer attending has opportunity to state his difficulties, draw upon his brother farmers' experience, and reduce to an available form in his own mind, for future use, the information and experience given." Hon. Franklin Dye, New Jersey.

"Go to the country where man lives close to nature's heart, study him as he there meets the problems of life and you will find literature which is realistic in the best and truest sense. Men of the country are to our national life what the steel frame work is to the mighty stone or brick structure, when the crises come which shake the nation to its foundation. It is the loyal hearts, and clear brains of the country folk which save it from destruction." (Ian MacLaren) Rev. John Watson.



GOVERNOR EDWARD SCOFIELD.

WISCONSIN

FARMERS' INSTITUTES

A Hand-Book of Agriculture.

BULLETIN NO. 11.

1897.

"Whatever else may tend to enrich and beautify society that which feeds and clothes comfortably the great mass of mankind should always be regarded as the great foundation of national prosperity."— DANIEL WEBSTER.

Edited by GEORGE McKERROW, Superintendent.

SIXTY THOUSAND COPIES ISSUED.

Stenographic Report by Mrs. R. Howard Kelly, Chicago.

ILLUSTRATED BY
DE LONGE, HOWARD & ZANDER,
MILWAUKEE, WIS.

PRESS OF
THE DEMOCRAT PRINTING CO.,
MADISON, WIS.

TABLE OF CONTENTS.

FIRST DAY.

	PAGE.
Address of Welcome—Mayor P. R. Thom	19
Response to Address of Welcome, Supt. Geo. McKerrow	20
Tillage, Thos. Convey	21
Saving Fertility, L. E. Scott	28
Raspberries, R. J. Coe	37
Apple Growing, Prof. F. W. Taylor	43
Apple Culture as a Business, A. L. Hatch	52
Swine for Profit, C. H. Everett	55
Growing Sugar Beets, Jas. R. Watson	61
The Sugar Beet Industry, Prof. W. A. Henry	65
What the State Historical Society is Doing, Secy. R. G. Thwaites	80
The Aim of Education, Miss Florence C. Cleland	85
Our Rural School System, Supt. J. Q. Emery	88

SECOND DAY.

Keeping Bees for Profit, Jacob Huffman	94
Foul Brood Among Wisconsin Bees, N. E. France	99
Poultry Keeping on the Farm, Mrs. A. W. Lehmann	102
Breeds of Poultry for Special Purposes, F. W. Jenkins	108
Country Roads, A. C. Powers	115
Sheep Feeding Experiments, Prof. C. F. Curtiss	122
Prospects for Profit in Beef, Alex. A. Arnold	132
Baby Beef and Silage, J. W. Hays	135
Rural Mail Delivery, Secy. John M. Stahl	142
Our Public Schools, Supt. Carrie E. Morgan	145
Russia, Prof. F. W. Taylor	150

THIRD DAY.

The Horse and Its Market, Prof. J. A. Craig	154
Marketing the Horse, Alex. Galbraith	169
Economical Feeding, Supt. Geo. McKerrow	177
The Children's Home of Appleton, Mrs. Geo. M. Miller	184
How to Get Good Cows, H. C. Taylor	185
Handy Things on a Dairy Farm, Chas. Thorp	198
The Co-operative Creamery, John Imrie	202
The Cheese Factory, John W. Decker	206
Resolutions	213

COOKING SCHOOL.

First lesson	214
Second lesson	227
Third lesson	238

MISCELLANEOUS.

Education of the Farmer's Wife, Mrs. L. O. Grove	249
Diversified Farming, Jas. H. Brewer	251
Home Building, W. H. Pickford	254
Opportunities Afforded Young Men, R. A. Moore	258
Index to Advertisers	272
Advertising Pages	274

A Farmers' Institute Audience at Waupaca Wis., Feb. 25, 1897.

LETTER OF TRANSMITTAL.

HON. JOHN JOHNSTON,

President of Board of Regents, University of Wisconsin:

SIR:—I have the honor herewith of presenting to you Bulletin No. 11, of Wisconsin Farmers' Institutes.

Most respectfully yours,

GEORGE McKERROW, *Superintendent.*

MADISON, WIS., Nov. 12, 1897.

Hon. John Johnston, President Board of Regents.

UNIVERSITY OF WISCONSIN.

Board of Regents.

The State Sup't of Public Instruction, *ex-officio.*

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

State at large, John Johnston, President.

State at Large, H. W. Chynoweth.
1st District, Ogden H. Fethers.
2nd District, B. J. Stevens.
3d District, W. A. Jones.
4th District, Geo. H. Noyes.
5th District, John R. Riess.
6th District, Frank Challoner.
7th District, Wm. P. Bartlett.
8th District, Orlando E. Clark.
9th District, J. A. Van Cleve.
10th District, J. H. Stout.
Secretary, E. F. Riley, Madison.

Colleges.

College of Letters and Science.
College of Mechanics and Engineering.
School of Pharmacy.
School of Economics, Political Science, and History.
College of Agriculture.
College of Law.
School of Music.

Courses.

Long Agricultural Course.
Mechanical Engineering Course.
Electrical Engineering Course.
Law Course.
Ancient Classical Course.
General Science Course.
Short Agricultural Course.
Dairy Course.
Civil Engineering Course.
Pharmacy Course.
Modern Classical Course.
English Course.
Civic Historical Course.
Courses in Economics and Political Science.
Special Science Course, antecedent to Medicine.
Special Courses for Normal School Graduates.
Collegiate and Academic Courses in Music.

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-one special courses. Under the Sciences there are a variety of courses in each of the following: Astronomy, Physics, Chemistry, Geology, Mineralogy, Zoology, Botany, Bacteriology. In History there are sixteen courses; in Civics, nineteen; in Economics and Sociology, twety-eight; in Mental Sciences there are twenty, embracing Psychology, Ethics, Aesthetics and Logic. There are eleven courses in Pedagogics, and two courses each in Military Drill, Gymnastics, and Music.

FARMERS PICNIC ON WISCONSIN EXPERIMENT STATION GROUNDS.

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 Hygene, 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 Ladies' 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, 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, etc.

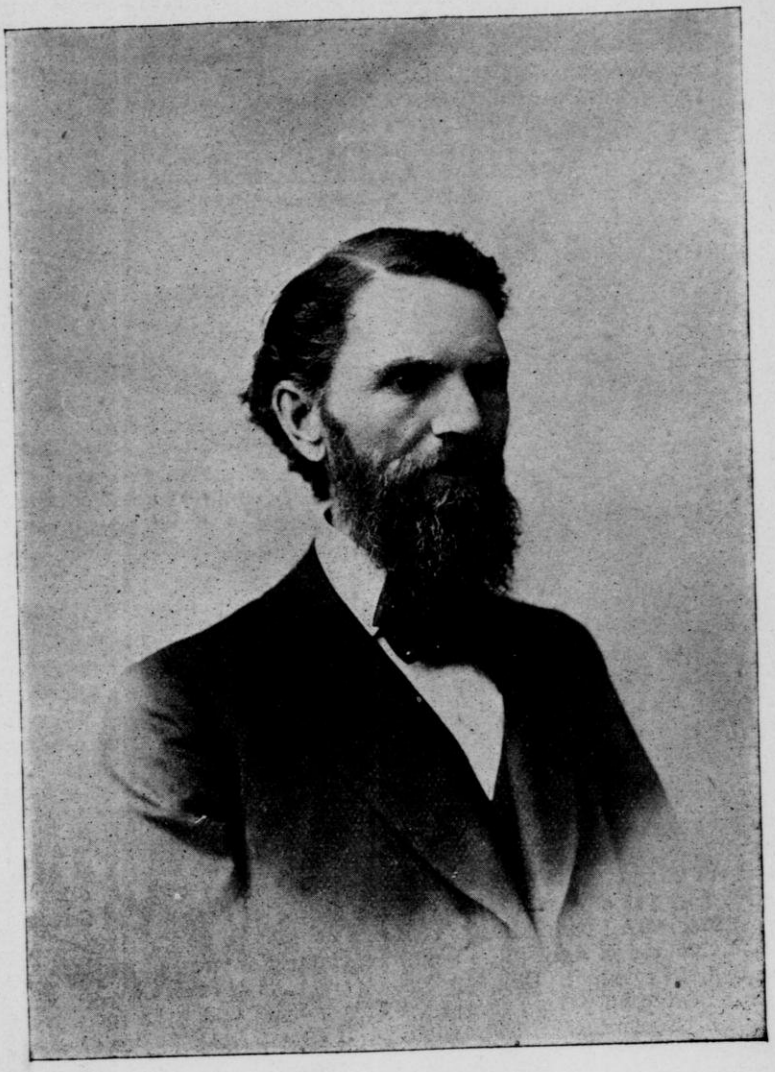
In Pharmacy:—Courses in Practical Pharmacy, Pharmaceutical Chemistry, Materia Medica, Pharmaceutical Botany, and Practical Laboratory Work.

General Facilities:—The faculty embraces upward of 115 instructors. The laboratories are new, extensive and well equipped; embracing the Chemical, Physical, Metallurgical, Mineralogical, Geological, Zoological, Botanical, Bacteriological, Civil and Mechanical Engineering, Agricultural and Pharmaceutical Laboratories. *Seminars* are held for advanced study in History, Language, Literature, Mathematics, and other branches.

The libraries accessible to students embrace that of the University, 43,000 volumes; of the State Historical Society, 180,000 volumes, including pamphlets; of the State Law Department, 26,000 volumes; of the city, 15,000 volumes, besides special professional and technical libraries, making in all more than 264,000 volumes, thus affording very exceptional opportunities for reading and special research.

For further information send for a catalogue, or address the President or the head of the department concerning which information is desired.

C. K. ADAMS, *President.*



HON. W. P. BARTLETT,
President Board of Regents from 1891 to 1897.

UNIVERSITY OF WISCONSIN.

COLLEGE OF AGRICULTURE.

Agricultural Committee.

Hon. W. A. JONES, Chairman,	Mineral Point.
Hon. ORLANDO E. CLARK,	Appleton.
Hon. OGDEN H. FETHERS,	Janesville.

Officers and Instructors.

THE PRESIDENT OF THE UNIVERSITY.	
W. A. HENRY,	Dean and Director.
S. M. BABCOCK,	Chief Chemist.
F. W. WOLL,	Assistant Chemist.
F. H. KING,	Physicist.
E. S. GOFF,	Horticulturist.
W. L. CARLYLE,	Animal Husbandry.
H. L. RUSSELL,	Bacteriologist.
E. H. FARRINGTON,	Asst. Professor of Dairy Husbandry.
J. A. JEFFERY,	Assistant Agricultural Physicist.
J. W. DECKER,	Cheese Instructor.
R. A. MOORE,	Assistant to Dean.
ALFRED VIVIAN,	Assistant Chemist.
L. H. ADAMS,	Farm Superintendent.
IDA HERFURTH,	Clerk and Stenographer.
EFFIE M. CLOSE,	Librarian.

Farmers' Institutes.

GEO. McKERROW,	Superintendent.
HARRIET V. STOUT,	Clerk and Stenographer.

I. 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. Each year an annual report of several hundred pages and frequent bulletins are issued and distributed gratuitously among the farmers of the State. Any 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 graduates of our own or other colleges, a four years' course leading to the degree of Bachelor of Science in Agriculture, special instruction to students of mature years, instruction in the Short Course in Agriculture requiring two winter terms of fourteen weeks each, and the course in Dairying lasting one term of twelve weeks. For information concerning these courses see this bulletin and write for catalogue, illustrated circulars, etc., addressing *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 Farm 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 to Geo. McKerrow, Supt. Madison, Wis.

W. A. JONES, Chairman.

ORLANDO E. CLARK.

OGDEN H. FETHERS.

Farm Committee of t he Board of Regents.

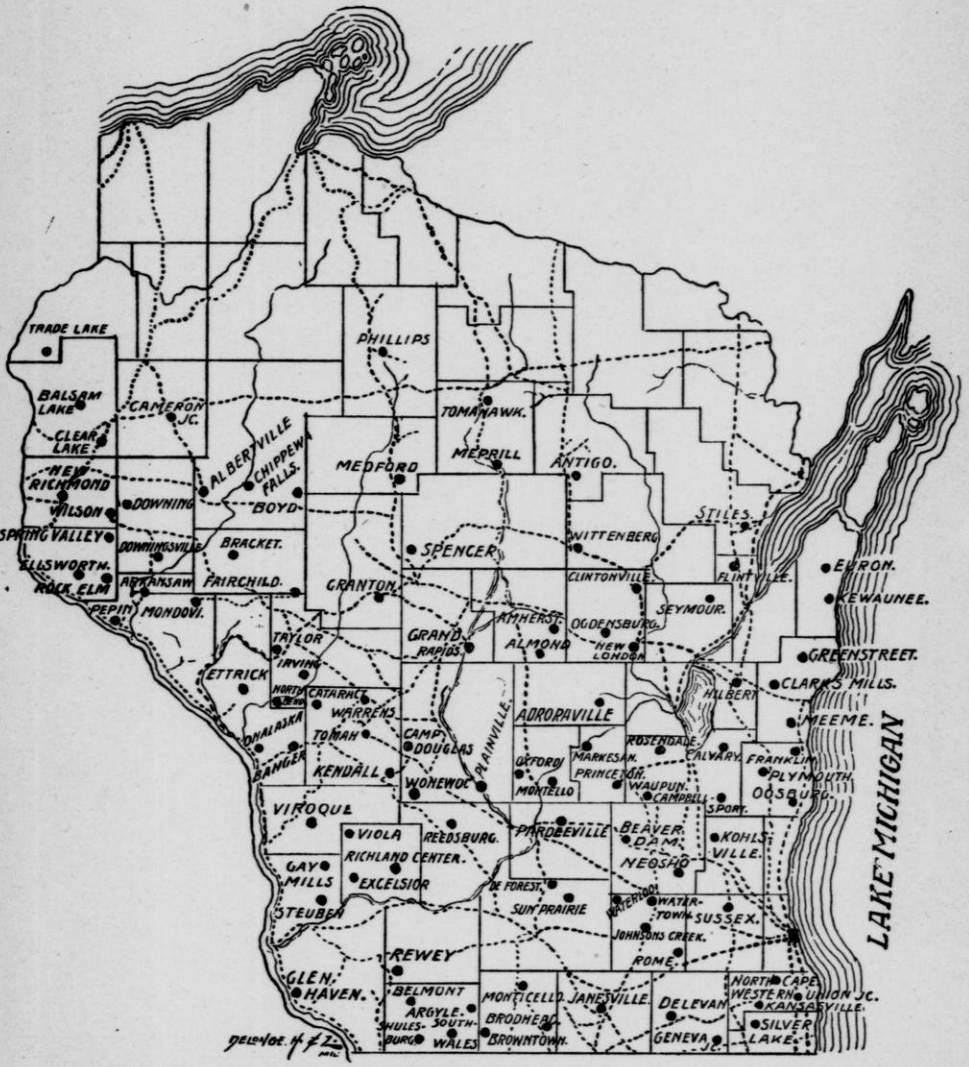
WISCONSIN FARMERS' INSTITUTES FOR 1897-8.

Date.	Thos. Convey, Conductor.	C. H. Everett, Conductor.	H. A. Briggs, Conductor.	Alex. A. Arnold, Conductor.	H. C. Taylor, Conductor.
December.					
7- 8	Phillips	Albertville	Wilson	Downing	Seymour.
9-10	Medford	Boyd	Downsville	Spencer	Ogdensburg.
14-15	Stiles	Merrill	Clarks Mills	Clintonville	Campbellsport.
16-17	Euren	Wittenberg	Flintville	Calvary	Princeton.
21-22	Trade Lake	Rock Elm	Cameron	Taylor	New Richmond.
23-24	Balsam Lake	Pepin	Chippewa Falls	Granton	Amherst Jct.
January.					
4- 5	Franklin	New London	Beaver Dam	Greenstreet	Neosho.
6- 7	Kewaunee	Antigo	Rosendale	Plymouth	Auroraville.
11-12	Cataract	Ettrick	Clear Lake	Spring Valley	Warrens.
13-14	Camp Douglas	Bangor	Ellsworth	Arkansaw	Brackett.
18-19	Montello	North Bend	Mondovi	Plainville	Viroqua.
20-21	Almond	Kendall	Fairchild	Pardeeville	Tomah.
25-26	De Forest	Rewey	Oxford	Argyle	Irving.
27-28	Excelsior	Browntown	Sun Prairie	Shullsburg	Wonewoc.
February.					
15-16	Steuben	Glen Haven	Belmont	Johnsons Creek	Monticello.
17-18	Viola	Onalaska	Brodhead	Reedsburg	South Wayne.
22-23	Kohlsville	Waupun	Meeme	Tomahawk	Watertown.
24-25	Sussex	Markesan	Oostburg	Grand Rapids	North Cape.
March.					
1- 2	Delavan	Richland Center	Rome	Hilbert	Western Union Jct.
3- 4	Waterloo	Gays Mills	Genoa Jct	Kansasville	Silver Lake.

Twelfth Annual Closing Institute at Janesville, March 8-9-10, 1898.

Applications for Posters, and all inquiries in reference to the Institutes will be promptly answered.

GEO. MCKERROW, *Superintendent*,
Madison, Wis.



MAP SHOWING WHERE INSTITUTES WILL BE HELD DURING THE WINTER OF 1897-98.

AGRICULTURAL DIRECTORY.

National Agricultural Organizations.

Dep't of Agriculture, Washington, D. C....	Sec'y, James R. Wilson.
Farmers' National Congress.....	W. D. Hoard, Pres., Ft. Atkinson, Wis. John M. Stahl, Sec'y, Chicago, Ill.
Association of American Agricultural Colleges and Experiment Stations.....	H. C. White, Pres., Athens, Ga. J. H. Washburn, Sec'y, Kingston, R. I.
American Ass'n of Farmers' Institute M'g'rs	Geo. McKerrow, Pres., Madison, Wis. F. W. Taylor, Sec'y, Lincoln, Neb.

Horse Breeders' Associations.

American Clydesdale Breeders' Association	R. B. Ogilvie, Pres., Madison, Wis. Alex. Galbraith, Sec'y, Janesville, Wis.
American Shire Horse Association.....	W. E. Pritchard, Pres., Ottawa, Ill. Chas. Burgess, Sec'y, Wenona. Ill.
American Percheron Horse Breeders' Ass'n	T. W. Palmer, Pres., Detroit, Mich. S. D. Thompson, Sec'y, Chicago, Ill.
National Register of French Draft Horse Association	W. M. Springer, Pres., Oskaloosa, Ia. C. E. Stubbs, Sec'y, Fairfield, Ia.
American Suffolk Horse Society.....	Peter Hopley, Pres., Lewis, Ia. Alex. Galbraith, Sec'y, Janesville, Wis.
American Hackney Horse Society.....	A. J. Cassett, Pres., Chesterbrook, Pa. W. Seward Webb, Sec'y, 44 St., New York City.
American Cleveland Bay Horse Society.....	W. A. Banks, Pres., LaPorte, Ind. R. P. Stericker, Sec'y, Springfield, Ill.
American Shetland Pony Club.....	L. W. Mitchell, Pres., Dixon, Ill. Mortimer Levering, Sec'y, LaFayette, Ind.

National Cattle Breeders' Associations.

American Shorthorn Breeders' Association..	Emory Cobb, Pres., Kankakee, Ill. J. H. Pickrell, Sec'y, Springfield, Ill.
American Hereford Record.....	Chas. B. Smith, Pres., Chicago, Ill. C. R. Thomas, Sec'y, Independence, Mo.
American Aberdeen Angus Breeders' Ass'n	H. W. Elliott, Pres., Estill, Mo. Thos. McFarlane, Sec'y, Harvey, Ill.
Red Polled Cattle Club of America.....	P. G. Henderson, Pres., Central City, Iowa. J. McLain Smith, Sec'y, Dayton, Ohio.
American Jersey Cattle Club.....	E. A. Darling, Pres., New York City. J. J. Hemingway, Sec'y, New York City.
American Guernsey Cattle Club.....	Silas Betts, Pres., Camden, N. J. Wm. H. Caldwell, Sec'y, Peterboro, N. H.
Holstein Friesian Association of America...	C. R. Payne, Pres., Hamilton, N. Y. F. L. Houghton, Sec'y, Brattleboro, Vt.

National Sheep Breeders' Associations.

National Wool Growers' Association.....	Wm. M. Lawrence, Pres., Bellefontaine, O. W. G. Markham, Sec'y, Avon, N. Y.
American Shropshire Registry Association..	John Dryden, Pres., Brooklyn, Ont. Mortimer Levering, Sec'y, LaFayette, Ind.
American Oxford Down Breeders' Ass'n..	Geo. McKerrow, Pres., Sussex, Wis. W. A. Shafor, Sec'y, Middletown, O.
American Southdown Breeders' Association	J. H. Pickrell, Pres., Springfield, Ill. J. H. Springer, Sec'y, Springfield, Ill.
American Cotswold Association.....	J. C. Snell, Pres., Edmonton, Ont. F. W. Harding, Sec'y, Waukesha, Wis.
National Lincoln Association.....	H. A. Daniels, Sec'y, Elva, Mich.
American Rambouillet Sheep Breeders' Ass'n	L. G. Townsend, Sec'y, Ionia, Mich.

National Swine Breeders' Associations.

American Poland China Record Association	R. J. Johnston, Pres., Humboldt, Iowa. Wm. McFadden, Sec'y, West Liberty, Iowa.
American Berkshire Association.....	N. H. Gentry, Pres., Sedalia, Mo. Chas. F. Mills, Sec'y, Springfield, Ill.
American Duroc-Jersey Swine Breeders' Association	S. E. Morton, Sec'y, Camden, Ohio.
Cheshire Swine Breeders' Association.....	G. S. Button, Sec'y, Chittenango, N. Y.
Todd's Improved Chester White Record Association	C. W. Baker, Sec'y, Delaware, O.

Wisconsin State Agricultural Organizations.

Wisconsin State Agricultural Society.....	S. D. Hubbard, Pres., Mondovi. T. J. Fleming, Sec'y, North Greenfield.
Wisconsin State Board of Agriculture.....	J. M. True, Pres., Baraboo. Geo. McKerrow, Sec'y, Sussex.
State Horticultural Society	L. G. Kellogg, Pres., Ripon. A. J. Philips, Sec'y, West Salem.
Wisconsin Dairymen's Association.....	G. W. Burchard, Pres., Ft. Atkinson. D. W. Curtis, Sec'y, Ft. Atkinson.*
Holstein Friesian Breeders' Ass'n of Wis.	J. Rust, Pres., North Greenfield. Fred E. Harriman, Sec'y, Appleton.
Wisconsin Shorthorn Breeders' Association..	Geo. Wylie, Pres., Leeds. H. B. Drake, Sec'y, Beaver Dam.
Wisconsin Jersey Breeders' Association.....	Geo. E. Bryant, Pres., Madison. H. C. Taylor, Sec'y, Orfordville.
Wisconsin Swine Breeders' Association.....	Geo. Wylie, Pres., Leeds. H. P. West, Sec'y, Fayetteville.
Wisconsin Sheep Breeders' and Wool Growers' Association	J. N. Crawford, Pres., Mukwonago. H. J. Wilkinson, Sec'y, Whitewater.
Wisconsin Farmers' Alliance.....	W. E. Fay, Pres., Star Prairie. Wm. Toole, Sec'y, Baraboo.
Wisconsin State Grange.....	H. E. Huxley, Worthy Master, Neenah. A. C. Powers, Sec'y, Beloit.
State Forestry Association.....	B. S. Hoxie, Pres., Evansville. L. S. Cheney, Sec'y, Madison.
Wisconsin Beekeepers' Association.....	Frank Wilcox, Pres., Mauston. N. E. France, Sec'y, Platteville.
Farmers' Alliance and Industrial Union of Wisconsin	C. M. Butt, Pres., Viroqua. W. F. Donaghue, Sec'y, Star Prairie.
Wisconsin Cheese Makers' Association.....	J. K. Powell, Pres., New Lisbon. U. S. Baer, Sec'y, New Lisbon.
Wisconsin Auxiliary of the National Dairy Union	W. D. Hoard, Pres., Ft. Atkinson. John W. Decker, Sec'y, Madison.
Wisconsin Fair Managers' Association.....	John M. True, Pres., Baraboo. Arthur Babbitt, Sec'y, Madison.

*Deceased.

NORTHERN WISCONSIN SCHOOL.

PROCEEDINGS

OF THE

ELEVENTH ANNUAL

Closing Farmers' Institute

HELD AT

APPLETON, WIS., MARCH 9-10-11, 1897.

C. H. EVERETT in the Chair. Prayer by the Rev. Dr. Plant.

ADDRESS OF WELCOME.

P. R. Thom, Mayor of Appleton, Wis.

Mr. Chairman, Ladies and Gentlemen:—In extending to you the freedom of this city the municipal authorities and citizens unite in offering you a hearty welcome. All are deeply interested in those that supply us with that by which we maintain our energy and existence. Nature and the aid of the farmer supplies the existence of all energy, great and small, from the single horse power to the harnessing of Niagara. When we consider the primitive power of energy and how it can be multiplied it is wonderful. Coal under ground is of no use or little value, until the energy of man is applied. When the coal is brought to the surface its value and energy are quickly multiplied in connection with the modern mechanism of today, and still all in connection with the product of the soil, by the aid of the farmer by planting and harvesting, thus taking advantage of what nature in her wisdom has supplied to us for our use.

And then consider how little of the product of the soil it takes to give energy to our commercial pursuits, such as our railroads and steamship lines. In the first place we have to supply our locomotive engines with fuel which comes from the mines. A miner can mine from four to six tons

per day. The amount of food he consumes in proportion to amount of coal mined is small, still it is the primitive energy. A locomotive engine, pulling a passenger train from Appleton to Chicago, will consume about twelve to fourteen tons of coal, but the amount of food needed by the engineer and fireman is comparatively nothing compared to the consumption of fuel, but still all the primitive energy is supplied by the farmer. Cut off the supply of primitive power and everything is at a stand still. All of this taken into consideration, it is needful and necessary for the farmer to take under serious consideration the best means of getting the greatest results from what nature in her greatness has given us.

Hence you have associated yourselves for the purpose of meeting together at stated times and comparing ideas as to how the most satisfactory results can be obtained from the different crops and the various ways that progress can be made in the numerous stages of routine work on the farm. All such information has been productive of great good not to the farmers alone, but to all. The past history of your Institutes has also made it possible for men who have not followed farming, to get information that enables them to carry on farming with some degree of success, where without such information failure would in many cases surely be the result.

The result of your deliberations are also productive of much good to the experienced farmer; he is able to make very close comparisons in all the products of the farm, from different soils, change of fertilizers, change of seeds, rotation of crops, and the most minute details of the farm have been reduced to practical demonstration. No one man lives long enough to make all of these experiments within himself. The interest that you have taken in the past goes to show that you have long since learned to appreciate the usefulness and value of the Institute as relative to success on the farm.

It has been said that the farmer makes life on the farm a drudgery; this assertion belongs more to the remote past than to the present or future, as with all the modern improvements in agricultural machinery, a farmer can accomplish his work in much shorter time and more satisfactorily.

We hope that the success of this meeting will more than meet your highest anticipations, and I hope you will be so impressed with the hospitality of our people that you will always consider that you have a warm welcome.

RESPONSE TO ADDRESS OF WELCOME.

Supt. Geo. McKerrow.

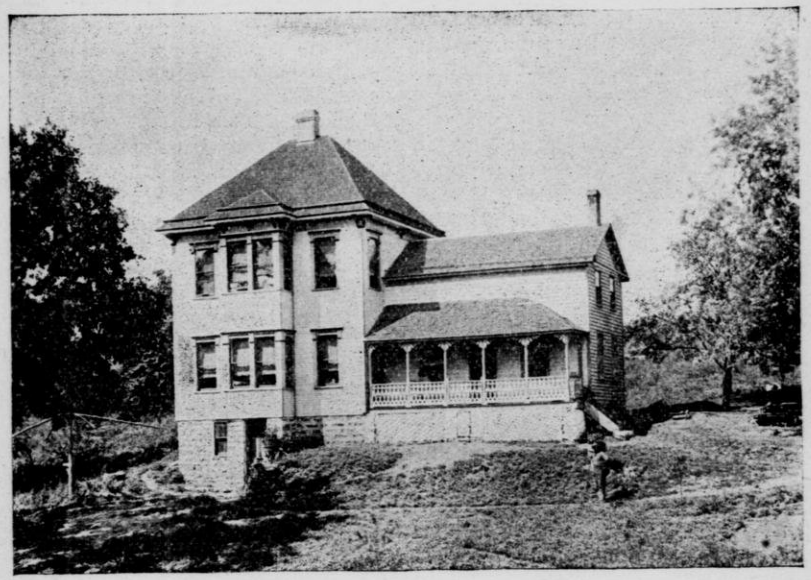
As the representative of the farmers here assembled from the different sections of Wisconsin I heartily thank you for your warm words of welcome. Also on behalf of the Farmers' Institute I thank you for the words of encouragement contained in your address, for that work. It is not my purpose to reply here at any length to this magnificent welcome given us by the representative of your city, but simply to say that we shall endeavor in the sessions that we hold here and the discussions that we take part in here to earn this welcome that you have so cordially granted us.

We have a very full program this forenoon, and we will therefore immediately proceed to business.

TILLAGE.

THOMAS CONVEY, Ridgeway, Wis.

Mr. Chairman, Ladies and Gentlemen:—The subject of tillage comprises such a large field that it will be out of the question to discuss it in all its bearings. Tillage refers to the preparation of land for the crop, to the seeding of the crop, to the care of the crop, and to the kinds of crops that you raise, in order to improve the mechanical condition of the soil and to retain the fertility, so that it will be utterly impossible to fully discuss this question in the time allotted me. I will confine myself, therefore, to speaking with reference to plowing, harrowing, cultivating and rolling.



FARM RESIDENCE OF THOS. CONVEY.

Plowing.

We find a great diversity of opinion in regard to the time in which to plow and the manner in which to plow. Along the whole eastern side of the state we find that the tendency is to do fall plowing, and that the opinion is, that it is necessary to do that, in order to get fairly good results. On the south and west, where the soil is lighter, spring plowing is preferred in the majority of cases, more particularly with those farmers who like to keep a growing crop on their land as nearly all the time as possible. There are certain advantages connected with fall plowing that we should take into consideration. Of course it facilitates the putting in of the crop to have a portion of the spring work done in the fall; besides that, the action of the frost and the other elements tend, in a measure, to pulverize and reduce fall plowed land and get it in very much better condition to yield up its fertility to the crop the following season. It will retain moisture to a greater extent and will give better results, especially with stiff, clayey soil.

On the other hand, in those parts of the state where they run their farms very much to grass and like to top-dress that grass land with manure, they find that spring plowing gives good results. In that case the texture of the soil is such that the spring plowing can be done early and the soil reduced to the proper conditions to receive the seed with comparatively little labor. Besides, it removes the coarser part of the manure, the liquid portions of which have been leached out into the soil; it removes the coarser portion of manure out of the way of cultivation, and in a measure delays the sprouting of weed seeds, so that crops will get a start before the weeds are started, and it will be easy to care for the crop later on. In the majority of cases on light lands this will give better results, because the growing crop on the land tends to retain the fertility, and guards against the surface washing and blowing of the soil that you find prevails in some portions of the state. Where the farms have been run largely to grain or even corn, and the mechanical conditions are not just right, and where it does not partake of the character of new land, not being light, mellow, and inclined to dry out early in the spring, fall plowing should be depended upon. After all I question the utility of that style of farming, unless, of course, your land is of such a character that you cannot get on there sufficiently early in the spring in order to get in the crop in good time, because we all realize that the early crop is the paying crop.

Deep vs. Shallow Plowing.

Now, with reference to the matter of plowing deep or shallow. It is a subject that every farmer should carefully study from his own standpoint. Some subsoils are comparatively rich in fertility. There, of course, the soil may be deepened by deep plowing, but the plowing should be a little deeper each year until the desired depth is obtained. Where grass or manure is plowed under of course it is better to plow shallow unless it might be for a root crop and of course deeper plowing would have to be depended upon in that case, but for a corn crop on grass land, and especially grass land top-dressed with manure, shallow plowing—four or five inches in depth—will give good results. There is a serious objection to shallow plowing, and that is, the deeper soil is prepared, the greater the capacity of the soil to take up and retain moisture, so that if the soil is deep it will take up the rainfall to the full point of saturation. It has been determined that land prepared to the depth of ten inches will take up two inches of rainfall, which would be an extremely heavy rain, of course.

Harrowing.

Proper use is not made of the harrow; that is, we neglect to harrow when we should and in that way save a great deal of moisture in the soil. Fall plowed land that is intended for a late crop should be harrowed early in the spring. The object should be to simply drag on the surface, kill whatever weed seeds have germinated and prevent the evaporation of moisture. Now, in case the land is fall-plowed and you wish to put in a late crop of corn or potatoes, it would be better not to try to level the whole surface; it would be better to harrow lengthwise rather than crosswise and leave it rough. Successive harrowings will get land in proper condition to put in your crop, and in that case the cultivation necessary to take care of the crop will be in a large measure done, even before you sow the crop, and the moisture retained in the soil. There is another valuable feature in this, and that is that it is so much easier to get the soil in proper condition when it has the right amount of moisture in it. Slight harrowing,

when the soil has a sufficient amount of moisture in it, will save very much labor later on.

It is surprising to see how many farmers spring plow for corn, or in fact for any crop, and neglect to harrow until they get through plowing. If it is a dry time it is impossible to get it in proper condition; it is lumpy and dry, double the labor, and will not produce half the results. If rain does not come the crop starts unevenly, or if rain does come after seeding it down the field is lumpy, and in condition to dry out rapidly, and a poor crop is obtained. Harrow every half day, if necessary. Fall plowing is better left in a rough condition during fall and winter, if intended for a spring crop. Harrowing winter grain in the spring gives good results. Just try it. It closes cracks or fissures made by the frost, breaks up the crust, kills weeds, and will put in grass seed in the very best manner. I like it better than sowing the latter on snow.

Cultivation.

The idea in Wisconsin at the present time is to give shallow and frequent cultivation. Those of you who read the market reports know that in the state of Iowa at the present time, although it is a much better corn state than Wisconsin, there is about half the corn crop not fit for market. They plant it earlier than we do, and have even a better corn soil, and climate. Many parts of our state are not at all adapted to the early maturity of many varieties of corn, but I have yet to hear of a case in our state where the corn crop was not fully matured, as was the case in Iowa last season. I attribute this very much to the difference in the methods of cultivation, because the Institute has been preaching shallow and frequent cultivation all the time. Now, if we attempt to reason along this line we can understand why we get better results in shallow cultivation of any kind of a cultivated crop than from deep cultivation. The surface soil ought to be the richest part of the soil, and if we attempt to cultivate to the depth of three or four inches, we realize that we cut off the roots and force them down into the subsoil where it is cold, and where the fertility, if there be fertility there, is not in proper condition for plant food. So we will see if we study this matter, that we will not be as much inclined to follow deep cultivation as some of us have been in the past.

Tools for Cultivation.

Now, with regard to the kind of implement that is necessary to secure shallow cultivation. You take those large shovel cultivators and in order to stir up the entire surface of the soil it is necessary to run them deep, so it is not possible to carry on shallow cultivation with a large shovel cultivator; besides they lift up and loosen the soil rather than pulverize it, and that is an objectionable style of cultivation. The proper implement to cultivate with to get shallow cultivation is one you can adjust to the depth you wish, and at the same time stir the entire surface soil, and the implement should enable you to do this without going to more than two or three inches in depth and leave the surface level. If you can secure a cultivator where these conditions all exist it ought to be satisfactory for any kind of crop. Remember when I speak of shallow cultivation I am not advocating shallow preparation—the deeper the preparation the better because soil of that kind will take up and retain moisture better, but the subsoil should be reasonably compact and only the surface soil cultivated. I have examined crops where the deep system of cultivation has been followed, and found that where the land is ridged up, that it dries our very rapidly, in fact, in a dry time there will be no moisture present near the surface, and consequently no roots. Now, you evidently drive the feeding roots of the

plant down in the subsoil, and yet you expect to get good results from cultivation of that kind. Of course where you give this cultivation to your corn crop particularly, it will check the growth until the root system is rebuilt, it may make a larger growth of top, but it will be at the expense of the maturity of the crop, and the final yield of grain. You take any kind of a cultivated crop, where the surface is kept fine and level, and you can find moisture within an inch or two of the surface.

Deep cultivation is not detrimental to the retention of moisture, provided the surface is left fine, and comparatively level, but usually it is uneven and loose, but more mischief is done by root pruning. This very materially affects the quality of the grain, especially corn. Immature corn is undesirable for seed; it has a large per cent. of moisture, is deficient in dry matter, and lacks feeding value; hence the bulk or weight of such a crop is not a true test of merit.

Another style of cultivation that is very injurious is hilling up around the plant and leaving a hard surface in the center. This is quite common with potatoes. You build a roof to run the water from around the plant —a hard surface in the center to carry the water off, or if perchance some of it should soak into the ground the compact soil affords the open door for its escape. And yet you fervently if not piously pray for rain, and continue the same foolishness.

Rolling.

Another feature connected with tilling is rolling. It requires more judgment to do rolling at the proper time and in the proper way than to use any other implement we have on the farm. There is one form of rolling that I want to speak about, and that is the rolling of a corn planter when you plant corn, that is in the wheel-marks. Many of you do not realize when you allow that wheel mark to remain there for any length of time that it compacts the soil and takes moisture out of it and crusts it over; that is the reason that corn farmers advocate immediate harrowing, or in the case of a stiff soil to use some implement that will throw a furrow. But it should never be neglected, the harrow running in the same direction that the corn planter went. You might think from the fact that the weeds will grow very rapidly in that wheelmark that it will be favorable to the crop, but you must remember that weeds will sprout at a lower temperature than the corn will, and the leaving of that wheeltrack there not only takes the moisture out of the soil but takes the heat as well.

I was not put on this subject to discuss corn, but I would like to call your attention to some advantages that would be likely to occur in harrowing or cultivating immediately after planting, and that is that it guards against insects or gophers attacking the corn plant; it checks the growth of the weeds and enables you to give cultivation more readily and prevents the evaporation of moisture. We do not begin to realize the necessity of giving good cultivation. You can take two pieces of land, one rich in fertility but poor in texture, and get better results from good cultivation on poorer land than you will from greater fertility on the other. Of course when you get new land you probably get texture, and fertility, but a good deal of our old land that has been run to grain continuously without sufficient grass or manure, is very much out of condition; it is lumpy, hard and poor in fertility, and in order to make the fertility in the soil available the land has to be reasonably well cultivated. It not only takes the fertility out of the atmosphere in a measure, but it actually catches and holds fertility that would escape from the soil when rapid evap-

oration is going on. For this reason we want to pay strict attention to stirring the soil just as soon after a rainfall as it is possible to get on it. Of course we cannot work soil that is too wet, but if we have a slight rainfall in a comparatively dry season, in a day or so you will have drier soil than you had prior to the rain, from the fact that there is a connection established between the moisture in the subsoil and the surface—and this promotes evaporation.

You should always harrow after rolling, because if you leave a rolled surface it will dry up very rapidly, whereas if you harrow after rolling it will prevent the rapid escape of moisture.

DISCUSSION.

Mr. Kellogg—I would like to ask you to explain the benefits of subsoiling and how it can best be done, aside from what you have already said in regard to the retention of the moisture.

Mr. Convey—A man who has never done any subsoiling should not attempt to explain, yet we understand the principle of it. It deepens the soil so that the rainfall will readily go down in the soil. It will retain moisture and at the same time afford an opportunity for the roots to find plant food and have access to the subsoil.

Mr. Kellogg—I would like to ask if any one here has had experience in regard to this subsoiling?

Mr. Coe—I have subsoiled a little, and we find a good deal of benefit from subsoiling where we have quite hard, stiff, packed subsoil; it breaks it up and makes it hold more moisture, and to a great extent it takes up the rain and more readily gives it up to our growing crops in a dry time. We have had the best results from subsoiling in the fall of the year.

Mr. Kellogg—What kind of a subsoiler are you using?

Mr. Coe—The one we have is an old-fashioned one; it has a beam like a comomn plow with a strong, long standard, about twenty-two inches long, and on the bottom of the standard is a cast iron diamond-shaped point about fourteen inches long by eight inches broad and considerable higher in the center. This runs in the bottom of the furrow, breaking up the subsoil as deep as you want, making it in good mechanical condition. Then we also have the best results by subsoiling two years in succession. The first year we run the subsoiler north and south, and the next year we like to run it east and west and break it all up and get a good condition.

Mr. Arnold—In his address Mr. Convey said a thing that I doubt the propriety of. He said that in the eastern portion of the state where we have clay soil, they plow in the fall, while in the western part of the state where we have lighter soil they plow in the spring.

Mr. Convey—In the southern part of the state, and in the southwestern part, fall plowing is really rather an exception.

Mr. Arnold—It is possible that our custom is not in accord with the best way of doing things. In my experience fall plowing is the best for my land, spring plowing for heavy clay, and it seems to me there is a good reason for it. The light soil wants to be plowed in the fall so that it can compact itself and put itself in condition just right for the plant root during the summer; it will retain moisture with this surface cultivation we speak of, whereas a stiff clay, if plowed in the fall becomes too compact, just the condition that it should not be for a good growing crop, but in the main I think the fall plowing is best all over if it has proper cultivation—proper tillage before the crop is put in. The great trouble with the farmer is that he does not give it sufficient cultivation before

the crop is put in. The main share of the cultivation should be done before the crop is put in the ground, and when this is well done we may be sure that a good crop will follow, provided we do not dig too deep in the soil. I believe the great reason why they failed to raise a good corn crop in Iowa is because their system is to use much deeper cultivation. In the state of Wisconsin by reason of the Farmers' Institutes it has been pretty well pounded into our heads that in order to have an early crop, we must allow the roots to come near the surface and not cut them off. I had rather not have it cultivated if I wanted an early crop than have it cultivated deep.

Mr. Convey—There is a great deal of land on the east side of the state that needs underdraining, and it would be quite difficult in the spring to get it sufficiently dry to plow early enough and the bulk of the farmers there practice fall plowing and get better results. With the lighter lands in the south and southwestern portions of the state you can compact the soil by cultivation. There is one thing you should not neglect in spring plowing, and that is to harrow before the land gets too dry. The tendency on light lands should be to keep a growing crop just as long as possible, and where you follow that system on the farm you will get good results and retain more fertility near the surface than if you fall plow and allow the soil to blow and surface wash and then prepare for a crop in the spring. I have tried both systems and I like the spring plowing of the clover sod very much better than the fall plowing.

Mr. Chadwick—Would you recommend the rolling of the corn immediately after planting and then harrowing.

Mr. Convey—Where you give a sufficient harrowing before planting it is scarcely necessary. I like to prepare the land well before I attempt to plant, and then we harrow just after planting.

There is another matter I have not spoken of, and that is the discing of corn ground for a grain crop. It is very desirable in every respect, except one, and that is with shallow preparation the land will wash very badly. On land that is inclined to be too rich for the oat crop, where you disc it in, you will get better results; the exposure to the elements of the surface soil during winter will bring the very best condition for crops. So where land is clean and well cultivated, and more particularly where the corn stalks are all cut off, discing in the preparation of the corn stubble is preferable to plowing in every respect, save that of washing.

Mr. Chadwick—Do you roll that grain after putting it in?

Mr. Convey—Well, we haven't rolled it very much recently, though it might be an improvement to do so. Now the washing that I refer to is about the time you sow the seed before the grain is fairly well started. It is not a deep washing, but it leaves little ruts all over the surface of the field and it is inclined to occur where the land has been well cultivated, even where it is comparatively level.

Mr. Reed—Is there any sulky cultivator made with which you can cultivate shallow and keep it regular?

Mr. Convey—There is a style of cultivator made with levelers attached and you can have them so arranged that you can adjust the depth of cultivation, even with a sulky cultivator. I have one of that kind. Mine is a disc cultivator.

Mr. Gray—Have you ever observed the effect of early fall plowing on loosening the subsoil? I have noticed that early plowing immediately after the crops are harvested we would generally find hard pan in the bottom of the furrow on these stiff soils and if you

attempt to replow later in the fall that hard pan is all gone, and it is mellowed up to the depth of the original plowing.

Mr. Convey—That is true, and that accounts for the improved condition of land that is underdrained. The water percolates through the soil rapidly and it dries out rapidly; the wetting and drying tend to create a crumbly or loose condition of the soil, so that land that is underdrained improves in condition for several years after.

Mr. Brooks—Don't you think there would be a great deal more fall plowing done in your part of the state if it was not that they have to guard so against the washing of the soil?

Mr. Convey—The washing and blowing of the soil are the serious objections to fall plowing.

Mr. Brooks—If your land was as level as it is in the eastern part of the state don't you think you could follow fall plowing?

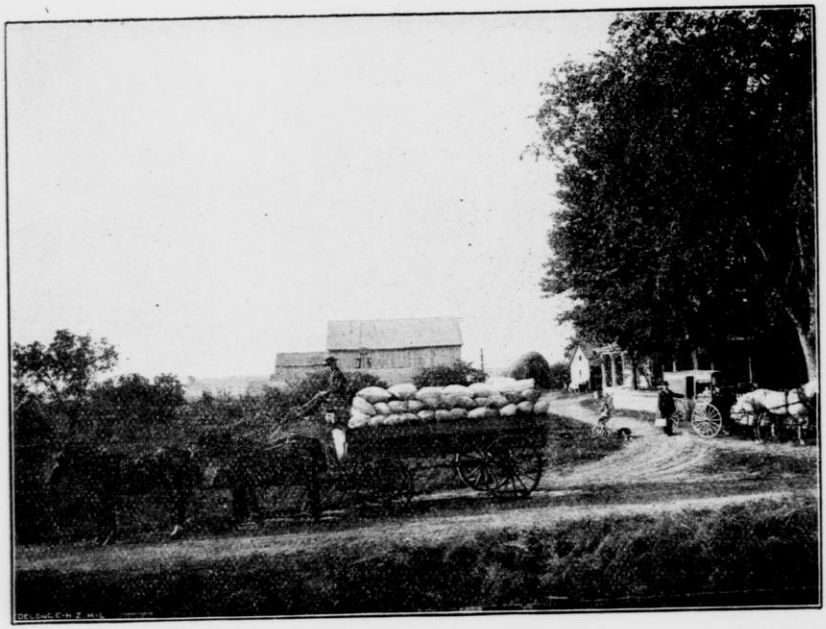
Mr. Convey—I have followed fall plowing for a number of years and I have come to the conclusion that as near as I can I will keep a growing crop on the land; the mechanical condition is very much better and there seems to be better results. The advantages are all in favor of fall plowing, I think, except that one fact; where you keep a growing crop on the land it tends to retain the fertility, prevents the washing and improves the mechanical condition of the soil as well.

Mr. Arnold—I think the soil should be occupied, it should not be without a tenant. Soil that is left bare cannot help but lose its fertility. I am of the opinion, however, that in the southern and western parts of the state, in order to mature the best crop, if the ground is not too rough, the time to plow the ground is in the fall of the year; let it rot, and then it will not blow. There is something to be lost and there is something to be gained. We lose this crop that is occupying the ground and the fertility is being lost when the ground is idle. Nature sees to it that there is some kind of a growing crop on the ground, if possible, but if you want a good crop next year you must perhaps lose some of this fertility in order to insure a good crop next year to have the ground sufficiently compact.

Mr. Convey—I apprehend that Mr. Arnold speaks of plowing under a sod or something of that kind, where it is absolutely necessary that you do fall plowing in order to get the land in condition for the next crop, for instance tough sod, but I speak particularly of the clover sod that has only been in clover one or two years. It is just as easy to reduce it to a condition fit for the use of the crop as it is stubble land. Where grass land is allowed to remain until spring "Is it advisable to allow that grass to grow just as large as possible before cropping?" is a question I am asked. It is not. At the Experiment Station they have determined where they spring plowed land reasonably early and they took proper care of the soil afterwards, and later on compared the soil with that where the crop was allowed to grow as late as possible prior to plowing, they found in the first place that with early plowing they had twenty pounds of moisture to the cubic foot, whereas in the latter case it showed only six pounds of moisture; besides, where you allow a crop to grow large and woody, like that, it may form a layer between the subsoil and the surface soil and intercept the moisture that would arise by capillary action. Besides, where you allow it to become woody it is difficult to produce decay under those conditions, when moisture may be deficient, consequently good results will not be obtained. Therfore there is a necessity of plowing reasonably early.

SAVING FERTILITY.

L. E. SCOTT, Neenah, Wis.



Farm property of L. E. Scott. The wagon shown in the foreground is a homemade affair, 14 ft. long (inside measurement) with 10 inch projections on each side, not only making it convenient for hauling potatoes or other bulky products to market, but a good sized load of manure may be brought back therein from the livery stables and hotel barns of the city, to assist in keeping up the fertility of the farm.

Mr. Chairman, Ladies and Gentlemen.—A fertile soil is the foundation of succesful agriculture. It is the first thing sought by the inquiring pioneer seeking a farm and a home. Other conditions may enter into his consideration, but the first and most important is fertility, and he eagerly looks for evidence of it in the character and growth of the original crop, whether it be of forest trees, or of prairie grass, for he well knows that it is the base upon which his future hopes and prospects are to be builded. Equally important is it that this fertility, when once obtained, be conserved and judiciously used, that it may serve to the best advantage, not only for the benefit of the original owner, but for succeeding generations.

We Must Enrich the Soil.

It seems almost incredible, in this advanced age, that men of ordinary judgment in most matters, can be found, who believe in the inexhaustibility of soils; and that they are sincere in their belief, I have no doubt when I see how prodigal they are in their practice. The best we can do, if we are consuming or selling more from our farms than we are returning to them, then they are certainly becoming poorer. They may not show it for a term of years, for they

may contain a sufficient quantity of the original elements of fertility, though latent, to last for some time, and we have only to cultivate and rotate to render these elements available for plant food, and thereby succeed in growing satisfactory crops for a period longer or shorter, according to the original strength of the soil. But the fact remains that every ton of hay or bushel of grain or potatoes, every hundred weight of milk, every pound of meat or fleece of wool we sell from the farm, removes with it a given amount of fertility; and unless we are replacing it with grain or commercial fertilizers, or some form of fertility, our farms are becoming just that much poorer.

Wasted Fertility.

Loading a pile of stable manure in the city, one winter's day, to draw upon the farm, an object lesson presented itself to view. Here was a pile of manure from a stable of well fed cattle, the grain and hay which entered into its composition had been purchased, for aught I know, from my neighbors' farms. Being upon a side hill, had that pile been allowed to remain there a few weeks, the spring rains would have washed it into a ravine which ran at its base, and while it would not have gone up the proverbial "Salt Creek" it would have gone down Fox river to Green Bay; thence through the lakes and St. Lawrence, to the Atlantic Ocean. Then I thought of the millions of dollars worth of fertility that goes, annually, through the sewers of our cities to that vast receptacle, the ocean, and until the day comes for the sea to yield up its treasures, no power on earth can ever reclaim any considerable portion of it.

Elements of Fertility in a Crop.

Prof. Woll has figured that, according to the state census report of 1895, the crop of grains, hay, and potatoes grown in Wisconsin in 1894, contained nitrogen, phosphoric acid, and potash to the amount of twenty-seven millions of dollars at the market price of these elements in the form of commercial fertilizers. This did not include the straw or corn stover or potato tops, nor the milk, beef and wool that was produced from our pastures. It will be remembered, too, that owing to the drouth of that year, the crop was below the average.

Can we calmly witness this tremendous drain with no degree of apprehension? Let us stop and consider the experience of other and older countries. Some of the older portions of the world, once rich, are now depleted. In others the fertility has been kept up in various ways. The fertile lands of Egypt are maintained by the inundations of the Nile, which annually brings down the rich wash from the forests of Central Africa. Japan and a considerable portion of China supply the incessant and necessary demands of the soil by the fish products of the sea, and by carefully saving every particle of fertility, they have succeeded in supporting a dense population for thousands of years. England's high state of agriculture is due partly to the use of commercial fertilizers, but more to the imports of the products of the soils of newer countries.

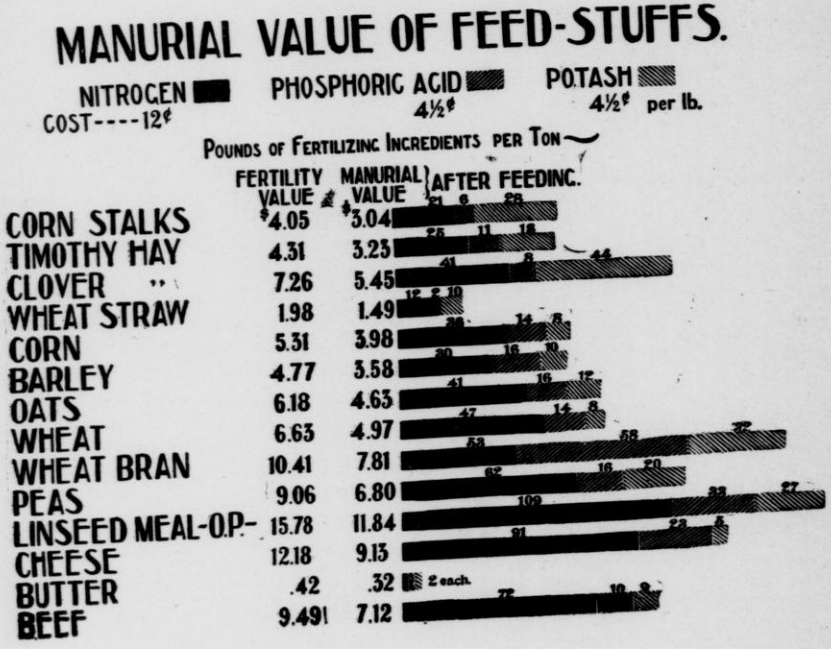
We are told by the chemist that some thirteen or fourteen elements enter into the growth of all plants, and that nearly all agricultural soils contain a sufficient supply of all, except three of these, to be practically inexhaustible. These three are nitrogen, phosphoric acid, and potash. The farmers of New York are already paying annually five million dollars for these three elements in the form of commercial fertilizers, paying 12 cts. per pound for nitrogen, 4½ cts. per pound for phosphoric acid, and 4½ cts. per pound for potash. The nitrogen could no doubt be supplied,

in part, at least, by the use of clover which has the power of extracting this valuable element from the atmosphere and storing it in the soil for the use of succeeding crops.

Value of Clover.

Nitrogen is not only the most costly element of fertility, but it is the one in which our soils are most frequently deficient, owing to its being the most readily washed or leached away. The clover plant, in supplying this one thing needful in our Wisconsin soils which are generally rich in the other elements, has been the means of increasing our yields of other crops in a large degree.

The practice of sowing clover with all grain crops, is therefore to be commended. But contrary to the belief and claims of many enthusiastic friends of this plant, soil fertility cannot be kept up for an indefinite period by the growing of clover alone, for with the exception of nitrogen, it adds nothing to the soil except what it takes from the soil, and it is evident that if by supplying needed nitrogen we grow a larger crop, then that crop in proportion to its increased yield, draws more heavily upon the other elements, and the soil is really rendered poorer in all the elements, save the one, than it would have been had the clover crop not been grown.



Careful Rotation Necessary.

Inasmuch as two different plants do not require elements of fertility in the same proportion, a proper rotation of crops will aid in conserving the hidden treasures of the soil. A careful attention to the analysis of the crop that we are selling is also of

the utmost importance. Farms in the older portions of the state from which the most grain has been sold, are beginning to present a sad contrast to adjoining farms where stock growing or dairying has been the leading industry, and upon which the products of the farm have been more largely fed. But with all our care nothing can fully compensate for the annual outgo, but to bring back to our farms fertility from some other source than from the products of our farms. I believe commercial fertilizers to be too expensive to correspond with the present prices of farm products in the west. The hauling of stable manure, from the village or city, cannot be thought of except by the comparative few who live within a limited radius therefrom.

How, then, are we to balance our account with our soil? It is plain that to do this we must put back as much as we take from it, but it is unnecessary that it be of the same money value, or of the same form. We see by the chart that at the market price of commercial fertilizers a ton of butter contains but 42 cts. worth of fertility, while a ton of wheat bran contains $10.41 worth. Now a ton of butter at 16 cts. a pound would purchase forty tons of bran at $8 per ton. Forty tons of bran judiciously fed to good dairy cows, in connection with other feeds grown upon the farm, should produce one and one-half tons of butter more than the other feeds would produce without it. Figuring upon a basis of 5 per cent. milk, this would mean an extra fifty-two thousand pounds of skim milk.

It is not my purpose to discuss the profits of this extra amount of butter or skim milk, more than to merely mention the fact that the farmer may at least get pay for the first cost and extra labor, and that while the ton of butter sold has carried with it but 42 cents worth of fertility, the forty tons of bran purchased with the proceeds, after deducting 25 per cent. that the cows would extract in process of digestion, would still give the farm $312 worth of fertility at market prices. Again, deducting 25 per cent. from the extra 52,000 pounds of skim milk, we would have $34 more from that source, and while owing to many contingencies the absolute value of manures can never be determined, it is safe to say that the manure from this forty tons of bran, if carefully saved and applied, would supply the farm with as much fertility as $346 would purchase in the form of commercial fertilizers.

Handling Manures.

It would seem then that so long as we can purchase bran or linseed meal from Minnesota or the Dakotas, or cotton seed products from the south, and can get first cost or more, in the milk pail, or from stock grown, that it would be wiser for us to add this fertility to our farms, than to see it go to enrich the lands of Europe.

But after once obtained, the saving and applying this manure are matters which demand our consideration. Our varied practices upon the farm are too frequently impelled by capricious notion, prejudice or mistaken idea, instead of being founded upon scientific knowledge and carefully tried experiment. And in nothing is this more manifest than in the handling of manures. Men still continue to leave manure in the yard all summer to rot, knowing full well that they are losing the use of it for a year, and in the face of the fact that even when piled in the most approved form it will, upon the average, lose more than half its value if allowed to remain there six months in the summer season. If spread out over the surface of the yard the loss would be even greater.

Saving and Applying Manures.

While the loss from these piles has

been ascertained by carefully tried experiment it seems incomprehensive to the majority of farmers if not really incredulous. We all recognize the difference in strength between leached and unleached ashes and it might be plainer to us if we would contrast "barnyard" and "stable" manures in much the same way. Some have done this, and desiring to save the leachings which are the most available if not the most valuable portions, they have dug cellars under their stables, with water tight floors, an excellent place for the storage of the manure, but the fumes arising from this decaying vegetation fill the atmosphere with impurities, and permeating the hay loft and meal bin render the feed unwholesome.

Covered barn yards have been advocated by some of our eastern farmers, but they are expensive. Sheds large enough for a few months' accumulation might be practicable, but as manure never gains anything by age except in solubility, I believe the better way is to take it to the field as directly from the stable as convenient, and spread it at once. This would hardly be advisable upon a frozen hillside, but upon comparatively level ground the loss would undoubtedly be far less than if left in the yard through the spring rains.

A Bad Practice.

The practice of hauling the manure into little piles in the field would seem to be poor economy. A load of manure can be spread from the wagon almost as quickly as it can be hooked into piles and when once spread it is where it will do the most good. If left in piles a rain or two will carry the most available portions of it directly into the soil, making a few square feet in close proximity perhaps too rich, while the haulm only remains to be spread upon the intervening spaces. As a result our field presents the appearance of a vast checker board for several successive seasons.

Waters from under drains from manured fields have been analyzed to determine the loss from leaching. Of course this depends largely upon the character of the soil, but upon the same soil Sir John Lawes found that water from a fallow field contained more fertility than from a field upon which there was a growing crop, proving that if we apply manure to a grass field we will save more fertility than we would to spread it upon a stubble or fallow ground for the growing crop would at once take up some of the liquid portions that might otherwise leach away.

Stable manure is a complete fertilizer in the full sense of the term, for it not only contains the nitrogen, phosphoric acid and potash which the so-called complete commercial fertilizers are said to contain, but it comprises every element that enters into the growth of the plant and is therefore worthy of our considerate attention.

Let us increase the fertility of our soils, if possible, but if we will not do this we owe it to posterity to at least hand down as much land to the acre to our children as we received from our fathers.

DISCUSSION.

Mr. Wicker—You said that it was best to spread stable manure directly on the ground on comparatively level ground. What do you call comparatively level ground?

Mr. Scott—I would say most of the lands in southern Outagamie and Winnebago counties. I should prefer to spread by all means upon grass land, especially on the side hills because the washing will be less. A growing crop, starting in the spring would take up the liquid portions quite quickly, and the loss would be

far less than if spread upon fallow ground.

Mr. Wicker—But you see I have considerable land plowed, and there would be some portions where I wanted to get a stand of clover, and I followed that plan of spreading it on the ground where the land would be plowed.

Supt. McKerrow—Let me put it a little differently. Supposing you had no grass land to put it on, but had these plowed hillsides, would you leave it in the yard, or haul it out?

Mr. Scott—I would prefer putting it on the side hills to leaving it in the yard. I would put it there and plow it under as quickly as I could.

The Chairman—Wouldn't it be a good plan to harrow it in?

Mr. Scott—Yes.

Supt. McKerrow—How many of these gentlemen have practiced hauling out and spreading manure at all times of the year? I see twenty or twenty-five hands. Now, how many who have practiced it feel satisfied that it is the best plan? The same number, I see. Are there any here who are not satisfied that it is the best plan after having tried it? There is one. Now, tell us why you are not satisfied.

Mr. Anderson—I put it out just about this time and the land was watersoaked, as it is now, and there was frost; after that we had a snow storm and a big thaw and the water from the manure ran right for the ditches and my crop was no better.

Supt. McKerrow—That was your bad experience, as against the good experience of several others. We like the bad stories, as well as the good ones.

Mr. Kellogg—We are hauling out our manure and spreading it, excepting at this time when the ground is frozen so that it cannot leach into the soil at all, and we are piling the manure to spread later. We have noticed that on the most level portions of some of our ground the accumulation of water and ice occurs and if we spread the manure we will lose a great deal of fertility, even the level portions the water washes away. We believe in applying it on almost all kinds of soil and all kinds of situations excepting when the ground is hard frozen.

Mr. Reed—When the ground is hard frozen, if you want to use that ground for early crop will there not be some danger of the manure holding the frost in the ground and delaying the crop?

Mr. Scott—I think there might be if the manure is coarse.

Mr. Robbins—The ground of this country is always hard frozen during the winter, and I have found, contrary to the teachings that I had when I was a boy in the old country, that it was necessary to plow up and down, something of a trench—that it is better to have the ground plowed so that the water would not drain off easily, plowing along the hills instead of up and down. Of course, with a very steep hill it might not work so well, but I have found it very advantageous for me to put the manure from the barn onto the ground in the winter, even when the ground is frozen, and even upon plowed land, if it was plowed so that it would retain the moisture.

Mr. Scott—I wish to emphasize the point made regarding the loss of manure that is left in the barnyard. Prof. Roberts, of Cornell, tried a two years' experiment, analyzing each day's product as it was piled in the yard; he had it piled in as compact a form as practicable, about three feet deep with square sides, and then after leaving it in the pile six months this manure was hauled to the field, each load analyzed, and it was found that in those six months it had lost forty-two per cent. This was a very dry season The next season he repeated the same experiment and he

found that the loss was sixty-two per cent., or an average of fifty-two per cent. in the two seasons, more than half of its value. Now, the question for us to settle is this—will we lose anything like that amount if we spread it upon the surface of our fields. If we lose more, then perhaps it would not be good policy.

Mr. Briggs—When Mr. Scott spreads this manure on the surface, does he plow it under in the spring, or does he take off a crop of grass or pasture that one season?

Mr. Scott—With fairly fine manure we produce good results upon the grass crop, but my practice has generally been to plow it under for corn or potatoes; I have done both, however, and have had good results from both practices.

Mr. Lyman—Have you ever had good results from manuring your clover and plowing it after you take a crop of clover off of it with a successive crop of corn?

Mr. Scott—Yes.

Mr. Arnold—I get the best results by hauling out the manure whenever I have it, all that I can, but we make so much of it that we cannot haul it out at all times of the year, so all there is left in the barnyard is put in piles. We square the sides of this and make it as solid as possible, and then put that out in the fall of the year on winter wheat, thereby starting a good crop of clover. I maintain that if there is any time that clover needs help, like a young animal, it is when it is young, so that it can get a good, long root, and get well started. I never yet had a failure of a crop handled in that way. Manure the clover and then the rest of the crops will take care of themselves.

The Chairman—Mr. Arnold made one good point with reference to the coarse manure upon the farm. We all have considerable manure from the litter that is piled in the yard in the spring—straw and bits of stalk. Now, that is not in fit shape to plow under, and if it is firmly piled up and nicely squared, it will give satisfactory results. First, put up the coarse stalks, straw and such things, apply a little land plaster, and keep it piled up. I think it is better to get it out of the yard entirely.

Mr. Arnold—Do you not have trouble in heating in that way?

The Chairman—No; the land plaster tends to neutralize that; apply liberally of land plaster.

Mr. Scott—If Mr. C. P. Goodrich were present I think he would say that he applies such manure to his pasture land.

A Member—Mr. Goodrich doesn't do any yard feeding, and I don't see any occasion for having it in the yard.

Supt. McKerrow—You must not forget the sheep man. He must have a good large yard for the sheep.

The Chairman—And the steer man, too.

Mr. Convey—I think that where you have yards adjacent to the field it is a good deal better to let your stock exercise on the land where you expect to raise the crop, and you will see that that land will be very much enriched. It is better than to keep the stock in a small yard.

Supt. McKerrow—We will accept your amendment except for sheep; for two or three muddy weeks you must have them in the yard.

The Chairman—About the cow, too, it is possible that a cow cannot be turned into the field in the spring, sometimes, but I do like to have my cows in the yard, enclosed by a tight fence, lying in that yard very deep in the straw; it may not be the best way, but it is what I have practiced.

Mr. Convey—Mr. Scott said that barnyard manure compared favorably with commercial fertilizers in regard to the fertility, and he might also have spoken more of the humus con-

tained in barnyard manure, which is very valuable.

Mr. Scott—The friends of commercial fertilizers make this point in favor of their wares, that "they are more quickly available than barnyard or stable manures." That may be true, but there is an advantage with stable manures; they supply the land with the mixed vegetable matter which is needed in most of our soils, and which is especially beneficial to our heavy clay soils, keeping them light and porous, giving them a greater storage capacity for moisture. And then in rotting and fermenting in the soil, they break down the elements of fertility that are already there, but in a form which is not available for plant growth, putting these elements into a form that will enable them to be taken up by the crop and give us the benefit of an increased yield. Upon sandy land this humus, we are told, is also beneficial. It prevents washing, for one thing.

Mr. Briggs—I don't like the way that Supt. McKerrow handles this coarse manure, it makes too much work, and I am always willing to get rid of work.

Supt. McKerrow—I understand Mr. Everett's practice is like mine, to get the coarse manure out onto the pasture land. We have some permanent pasture lands, but I always avoid putting this fresh manure out on sheep pasture because in wet seasons I am convinced it has a great deal to do with the development of intestinal parasites—the lung and liver worms.

Mr. Robinson—Isn't it sometimes advisable to plow in our horse manure in the soil? I know for a time on my farm in Manitowoc county there was a knoll on which I had hardly grown anything, and I plowed in on that land all the straw I could turn under; the result was that the best part of the winter wheat grown on that ground, about forty-five bushels to the acre, was on that clay hill.

Mr. Scott—I have found it very beneficial to our soils to plow in as much of that litter as we have, but I am told by those who have had experience upon sandy soils that it is objectionable upon that sort of soil, because it checks the capillary action, preventing the moisture from coming up from below and as a consequence the crop suffers in time of drought.

Mr. Coe—In all this discussion we have not heard a word about rye. I believe that Wisconsin farmers can make a good deal more use of rye than they do. I have very serious objections to leaving any soil bare in the summer or winter; as soon as one crop is taken off another is put on, and I find that the rye crop comes in very handy. It is a crop upon which we can apply manure, which will take the fertility up and hold it near the surface where we want it, and when we come to plow that crop under, which we do early in the spring, we find everything in much better condition for use. We do not add any particular amount of fertility by the use of the rye crop, but we hold what we have, and it also holds the soil from blowing away by the winds of the summer and fall, and it holds the fertility from going down through into the sub-soil, and of course this fertility being stored in the rye crop, when it comes to decay early in the spring when it becomes full of water, it gives its fertility back to the crops.

Supt. McKerrow—You would not suggest replacing clover with rye?

Mr. Coe—Oh, no; but you know we have always some crops taken off our lands in the fall, corn, or strawberries, or something. Of course the clover is preferable to the rye, but we always keep the land covered with some crop.

Mr. Scott—I have sown a good deal of rye and turned it under, and had good results. We get the benefit of the mechanical action, but I am fully

aware that in doing this I really add no fertility to the soil more than that which the rye takes from it, but of course we get larger crops by the use of the rye.

Supt. McKerrow—I can see a good deal of force in Mr. Coe's statement. We are told by the scientists that nitrogen in some of its forms, passes out of the soil very rapidly. Now, if the rye crop can hold that nitrogen when we turn the rye back into the soil, we have saved it, although we may have added nothing.

Mr. Kellogg—We have used rye a good deal, and only in one instance have I found it was detrimental. I generally let it grow in the spring to about eight inches high before we plow it in. One dry season I think the following crop was injured.

Mr. Arnold—Nature clothes herself with verdure. This world has been going along many years and there is no evidence of its becoming poorer; it has been covered all the time by nature. I believe that in order to avoid its becoming poorer we must keep it covered either with roots or clover or rye, something that will keep a growing crop on the land all the time.

RASPBERRIES.

R. J. COE, Ft. Atkinson, Wis.

Mr. Chairman, Ladies and Gentlemen:—When we come to look back at the years that are passed and gone, and consider where we used to get our raspberries and compare that with the present time, it seems to me that this is a good object lesson for us. I well remember when I was a boy, going into the field, into the fence corners, to get the raspberries for the year's supply; I also remember that it was the early boy that got the berry, and I have been in the field many and many a time waiting for it to get light enough for me to pick the berries. All this has changed with me, and it should be changed with every man who owns a piece of land, whether he be a farmer, whether he be a village lot owner, or wherever he is, he should have some of the small fruit. Raspberries, I think, are more neglected than any other small fruit, and perhaps that is the reason this subject is put upon the program, for this round-up Institute.

Preparation and Cultivation.

There are just a few points that I want to make, that go to make a success in growing them. In the first place, suppose we begin with the preparation of the soil. We would like to have the land made as rich as it may be, before the crop is planted, manuring it thoroughly the year previous, keeping it well cultivated, plowing it early in the spring—as early as it will plow; harrow it immediately and harrow every two or three days after to keep in fine condition. If it is frequently harrowed it holds moisture. We allow no crust to form upon the surface and we aim to put out our plants with the expectation that every one will grow. Usually we make the rows seven feet apart and the plants three and one half apart in the row, and row both ways so that when they are pruned in spring we may cultivate crosswise of the rows about twice before they begin to leaf out. We do this for the purpose of saving work; we want the soil thoroughly well cultivated early in the spring so as to retain all the moisture we possibly can. The first year you may plant some other crop, such as potatoes, for convenience's sake and for economy's sake, as well. The first year when the new canes get about ten or twelve inches high, we pinch off the top; this makes them branch, and that is about the only pruning we do the first season.

Care the Second Season.

Now, when we come to the second season, and the seasons thereafter are simply a repetition of this, the two main points I want to make are, first, the summer pruning, and second, the summer cultivation. We find that the second season, along about the first of June, the first new canes will be about eighteen inches high. We want the main canes to grow two feet high, but when it gets eighteen inches high we will pinch out the tips, and we do it at this time because the cells at the top of the new cane are not fully developed; we find that the cane will grow just about six inches after the top is pinched out, and then we will have it two feet high. You may ask why not wait until it gets two and a half or three feet high and cut it off? The trouble is you would defeat the main object you have in view. In the first place you don't want to cut off any foliage from a growing plant except for special reasons, or on special occasions, but if you take off a lot of foliage from a growing raspberry cane, and will note the results, you will see that that cane stands still—it stops growing for quite a number of days—

and you will see that the remaining leaves on that plant will turn yellow, and that the plant has received a very serious check, which is something we do not want. We want it to grow every day from the time it starts to grow in the spring, until it ripens in the fall. We make our efforts all along this line, and it is with this in view that we pinch off the top when our raspberries get about eighteen inches high, just the terminal bud. Now, it is, we will say, the first of June, and we have two canes about eighteen inches high. Let us take these two canes and treat them, first, as some treat them, and again, in the manner that I will suggest and see the difference in the crop.

Two Methods of Treating Canes.

In the first place we will take this one and do nothing but cultivate it and aim to keep it growing right along. By August or September, it is way up, seven or eight feet high, and a good deal like a buggy whip. Now, then, the other one; let us pinch this bud off and see what that one does. We see in this cane that we simply pinch off the terminal, in the next two inches below the top there are five or six or seven buds. These cells develop, the top of the cane stretches out, and in less than six inches we have five or six branches, something like an umbrella plant—they grow and keep on growing during the summer—we are talking about black raspberries now; so you see the difference between the two canes by this treatment.

Now, let us see what some of the advantages are. All along these branches, of course, we have buds pretty close together. Now, the next spring when our two raspberry canes begin to grow, these buds along this cane grow out eight or ten inches long and at the end of each one there is a little cluster of berries. These others do just the same, only there are a great many more buds and there is a bigger crop. Then this cane, as it stands up through the winter, is exposed to the dry winds of winter, and very likely loses the greater part of its vitality before spring comes. On the other hand this, treated as I suggest, has its strong branches. They do not sway back and forth by the winter's winds. They are not high and therefore are not exposed to much of the winds. Of course they have had the proper summer treatment, and now let us see what that proper summer treatment is.

Summer Treatment.

In the spring you can very readily see when these canes begin to grow that you will have fruit the whole length of these branches, if allowed to grow. But we do not allow them to grow; we prune them in the spring, taking off the end of the branches, then it will stand up without any tying or staking, and will carry itself well throughout the season. Just as early as the ground will work in the spring we go in there with a corn cultivator and cultivate very thoroughly, shallow, of course, but frequently. We induce as rapid and as strong a growth as we possibly can, and as early in the season as possible, and we do this so as to grow big canes. In the summer time most of the people, farmers at least, and in fact the majority of fruit growers, cultivate their raspberries until they begin to ripen, and then they will stop their cultivation. It seems to me that there is where they make a great mistake. Why, if that is right, for the same reason the dairyman would feed his cows first rate until they begin to give milk and then take the feed away from them. You see at that time our raspberry is doing double duty; it is growing new canes for the next year's crop, and it is developing its fruit and at the same time ripening its seed, the greatest work any plant can do. Our practice has been to cultivate at least twice every week during the picking season and sometimes three times a week, so as to force a strong growth at this time. If we do

not do this of course the plant goes on and develops its berries and seed just the same, but it does this at the expense of the new cane; they get a check, stop their growth to a great extent, and then later in the season, when we come to take out the old cane, they start a new growth which does not get ripe. If the growth has been kept right along, the new canes have made a strong growth and will ripen up their wood for winter and will stand a good deal of cold weather and come out in spring in good condition.

As soon as the fruit is picked, we take out the old canes and burn them, and allow the whole strength of the plant to go into the next year's growth, and then you may stop your cultivation and allow the balance of the season for the canes to get ripe. In this way they get a full growth and when the frosts come they are not full of green sap.

DISCUSSION.

Mr. Smith—How many canes would you leave in the hill?

Mr. Coe—In the case of Black Caps, when they are young, they hardly ever grow more canes than they can take care of—three or four canes in the hill—but when the plant begins to get weak and old, then the tendency is to grow weaker canes and more of them. At that time, of course, we want to have new plants to take their places and dig up the old ones. About five years is the usual life of the plant.

Mr. Briggs—Why not mulch instead of cultivating?

Mr. Coe—The object of cultivating is to prevent the weeds growing and hold moisture. Of course the mulch holds moisture, but it holds it just at the surface, and the roots of the plant will go where the moisture is, consequently the roots will be at the top of the soil, and when the dry weather comes, or when it passes through another winter, then our cane suffers in consequence. The trouble with mulching is we always see good results at first, but we do not consider the bad effects of the years following. If I had a raspberry patch and was about to discontinue it, and had the mulch, I would use it; but if I had a plantation I was going to keep year after year I would not use it, because I want the roots down in the soil.

Mr. Tobey—You don't pinch off the red raspberry?

Mr. Coe—That depends upon the variety. The Cuthbert we do pinch off, but as a rule, not the red raspberry.

Mr. Corse—Do you put the new plant right in the same hill?

Mr. Coe—Oh, no. I start in new soil entirely.

Mr. Corse—What kind of an implement do you use for cultivation?

Mr. Coe—The Planet Junior cultivator—it is one of the new ones. It has what they call a rake attachment—a concern made of iron and steel rods, which run behind the cultivator and drags the surface over level; you don't have to cultivate more than half an inch if you don't want to, and with this rake attachment you can gauge it very nicely.

Mr. Scott—Please explain how you trim off in the fall.

Mr. Coe—We do not trim off in the fall, but in the spring; we cut back the branches, half or more. I have been asked how long we should leave the side arms. Well, of course you cannot say fifteen or eighteen inches or two feet, because some canes are very much stronger than others, and are capable of carrying a much larger crop of fruit. The best rule I know is to cut the side branches at the highest point of the bend; that is the point that they begin to drop down towards the ground again. Your strong canes will then have long arms and your weak canes short arms, and in this way you gauge it by the strength of the cane.

A Lady—What do you do with the raspberry borer?

Mr. Coe—We do not do anything. That is one of the hard problems of raspberry growing.

Mr. Kellogg—Does it do anything for you?

Mr. Coe—It does not help us any. I haven't seen any of their work for the last two or three years, but for several years before that, during the dry seasons particularly, we had a great deal of trouble with that insect. I suppose you mean the one that bores little holes along the side of the cane and deposits its eggs. Of course they are out of sight and it is very difficult to get rid of them.

Mr. Loni—What variety of raspberries do you find best for Wisconsin soil?

Mr. Coe—I can name varieties that do best with us; of the black raspberries, the old varieties, Ohio and Palmer and Older do best for us. Of course the differences of climate and of soil make a difference in the best variety to use.

Question—What do you call the first season; the year you set out your plants?

Mr. Coe—Yes.

Question—Do you practice covering for the winter?

Mr. Coe—We do not.

A Member—A year ago last fall I covered mine and last spring I found they were frozen, killed back very badly. What was the cause?

Mr. Coe—That is a difficult question to answer. It was a very dry winter and the soil was very dry, so it would freeze as hard as if exposed to the weather. Where mine stood up through the winter they wintered through and gave us a very nice crop of fruit. I think that if you let them stop growing during the season, and then cut out the old canes and let the whole strength of the root go into the canes, it makes a second growth, and the first frost catches them full of sap, and they fall or winter kill.

A Lady—When do you cut out the old wood?

Mr. Coe—Just as soon as the fruit is picked, and we burn it. That will partly avoid this trouble you have with the borer, because a good many of these insects have not come from the cane at that time, and of course all of them that have not are destroyed.

Mr. Tobey—I believe that three-fourths of the farmers of Wisconsin cannot grow raspberries without giving them winter protection. Mr. Coe has covered the subject very thoroughly, but in my experience in growing raspberries in western Wisconsin, especially black raspberries, we have yet to find two winters where they will go through without being properly protected, and the next Bulletin, No. 11, will treat of that subject. I believe that the farmer should be warned in regard to winter protection. Many farmers will say that if they have to lay down and protect their raspberries, they won't grow them. The fact is, that they can be cared for without any more expense for half an acre than a quarter of an acre. A man and boy will lay down a half acre and give them protection, in a day, easily, and this insures the crop. I think the reason this gentleman's were winter killed was because last season was very dry. On our plantation of many acres a good many were winter killed. There are varieties grown near the lake that will winter kill in three quarters of our state, so that I believe in three quarters of our state we must protect them.

Mr. Loni—In the vicinity of Appleton I have raised raspberries, and I have found that by proper trimming at the proper time of the year, we have been more successful not to lay down either the black raspberry or the blackberry. I know that two or three winters ago I took particular pains with my blackberries and raspberries by laying them down, and the next season I had no crop at all. I believe that we let the cane grow too long, most of us, and that if we will follow Mr. Coe's suggestions, and properly trim, we will have better success.

Mr. Reed—Mr. Tobey, at what time

in the spring do you recommend taking up those that are laid down? We found last spring that many of ours laid too long and when we took them up they had started a growth of about an inch long, with roots about an inch long, and about one-half of our canes were entirely ruined.

Mr. Tobey—We should watch the cane. About the time the new growth starts, just the bud, we uncover, but not until then. Sometimes that is the 10th of April, and sometimes the 20th; it depends upon the season.

Mr. Kellogg—How do you cover them?

Mr. Tobey—We lay down earlier than most farmers, as a rule. Many farmers will put off laying down the raspberries until the last thing. We commence about the first of October to lay down upon the green side; they will bend easier and you can cover them up. We just cover the tops and then after our plantation is all down, we go along and cover them up entirely. When we first lay them down we do not cover them entirely, but the Nemaha, the Older, and the Gregg are entirely covered up, with us.

A Member—What kind of plants would you select in the spring to set out; those that come up the same spring or the year before?

Mr. Coe—The Black Caps, by bending over, that forms a growth of roots that we plant from. There are some sections of this state that are very much colder than some others. I have been told that Sparta is the coldest place in the world.

Mr. Tobey—We don't want that published as true, because it is not.

Mr. Coe—The fact is that the summer treatment has as much to do with the summering and the wintering as the covering in the winter. I am satisfied of that from my twenty years' experience; and moreover I have taken pains to ask questions in different parts of the state where they have covered and where they have cultivated thoroughly and pruned early in the spring. I find the average testimony is in favor of their not being winter protected; that you will get as good growth without winter protection as with it, and that being the case, we may at least afford to experiment along this line. If we find that we grow enough better crops to pay for winter protection, of course we will do it, but if it does not pay, as it certainly does not pay me, we will leave them to stand up. I never have lost a crop yet. I have had some crops cut short, but never have lost a crop by winter killing.

Mr. Kellogg—What is the condition of the canes at the present time after the past winter?

Mr. Coe—I have not been in the field since last fall.

Mr. Kellogg—I was in the field recently, examining these two varieties, of which I have specimens here, and I have also a peach here, cut from the same field, and it seems to me that some of them are dry.

Mr. Coe—The tips of them are dry, but that doesn't make any difference because we cut them off, anyhow; that is in pretty good shape.

The Chairman—How many practice laying down raspberries? One. Now, how many do not practice it? The evidence here seems to be against laying down.

Mr. Kellogg—I want to vote both ways.

Mr. Coe—I want to call your attention to one thing, and that is to a hoe that works easy. We had a hoe years ago, a three cornered hoe, and we like a three-cornered hoe yet, but it has a point on the other end, so when we go to get a hoe we buy a common shaped hoe, and the thinnest and best we can get. After you have your hoe bought, if there is a tin shop in connection with the hardware store, take the hoe into the tin shop

and have the tinsmith cut it in two; he will object, but insist; then draw a line straight, about half an inch from the shank, and the same on the side, and when you have a hoe that shape, have it sharp. When we go into the field to hoe strawberries or any other fruit, we take a file with us, and four or five times a day that hoe is filed, so that it is kept as sharp as a knife. If there are any weeds there it will cut them off very easily, and it will slide through the soil very easily. We can get the weeds out and we can take off the strawberry blossoms when we get ready to do so. I will state this on general principles, that any plant where the foliage is interfered with in the growing season, receives a very serious check, because the roots of the plant take up fertility from the soil, and it goes from the roots through the stalk into the leaf, where it undergoes the chemical changes that make wood growth, the surplus moisture is evaporated and the growth goes from there into the plant, and when we take off a lot of foliage from any plant, it disturbs the balance between the top and the root growth, and our plant receives a very serious check. In the case of the raspberry I have seen it in dry seasons, when we have taken off quite a good deal of cane like this, that the plant will stand still for several days, and the leaves will turn quite yellow before it starts to make growth again. If you simply pinch out the tip, it does not make any check.

Mr. Tobey—Do you ever practice pruning or cutting back red raspberries in the spring, and with what success?

Mr. Coe—We have sometimes, but unless they have made more growth than we think they ought to have, we do not do it.

Mr. Tobey—I will say that in the old country they practice that all the time on the red raspberry, and they claim that they get larger and better fruit.

Mr. Kellogg—Tell us something more about the varieties.

Mr. Coe—The Cuthbert does well with us, but it requires a little more care than some of the other varieties, because it wants to grow very late in the season. We cultivate during the picking time, just the same as we do the Black Caps, to enable us to grow effective fruit. Then we stop cultivation. In the other varieties the Brandywine has given us good results—not that it produces more berries, but it produces nice berries, and a great many.

Now, I suppose you would like to lead up to new varieties. There are two new ones that have been growing for a short time and give promise of very great value—one the Columbian and the other the Louden. They promise to be the most valuable varieties that we have, according to my opinion. The Columbian is of the black cap type, and is the strongest grower of anything I have ever seen in the raspberry line.

Mr. Reed—I want to emphatically object to what Mr. Coe says about the Columbian being a black cap type. It is of a distinctively new species; it has been given out as a cross and is supposed to be a true hybrid, which is supposed by many to be impossible. The Columbian and many others of the new berries are of the hybrid class.

Mr. Kellogg—It is of the black cap type in that it does not sucker from the roots. Both the Shaffer and the Columbian are of this type, and there is no question about their being hybrid. The red raspberries are all of the suckering varieties.

The Institute adjourned to 1:30 o'clock P. M.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. H. A. Briggs in the chair.

APPLE GROWING.

Prof. F. W. TAYLOR, University of Nebraska, Lincoln, Neb.

Mr. Chairman—It seems to me in beginning a talk about apples and apple trees that there are a few questions upon which some of us have wrong ideas, and that it would be well to go back a little further than we usually do to find out just why we run to certain classes or varieties that have been introduced through certain methods being used rather than others. I have some ideas of my own upon this subject which I shall present to you as my own ideas, not as necessarily being right, but simply as drawn from my own observation.

A Dearth of Apples—The Cause.

It seems to me that all over this great central, north central, and western part of the United States we ought to grow bushels of apples, where we now grow single ones, and the reason, which is not a sufficient one, but which is perhaps at the bottom of the whole question more than any other, is that during a certain period of years, some dozen or fifteen years ago, there followed two or three seasons, one after another, which resulted in the death of a large part of the orchards of the country, the individual trees suffering from various conditions which surrounded them at that time. There followed this series of years, another series, during which all sorts of trees were planted, which were recommended for their extreme hardiness as having originated in countries where they grow iron-clads; and so that brings me around to begin with the question of the production of varieties of apples; that is, as to where the varieties come from that we are most likely to find of value through all this section of the country.

An Indigenous Fruit.

To take up the history of the apple, which is the most commonly grown over a wide territory and which may be kept during practically the entire year which is true of scarcely any other fruit, this history has been something like this, as near as we are able to tell: From some wild form, which no botanist has been able to certainly tell us, there have come the present sorts that we have. In each country into which you may travel you will find a different assortment of apples; you find, in fact, those divisions which always go back of varieties, and there have often been ideas advanced that from certain sections there could be transferred varieties which have grown up there and which might be taken long distances to some other section and there find a home which in every way would be suited to them. The fact is, as far as my observation has gone, that into whatever country you go, you find that the apples grown there have originated practically where they are now grown. This is not strictly true enough so that it may be said to be a fact which is never other than true, but in a general sense the apples grown in any neighborhood are those which have originated not far from the neighbor-

hood in which they are now grown. Thus it has come about that each section of the country into which you may go, each state in our own union, each natural division in almost any other country have the same varieties of apples that have grown up in that immediate neighborhood, and which are suited to the conditions there, and it is to this feature of the growth and origin, and particularly of the development of the apple, that I wish to call your attention, and which I would emphasize. I know that this statement is squarely opposite to the generally received opinion, and I know just as well as you do down in your hearts, that it is true that the generally received opinions on many of these questions are not based on scientific or practical facts. You know, in your own experience, that there are many things which are taken for true that will not bear investigation, and I am quite sure that this is one of them.

A Mistaken Idea.

Now, to be specific. There were introduced into this country and have been disseminated all over it at the time of which I speak, some fifteen years ago, a lot of varieties of apples which would, it was claimed, take the place of those which had proven not sufficiently hardy to go through the severe series of winters of which I have spoken. These were of two different classes; they were those which were said to have been originated further north than this, and consequently would be very hardy here, and those which were brought from countries far distant from this, including eastern Europe. It was said of these apples, when they were brought here and introduced in Wisconsin, Minnesota, Iowa, and Illinois, and other western states that they had originated under conditions which would make them undoubtedly valuable here, and so they were planted, and over almost that entire territory in which they were planted there has been a vast amount of failure and loss, and a great deal of disappointment. There has been brought about a belief with many people that there are no varieties of apples which may be successfully grown here. It seems to me that more of that trouble than any other comes from having done this thing which is unscientific and impractical, tne bringing trees from some distant climatic and soil conditions and attempting to introduce them to our own conditions with the expectation that they are going to be a great success.

Study Climatic Conditions.

Those of you who have grown any apples have no doubt observed the great failure of which I speak, and there is a proposition connected with this which I wish to make, and which I think will perhaps surprise you, but which, if you will study into it, you will find is true. It is this, that this commonly accepted idea or belief that if you go to a certain district, say in the extreme north, and procure there certain varieties of plants, and take them along way south, that they will not only be hardy, but they will be much more hardy than if they stayed in their own neighborhood. The point that I wish to make is this, that the opposite is as likely to be true, as that; that in general you are as little likely to find that tree which is hardy in a certain locality is necessarily hardy five hundred miles south of that, as that it is hardy five hundred miles north. That tree which is exactly adapted to stand the climatic conditions here will not be any more likely to stand the conditions in Arkansas or Kentucky or some other point five hundred miles south than to take it five hundred miles north, for hardiness is a comparative thing; hardiness in one locality does not in-

dicate that the same thing will stand other conditions than those it has to stand here, even though they seem to be much lighter.

Select Varieties Carefully.

The accepted idea is that the conditions of heat are not as hard to withstand as those of cold, that the tree which is inured to considerable cold will stand an unlimited amount of heat; and just here comes in the fallacy of the whole question of transferring apple varieties which have become used through generations to one condition of things, to another place where they will be subjected to different conditions. That this is true you have only to go to your own experience to find out, if you have ever tried bringing trees from the north, south, or from the south, north. So I have come to believe that if you send trees of a certain variety which are known to be hardy there from Alabama, that the trees which you bring from Alabama are just as likely to succeed here as will those that you send from Hudson's Bay, or equally far north. So I think we ought to start out on the selection of orchards with the idea that we cannot go into any country on the face of the earth and bring plants here with the idea that we are doing anything but carrying on an Experiment Station, and it is not safe or economical, or money making, for the average farmer to do very much in experimental work. If he is what he ought to be, he is studying, he is watching things which he grows, whether livestock or trees, with the idea of learning how he might better their conditions, but in general, he does not want to set apart a portion of his farm to carry on experiments. In each state in the union there is a station which receives a considerable sum of money from the United States for that work, and when we go to any distant place and bring in varieties of trees or fruits, or corn, or grain, we should expect these stations to do the experimenting, and we should be extremely careful how we give up very much ground to it. The serious thing about experimenting with the apple is that you are doing something that is going to take years to carry out. If you plant apple trees today, which are two or three, or four years of age, it is going to be five or ten years before you have even a fair idea how they are going to succeed, unless they die, which in many cases will be better for you.

"Be Sure You're Right—Then Go Ahead."

So it comes about that in the suggestion as to varieties to plant in any section, my experience has all been, and my advice always is, to select those sorts which are absolutely known to come the nearest to supplying the best quality of marketable fruit if you are raising for the market, which you know can be grown in your own neighborhood, or under conditions which you think must be much the same as yours. It seems to me this is so important that in planting an orchard I would never plant a single tree, except as I planted it with the distinct idea that it was an experiment, except such sorts as have actually produced crops of fruit for a series of years in the sections where I was planting. This, of course, unless I were in a new country where I had nothing to guide me. I feel today, that if fifteen years ago instead of trying to drop all of the old sorts which had done well for a quarter or half a century, and which all at once through an unusual series of conditions, failed you, instead of trying to replace those with others which you believed were going to be a panacea for all the trials with which the apple grower is tried, instead of dropping those and taking up others you knew nothing of, you had continued from

the old sorts, selecting seedlings from them, to experiment with, that you would have been much further along than you are now. And that brings me to say a few words upon the subject of seedlings.

My Idea of Seedlings.

There is so widespread an error in regard to the hardiness and value of seedlings, that I wish to make some very emphatic statements regarding them, in order that you may get into your minds the uselessness of depending in any way on producing fruit from seeds. The apples which we grow, the varieties which are in our orchards, are not of the different kinds and shapes which we grow from the seed. We all understand that if we plant seeds from any certain varieties they produce something, we know not what, but they differ from the fruit the seed came from, and in nine hundred and ninety-nine cases or more out of a thousand, they are inferior in quality to the parent. The fact is that the grafted fruits that we have are simply selected seedlings. The grafted varieties are generally very much more hardy than are seedlings, for they are seedlings selected for hardiness, as well as quality. If you plant a thousand seeds from any of the hardy varieties of apples, you will be surprised to know that nearly every one of those will be much less hardy than the parent. Sometimes people say, "If we could only get varieties as hardy as the seedlings that used to grow in my father's orchard, what a splendid thing it would be." Well, it would be, if the majority of the seedlings that grew in your father's orchard were hardy, but they were not. The chances are that the varieties of apples grown today are better than they have ever been before, and so it is about orchards with regard to hardiness. The fact is that the seedlings are much less hardy than those which are propagated by grafting. The varieties that we use for propagating are those that have been selected for peculiar hardiness as well as other superior qualities, and they are much hardier than the average seedlings. I have known people who have planted entire orchards of seedlings on the supposition that they were getting something that would be hardy, even if they produced something a little lower in quality. This is absolutely false, as any man who ever planted any apple seeds and watched the result of the seedlings produced from them, knows. In my own case I have planted bushels of seeds in a mercantile way for the producing of seedlings upon which to graft, and wherever they have stood out for a year or two through severe winters, there has always been a very large and severe loss because many of them were unable to withstand the rigors of the winter, while the grafted sort, which had grown for the same length of time, were perfectly hardy and able to stand for themselves.

Now, it always seems to me in speaking upon any subject of this kind that it is better just to make a few general statements and remarks and then to find out from some of you what you are particularly interested in hearing, and what you wish to know about it, and so I will wait for questions.

DISCUSSION.

Mr. Kellogg—We are troubled very much with fire blight in our orchards, and during the past year it has come into our nurseries. Will you tell us what are the causes and what is the prevention, and if it is contagious?

Prof. Taylor—I think there is no question but that it is contagious. In my own experience in growing trees in the nursery, I have found that cer-

tain varieties are very much addicted to the blight, and I think that we know that our Russian varieties are particularly subject to it in this country. In Russia they do not seem to be, but there is a case of a variety of trees which are quite hardy in their own country, which is further north than this, which, when brought here, have proved very weak in many respects. They are not very good in quality, but leaving that out, one of the respects in which the trees from Russia and eastern Europe are weakest is in their being so extremely subject to this fire blight. I do not know that there is anything that can be said to be a cure, or to even palliate it. The only thing that I know of that can be done, is to cut off and burn all the blighted parts as fast as they appear, so that there may be no spores blowing from one tree to another. In certain years it is very troublesome in the nursery, attacking certain varieties of our own American sorts, all the so-called Siberian crabs are affected with it, and the larger proportion of the Russian apples. As the trees get older they seem to be less subject, but to answer the question as to whether there is any cure, I don't know of anything, except to cut out the affected parts as fast as they appear. Do you know of anything else, Mr. Kellogg?

Mr. Kellogg—No, sir, and I don't know that that will do it.

Prof. Taylor—That is simply to cut down the probability of infection, and it kills the spores that you get at, but they are produced in such immense quantities, that a few hundred millions, more or less, do not cut down the number very much.

Mr. Kellogg—How can we tell the fire blight?

Prof. Taylor—It comes along towards the latter part of the summer usually, and the leaves on the ends of the new growth begin to look as if they had been held over a fire; that is, they turn red, look as if they had been burned, appear just as they would if in killing caterpillars you applied the torch and it flashed up and burned the leaves.

Mr. Kellogg—It came on last year in May. It doesn't often come in dry seasons, does it?

Prof. Taylor—In my experience it seemed to me that it was much more likely to show itself in very hot weather, following heavy rains; when there have been soaking rains and everything as wet as can be, and the sun comes out strong, it seemed to make it develop.

Mr. Kellogg—Are there any Russian varieties free from blight in this country?

Prof. Taylor—Well, my experience with Russian varieties has been so unsatisfactory that I hardly like to speak of it. I planted quite a number of them when they were first brought to this country by the horticulturist of the Iowa Station, some eighteen years ago, and those are all dead from the blight or worthless in quality. I don't know of any of them which I should consider free from it, but I wouldn't care to make a statement that there were none of them so because my observation is rather limited with them.

Mr. Edwards—What time would you recommend trimming apple trees?

Prof. Taylor—The best answer I ever heard to that question was one I once heard given when I was a boy, by an old gentleman. He said, "Whenever you have a sharp knife." My impression is that when you prune, when the limbs are small, as they ought to be, any time you have a sharp knife is the proper time to do it, but it should be done at the very earliest moment possible; that is, you ought not to cut off a limb as large as a man's arm, any more than you would amputate a limb from an animal, for it is just about as hard on

the constitution. Indeed it is even worse to remove the limb of a tree than that of an animal because of the recuperative power in the animal through its circulation. Nothing should be cut off but the small limbs, and that can be done almost any time of year.

Mr. Kellogg—Supposing it was necessary or expedient, however, to cut off a limb as big as your arm, when would you do it?

Prof. Taylor—As early as you can in the winter, I am inclined to think, is as good as later.

Mr. Kellogg—Would you apply any dressing?

Prof. Taylor—It is desirable to put something on in the way of grafting wax, or something which does not have lead in it; no lead paint. It is desirable to cover it up, because it hinders the decay which would otherwise set in immediately.

A Member—How is shellac for covering?

Prof. Taylor—That is all right—anything that will last a good while, because you are apt to forget it next year, and there is nothing to hinder the place from rotting as soon as the shellac or oil, or whatever it is, is dried up. I am not sure that lead is injurious, but I have so often heard the statement made that it was, that I think perhaps it is safer not to use it.

A Member—Which is the best place to plant an orchard, on a level piece of land or on a slope, and which way; is it best to have any hedge row of trees around it?

Prof. Taylor—That brings up two or three important questions—the location of the orchard, windbreaks, etc. I think that generally speaking it is an accepted idea, and my own observation bears it out, that level ground is better than a southerly slope, and that the best of all locations is one that slopes at least a little towards the north. The reason for that is apparent. The injury which comes to our trees is almost invariably not from the severe freezing, but is the result of extreme variations in the temperature. Take a day like this, when it is thawing considerably in the sun, and last night was pretty cold and tonight may also be very cold. The south side of the trunk of a tree is very likely to get a good deal of the freezing and thawing on the south side of the trunk, and any location of the orchard or any protection of the trunk which will do away with that exposure to the sun the middle of the day is extremely desirable.

Mr. Kellogg—What protection would you give the tree, and when?

Prof. Taylor—Through the entire winter some protection is very desirable. The reason that the north slope is better is because the direct rays of the sun are less liable to strike the trees and as they get larger they protect one another. The most practical protection I have seen is to take two thin boards, perhaps three or four inches wide, nail them together, in the shape of a "V," and set them up to the height of the first limbs on the trees, maybe three or three and a half or four feet on the south side of the tree. Take a single wire nail and drive it through one of the boards, near the top into the tree; that will hold it, and it will be absolute protection from the sun. Many people make a lath screen to reach around the tree, which answers the double purpose of protection from the sun and from mice or rabbits. That is very nice, but it requires more watchfulness for fear that it may girdle the tree. I do not like tarred paper or any sort of paper, because it makes a harbor for insects in the winter, and it also shuts out the air.

Mr. Hill—Tarred paper will kill a tree if it is left on it during the growing season.

Prof. Taylor—Now, about the windbreak. There is another point on which the majority of opinion is wrong. The fact is that much more damage is done by the south winds than by the west winds. I should put a windbreak on one side only and that would be on the south, because the hot summer winds come from that direction, and the temperature in spring rises through the day and gets hotter than it ought to be sometimes; the winds from the south are the ones that cause injury. I consider a south windbreak desirable, providing you do not let it get too large so that it stops the circulation of air. I think a great deal more damage is done in general by windbreaks, than good.

Mr. Kellogg—I wish to protest against the Professor's recommending the Alabama Duchess for Wisconsin.

Prof. Taylor—I did not; what I said was that I would as soon have them grown in Alabama as from Hudson's Bay. I said that it was equally as risky to bring them from the far north as from the far south.

Mr. Reed—Would you advise planting an apple tree five years old?

Prof. Taylor—No, I would not. My own choice for an apple tree would be one not to exceed two years of age. I would wish that it be a simple whip, just a straight tree. It ought to be four or five feet in height at that age, without any branches; then you can form the top just exactly where you want it. I think the most successful orchard growers plant at about two years.

Mr. Reed—Is it also a fact that trees planted so that the tops will be two or three feet from the ground, make the best style of tree?

Prof. Taylor—Yes, I would want three feet to be about the minimum, because the top tends to get lower rather than higher. Of course, you know that as the branches increase in diameter, they grow downward as well as upward, and so the top is apt to get close to the ground.

Mr. Kellogg—Are there any five Russian apples that are good for anything in Nebraska?

Prof. Taylor—Well, the Yellow Transparent is the best, I think. It blights very badly in certain years, but, as it gets older, it seems to get away from that bad habit, so that if it lives until it is six or eight years old, it seems to survive, so that we consider that a very valuable thing for an extremely early summer apple.

Mr. Kellogg—Will you name five of the best Russians that you know of for the Northwest?

Prof. Taylor—To do so might leave me in the position of recommending them for general planting, and I should not do that unless I wished to include them with perhaps fifteen varieties of American sorts. I do not know of any five Russian varieties that I should want to plant ahead of any five, ten, or fifteen American sorts.

Mr. Kellogg—Do you know of five American sorts to recommend for the northwest—anywhere in this state—the northern portion of it?

Prof. Taylor—I do not think I should want to make up a list for the northern portion of Wisconsin at all. I do not know enough about it.

A Member—What do you consider the best kind of graft?

Prof. Taylor—I believe in piece root grafting, using a very long cion and a short root, so that the tree is practically a cutting growing on its own root.

Mr. Boynton—We find some of our most valuable orchards are protected by evergreen belts on two sides, some on one side. In Minnesota they say that the most successful orchards are also protected on the north and west sides. We find it does not cut off the circulation that is necessary, unless

allowed to grow very high, while the protection of that belt serves to keep the wind from blowing the young apples off.

Prof. Taylor—Do the winds come from the north that blow the apples off?

Mr. Boynton—No, from the west and southwest.

Prof. Taylor—We were speaking of that question before, and I said that in general my observation was that the south wind did the damage. A very low windbreak on the north at some distance may not be any injury, but I have never been able to see that it was of any direct use.

Mr. Hyatt—I would like to sustain the speaker in regard to the north slope. My observation for fifteen years has been directed to that matter, and by all odds the best orchards in Sheboygan county today are on a very steep northern slope.

Mr. Kellogg—What is the best time to prune nursery trees to promote a healthy growth and prevent blackheart?

Prof. Taylor—I do not think there is danger of blackheart unless you let the limbs grow to a considerable size. A man can do the heavy part of the pruning by simply rubbing off the buds as they begin forming limbs.

Mr. Kellogg—Are there any sort of Russian crabs or small fruits that will do for the northwest?

Prof. Taylor—I believe that the Russian cherries will prove of very great value all over the northwest, but it should be understood that they are all short lived. I never saw any that did not begin to show signs of death after they were planted ten years, but by replanting and remembering that they are short lived, I believe that they can be made of great value. I do not know of any native Russian grapes. The plums in my own experience have proven of little value. Our own native plums and the crosses from them are best for this section of the country.

Mr. Coe—Will you name for us the two Russian cherries most likely to prove valuable?

Prof. Taylor—I am not able to give any names that are reliable for those Russian cherries. The fact is that in Vladimir and Moscow where they grow the most of them, they are grown under the general name of Vladimir cherries. There are many different varieties of them. We have a black cherry which is called the Vladimir, which is one of the best there is, but if you should send to some nursery for Russian varieties, you might get a Vladimir that is very different. I do not know of any that we could depend upon getting by name.

Mr. Alsmeyer—If you had some of these old varieties of seedlings in your orchard, would you go to work and graft them, or would you grub them out—trees that in some cases are fifty years old?

Prof. Taylor—If I had some that were hardy in the trunk and seemed to be healthy, but produced poor fruit, I would top graft them with such varieties as do well in this country.

Mr. Kellogg—We are troubled with the flat-headed borer in apple trees. When does it get in, and how can we prevent it from getting there?

Prof. Taylor—It usually comes along in the summer time, and the direct cause of its coming in, I think, is sun scald on the south side of the body of the apple tree, resulting from the extreme variations in temperature. I think that the borer comes into a diseased tree one hundred times, where the diseased tree results from the coming of the borer once; the wrapping of the tree will help to keep out the borer.

Mr. Kellogg—My observation is that it comes in the first summer it

is planted, and the tree should be protected that first summer.

Mr. Convey—Do you recommend mulching apple trees? It is a common practice to mulch for the purpose of delaying the development of the tree, at least that is the common impression of the result.

Prof. Taylor—I know it is. The difference in the time of blossoming between a tree mulched and one not mulched is about fifteen minutes.

Mr. Hayes—Wouldn't you take the wrapping off and whitewash your tree, or wash it with something in the spring?

Mr. Kellogg—I wouldn't have a wrapping; I would have a lath screen that would let in plenty of air.

Mr. Hayes—Don't you think it is a good plan to take strong lye and wash your tree every spring?

Mr. Kellogg—You don't want the borers in there at all; you want to shade your tree and they don't work in the shade.

Mr. Boynton—Isn't it a common error to overfeed an apple tree with barnyard manure and isn't it just as necessary to feed an apple tree as a beef animal?

Prof. Taylor—Well, to a certain extent that is true, but with orchards planted on fairly good ground, the tree will pretty nearly take care of itself until it comes time to fertilize for the fruit. I think it is a mistake to push the growth too hard.

Mr. Boynton—We find it a good thing to apply ashes or other forms of potash.

A Member—How far apart should apple trees be planted?

Prof. Taylor—Most orchardists are following the plan of very close planting with the idea that a man will retain his senses in such a condition that when it comes time to cut out trees he will do it, but a good many men refuse to plant their trees thick, because they think they will not have nerve enough to thin them out; they even plant them thirty or forty feet apart. If you have the nerve, I should plant the trees not more than fifteen feet apart each way, cutting out the north and south alternate rows when they first come into bearing, and then cutting out the alternate east and west rows. I think all of the largest orchardists are adopting that policy now.

Mr. Edwards—Why is not rye straw good for protecting your trees, set up around the tree and tied?

Prof. Taylor—It answers fairly well; anything that will make it hard work for the mice is a good thing, but I am afraid the mice will get into straw, in most cases.

A Member—What was the cause of the failure of apple trees some years ago of which you spoke?

Prof. Taylor—The trees froze to death, not because it was so extremely cold, but because of the lack of water in the ground during the winter. There is nothing so absolutely necessary to a tree as water. A dry season is very hard on them.

Mr. Kellogg—This discussion would discourage the boys and girls from planting apple seed. The facts are that Wisconsin has produced some of the finest seedling apples in the United States. Wolf River, that took the two $10.00 prizes at New Orleans in competition with the world, is proof of its value and a living monument to William A. Springer, of Fremont, Wis., more lasting than granite or marble. This variety is catalogued by the best nurseries in the United States and Canada. Among those originating in Wisconsin, I will only mention, beside Wolf River, N. W. Greening, Newell, McMahan, Windsor, Avista, Eureka, Sweet Russet; there are twenty others that are claiming our attention, all very promising.

The boy or girl who will save the seeds of hardy varieties of apples and crabs will produce a better class of

seedlings than come from the cider-mills of our country. Of course, no one can expect to meet with best results every time but this planting seeds and growing trees will induce a love for horticulture and many a home will have plenty of fruit, when if they wait for the purchase of trees, they will go without. In my Institute work I have disseminated hardy seeds and I would advise every farmer's boy and girl to grow fruit tree seeds, learn how to graft and bud and transplant successfully, and become interested in horticulture.

There are a few things necessary to best success in apple growing in Wisconsin: First, high ground, clay soil, northern slope; second, varieties adapted to the climate and location, and trees grown the nearest where they are to be planted; third, formation of top, no sharp crotches, limbs six inches apart, one central trunk with branches at right angles; fourth, protection to the bodies summer and winter,—woven lath with wire, rye straw, anything to keep the sun off and the borers out, good mulch, clean cultivation, sow to buckwheat.

APPLE CULTURE AS A BUSINESS.

A. L. HATCH, Ithaca, Wis.

HOME OF A. L. HATCH.

There are enough apple trees grown successfully to show where the best sites and soils are found in southern and eastern Wisconsin. Thousands of carloads of apples not produced in our state, but consumed each year by our people, and our nearness to the fruitless north and

northwest, both show that we need not worry about paying markets. The question then of success in apple culture hinges upon growing and managing the orchard properly. There are some large orchards in Wisconsin, but scarcely one of them is a real business orchard, founded upon correct business principles. They contain too many varieties, altogether too many sorts, as a rule.

The Business Orchard.

This is a very different affair from the home orchard. While a man may consult his fancy in growing many or all varieties for his own use, such a course would make succotash of the whole matter as a business enterprise. From a business standpoint but few kinds should be grown, and these always in large quantities. To grow small lots of many sorts and expect good profits, is to expect profit from hash. Not only will the market take and pay better for good quantities of a few kinds, but the grower himself will learn the peculiarities of each kind and be better able to give them the kind of care each needs. Each sort has its individual traits, and no man can learn those of many sorts as easily as those of a few. The aim of the grower should be to secure perfection and superior excellence for whatever he grows. Let it be written in letters of gold, "Anything well grown is half sold."

Starting an Orchard.

There is no waiting in the business orchard. The orchard grows to the farmer; he does not invest in it, he does not buy into it, he simply starts right and then goes right along with his farming, and in a few years the orchard is there and he scarcely realizes that it has cost anything, provided it is done right. Let him devote ten, twenty, or more acres to the orchard and then he can buy the trees at the lowest rates. Let them be planted thirty feet apart each way, about fifty trees per acre. This will reduce the cost to about five dollars per acre for the trees. After the trees are planted the farmer crops the ground just the same as if he had no trees, giving preference in rotation to such crops as potatoes, peas, beans and clover, and in a way to increase the fertility of the land from year to year. Always give culture around the trees in April, May and June, but not after July 1st. In five years the trees should be worth two dollars each, and bear fruit. In ten years the trees will capitalize for five dollars each for the fruit they will bear. In this way ten dollars of value per acre can be grown into the orchard each year and still give the use of the land for other crops. There are many Wisconsin farmers having excellent apple orchard lands, teams, tools, and implements to farm with, who could in this way grow into wealth by means of the apple. And why not do it? They will farm the land anyway, and surely there is no other business way of making so much from so slight an investment.

Give the Trees Plenty of Room.

Thirty feet each way is near enough for trees in the apple orchard, and yet it is the universal custom to plant much closer under the mistaken notion that trees closely planted protect each other. This winter I measured two farm orchards of about two acres each and then took an inventory of the fruit trees, forest trees, buildings, etc. I then computed the necessary land required and found that it was overplanted three times—that there were three trees where there was room for only one. Such overplanting is quite as absurd as it would be for a dairyman to put three calves into a stall but three feet wide and keep them there until they became cows. I suppose it could be done, but I think the cows would be rather flat-sided specimens. And yet

we expect trees to thrive under forest trees forty feet high, or crowded with two others of their own kind that at twenty years will have a spread of top twenty to twenty-five feet across. If you want a good orchard let each tree have 900 square feet of room. On trees so situated I have had from three to five barrels of splendid apples per tree this last season, while some crowded trees have failed to produce a half barrel per tree of good apples for the last five years. The young orchardist may plant closely, but the old orchardist always gives more room.

Will it Pay?

Yes. Although my orchard is very far from being a business orchard such as I would now plant, it has always been a paying business upon my farm. How have I made it so? Even this last season of hard times, overproduction, and low prices, it paid me several hundred dollars clear money, and now it is established I cannot see how it can possibly bankrupt me as the principal expense about it is harvesting. Surely no man ever was bankrupted in Wisconsin by the cost of merely harvesting a good crop.

To make it pay I have always tried to grow good crops and one thing that has greatly assisted me in that is judicious pruning. By doing that in the spring before the sap starts I thin the coming crop and secure a vigor that is necessary to each tree to help it grow good apples. Where I cannot cultivate this has been a great help. Of course I spray and fight insects, but I go very slow in the use of animal manures, always preferring wood ashes as a top dressing. Although I am not favorably situated for shipping, I have for many years found profitable sales in the great city markets of Chicago, Milwaukee, St. Paul and Minneapolis. This last year all our shipments were to Minnesota.

Co-operation with my neighbors, especially this last season, has helped me very much. By joining together we were able to secure our apple barrels at five cents better prices than heretofore, for each barrel. On the 2,500 barrels we all used, this amounted to $125. Then we shipped only in car loads and made another saving to us all of about $600 above what it would have cost if we had shipped in less than carloads. In this way we saved on those two items over $700, of which my share was $300. In other words, on the eleven carloads shipped for myself and neighbors, my neighbors were worth $300 to me, and I was worth $400 to them on account of this co-operation.

But we did not ship all our apples. We picked, stored, cured, sorted and packed nicely a good many barrels, including our Snow apples, and others that were good keepers, and sold them at home during the last of October, at better prices than outside apples brought, and that, too, with good satisfaction to our customers.

A Few Words About Varieties.

Of over eighty varieties of Russian apples, and twenty-five or more American apples grown by me in the last twenty-five years, there are many paying kinds that can be safely planted in the business orchard. One of my favorites is the McMahan, not only on account of its superior hardiness, standing at the very front in that respect, but because it makes a large, strong tree in the orchard not easily broken by its loads of fruit, indeed it is very near a model for strength and stoutness. It is a splendid apple in the market and brings good prices. The Lubsk Queen is so beautiful that it has always sold for about double that of any other apple of its season. Last summer some sent to Minneapolis sold for $4.50 per barrel. In one car of 170 barrels there were ten barrels of them and they

made prompt sale of the whole at an advance of $25.50 for the car load. In other words they were worth just as much as the finest Duchess and $2.55 per barrel more.

In the orchard my trees are hardy, handsome, and productive, and I believe in the Lubsk Queen as well as the McMahan for the business orchard.

A Valuable Combination.

If I wanted to make a combination of three kinds to grow the greatest amount of fruit in the first ten years from planting, I would take Yellow Transparent, Longfield and Wealthy. They will not only all bear young, but keep persistently at it, and if properly handled there is money in them.

To the long headed business man there is a world of splendid possibilities in the top grafted orchard. For this use I know of no tree so promising of good results as the Switzer. It is a fine grower and very vigorous tree in the orchard. It is to be grown from five to ten years and then changed to produce such varieties as Northern Spy, Newton Pippin, Spitzenberg, etc., those finest quality apples of all known. The vigor and strength of the Switzer tree would improve these apples in maturity, quality and size, and also make them more productive, hardy, and profitable.

The Apple a Northern Fruit.

The apple is a northern fruit, and does not thrive so well in the south. I believe that for money making there are many places in Wisconsin where the apple is a surer, better investment than any other business, and second to few other regions in the United States. In these views I commend to your consideration the business orchard in Wisconsin.

SWINE FOR PROFIT.

C. H. EVERETT, Beloit, Wis.

Ladies and Gentlemen:—Supt. McKerrow said to me only a little while ago that I would have to take Mr. Wylie's place on this program and discuss this subject, and be brief. I will do the best I can.

This subject of swine husbandry is one that I am interested in. I presume that you are, to a large extent. I like the business, because I have been able to make some money out of the hog, and that is what we are after.

Value of Breed.

I early discovered, too, that a well bred hog would feed at a greater profit than would one with little or no breeding; that he was better fitted for the use that we intend to make of him, and that his powers of digestion and assimilation seem to be stronger; he made more meat from the food that we gave him, and therefore was kept at greater profit. Accordingly I have kept nothing but pure bred stock on the farm, simply because I can keep them cheaper. It costs a little more to start, but after you have started with pure bred stock, the expense is less.

I will not stop to discuss the good points of the hog in particular, because it is not necessary,—or to talk to you particularly about breeding, but more especially about the good

qualities of the brood sow and her care. I will say, however, that there are some points that we should look to.

I like a hog that resembles this one upon the chart—that is my kind of a hog—the kind that I keep; and I keep him because I like that breed better than any other. Of course we want a hog that has lots of vitality, plenty of heart room, broad and straight on the back, short legs, and well up on his feet.

Another valuable characteristic is that she should be a good milker, and this is perhaps the most valuable of all the good points of a brood sow.

Too Much Corn.

As a class I think that we feed too much corn to swine. It is the cheapest food that we produce upon the farm; we are liable to have large crops of it, and it is very convenient to shovel it over to the hogs. Men come to me looking for breeding

HOME OF C. H. EVERETT.

The Brood Sow.

Now, the kind of a brood sow that is best adapted to the farmer's use. I like matured dams to breed from, from one year up to five or six years of age. Whenever we find a sow that has the valuable characteristics of a good breeder, we keep her upon the farm as long as she continues to pay as a breeder. In the first place she should be a uniform breeder as to numbers in the litter and as to the size of the pigs. That is of very great importance; a brood sow that brings forth two pigs at a litter, and then again twelve, and they are uneven in size, has but little value.

stock, and they say, "My hogs look well—I like them first rate, but the bone is too fine. You fellows are spoiling these animals by breeding them too fine. When my hogs weigh 200 to 250 pounds, they become crippled and drag their hind parts—they can't stand up." I know at once that the man does not understand the business of hog breeding; he is not an intelligent feeder. He has not stopped to consider that the hog from birth up to whatever age he has arrived at, has been built out of what that man has given him. This fine bone, this crippled condition of the hog has been made because the foods were not

rich in bone element; because, in other words, they were fed too much corn. The food that makes plenty of fat and makes it cheap, makes heat and energy. The bone is largely made of those foods that contain protein and nitrogenous elements. You must consider that this sow is to bring forth this litter of young that are composed very largely of lean meat, and that she must be fed with that in view. To feed her corn will be very unwise feeding, because corn will not make bone or muscle, when fed to excess.

We feed our sows throughout the winter, protein food very largely, that is, considerable skim milk, which is one of the best, and wheat shorts. We feed a slop made of wheat shorts, skim milk, sometimes oats and pea meal and skim milk, and if we do not have all the milk we want, we use water; we feed whole oats, scattering them over the floor, or on the clean earth, so she will pick them up slowly and thoroughly masticate them and at the same time take exercise, which is essential to all breeding stock. We feed corn once a day, a good liberal feed. We have no fear of their becoming too fat, because we feed all the protein food they will eat. I think there is a difference between a hog in good breeding flesh, and a fat hog, so that, while we try to keep them in good flesh, they will not be too fat—the meat will be good quality. We sometimes feed clover hay, one or two feeds a week. Run it through the feed cutter, cut it fine, put it in a barrel, soak it a little while with hot water, and then add some meal and skim milk, and they eat it up clean. We feed a few roots in the winter and our sows are fed to keep them in good growing condition.

Care at Farrowing Time.

I believe that more men fall down at the farrowing period of the industry than any other. We come in contact with the udder of the cow every day, because we milk her twice a day, and we very quickly know when there is cake there, and that it must be looked after; and we know, first, that we must take the food away from the cow, we must lighten up on her ration, the food that makes the milk, and we must go to work and get the cake out of that udder. But how many of us come in contact with the udder of the brood sow four or five years old that may be just as heavy a milker as this cow—the udder may frequently drag on the ground; there is a big litter, and about the only idea we seem to have is that we must hurry up and promote the flow of milk, so that the little pigs may have all they want. I have known a litter of pigs to die, simply of starvation, because no attention has been given to this matter of the caked udder and the sow has lost the udder. It will pay every one of us to give this matter attention, and to look to this udder; if she is an old sow to be very particular about it, for she may be a heavy milker, and there is just as much difference in the milking ability of two sows as there is between a heifer and an old cow. There is often more milk at that time than the little pigs can take care of, and instead of crowding her with food we should let her run for two or three, or four days. At that time it may be well to give her a drink of water slightly warm, once in a while, because of her feverish condition, but beyond that I would not feed her. Usually most of the pigs upon our farm are born in May and in September, and we turn the brood sows out into a wood lot used for that purpose; they bring forth their young, and whenever we miss one of the sows at feeding time we go up the pasture and find her, because we are interested very much, and we make sure that everything is all right, and

then we steal quietly away from her and leave her alone until she comes along with the little fellows trotting behind her; then we know she is all right, that the pigs are taking all the milk from her that they need, and she has come up for something to eat. If this cake comes to the udder and the little pigs attempt to suckle, it hurts the udder, and she jumps up and gets away from them. Again, such milk is not good for the little pigs; it is not so healthy, so we feed them very carefully at first, not all they will eat, but gradually increase the food until we get them on full feed.

The Litter of Pigs.

Then we want to teach the little pigs to eat as young as possible, so we have some little shallow troughs; sometimes we use old tin pans which the good wife has discarded, and place them where the little pigs can get under the fence and feed out of them; they come upon these pans of skim milk accidentally, and when they have tasted it they are all right. If you wait for the pigs to eat from the trough where the mother eats, they may be nearly old enough to wean before they can eat from the large trough. We keep an old broom handy, and with a pail of water these troughs may be cleaned out very quickly. After they begin to eat we crowd these pigs—give them all they will eat. Never let any animal upon the farm that you are feeding lose a pound of flesh. If you let them shrink back and lose a pound it costs two prices to put it on again.

Our Hog Pens.

One word now about the use of the hog pen, and I will stop. A great many of you may have permanent hog houses upon your farms, nice expensive hog pens, and if you have, my only advice would be to make the best use you can of them, but those of you who anticipate building, and are thinking of building large ones, my advice would be not to do it, and I am giving that advice from the experience I have had. I know that if you are a breeder a nice hog pen is an ornament—a nice thing into which you can take prospective buyers, etc., to show off your swine, but it is not necessary to have one in order to raise just as good swine. There are some advantages in large, permanent hog houses, and some disadvantages. It is difficult to get sunshine, and you cannot get swine enough in there to warm up, and the pigs farrowed in such a pen will pile up, and if they are suckling the old sow who is a heavy milker, they become excessively fat and die with the thumps. Then, again, the floors and the soil under such pens become more or less diseased and foul, because you cannot get the sunlight in there to prevent it, and besides that, there is a great waste of fertility, besides having conditions that are not altogether healthy. Now, if you have several portable pens that you can put in the pasture in the spring, and back in your yards in the winter, and then the next year onto another pasture and plow up the old one, in that way you have conditions that are more healthy, and you get the benefit of the fertility. I find that it pays me to save that fertility and keep my swine healthy. The portable pen that I use is used by many men in this state and in many other states that I know of. I met Mr. Lovejoy, who is a large breeder of Berkshires in Winnebago Co., Ill., and he told me that he made some of these pens, and was much pleased with them, and asked me to talk to the farmers in his county about them. They are very simple to build—eight feet square, and cost about $5. You can have a good many for $50. Two men can lift one of them up, shove a stone boat under it, and take it wherever

you want to put it. There should be a large window light in the gable so that the sun will shine through. There should be a hole cut through the roof and some boards put over it for ventilation.

DISCUSSION.

A Member—Do you have a plank floor, or dirt floor?

Mr. Everett—We have a floor in them made out of inch stuff. We prefer these to planks because they are used for sleeping purposes, and being bedded through the winter I do not see but the floor is all right. If they were used for feeding, the plank floor would be preferable.

Mr. Arnold—I don't like that pen. If you would take it and cut two feet off the roof, and then have it arranged so as to raise the roof, then the sun will shine on the little pigs in the spring of the year. Then, in the summer time, even if you want to use that, turn that same side to the north and you have your pen well ventilated. I saw a pen at Mr. Scott's house that suits me better than that. Instead of having a hole in the roof, he has a side that swings in, so the little pigs can come out of there and get away from the dam. It will cost no more than that. You will simply have to have hinges on the inside and then you raise the roof right up, and you are not obliged to crawl through this door.

Mr. Everett—This is the simplest pen for the farmer. He is not apt to have any if there is too much work about it.

A Member—What remedy would you advise for the caked udder in the sow, besides taking away the food?

Mr. Everett—The same remedy that would apply to the dairy cow—knead it with hot water applications. A good kneading and rubbing is all I have ever done.

A Member—How about the sow eating her pigs?

Mr. Everett—I think that only comes from improper feeding. Where she has been fed too much corn and heating food, it causes her to be feverish and irritable, and then this caking of the udder makes the sow cross and she jumps up with a howl and snaps at the pigs, and gets a taste; when she gets a taste she will have more. It is quite possible that the sow that eats her pigs once will not do it again, but I cannot afford to wait a year to find out, because they are very liable to eat the second and third litters,

A Member—I have had a little experience with hogs this winter. It is somewhat of a new enterprise with me, and having had a little bad luck in the business, I want to ask for information. I have five sows that farrowed about the first of January. I was very particular and put them in a basement—a large basement, and made beds for them. Each sow did well; they had about fifty pigs and they lived along nicely and did very well until they got to be four or five weeks old; then they began to die, and they died down until finally I had only eight of them left. Then I took them away and put them out doors in another pen, and they all died but three. One of them today resembles a pig and two of them look just like ground hogs. I fed those hogs milk with bran and middlings mixed, and kept them only just in good flesh; I cared for them regularly, and could not assign any reason why the pigs should die.

Mr. Everett—I can give you my view of the case. From what you have stated I would assign the cause to lack of exercise. You fed the sows to promote a good flow of milk and no doubt successfully, but the pigs lacked exercise.

The Member—The basement was warm; they did not pile up at all;

they had a pen about ten by sixteen.

Mr. Everett—Were they excessively fat?

The Member—The pigs were fat, yes.

Mr. Thorp—Was there a floor in your basement?

The Member—Yes.

Mr. Thorp—If you had not had them on the floor they would have lived.

Mr. Everett—I don't take any stock in that. I don't believe the floor had anything to do with it, although I believe that they would have been better off on the ground than on the floor.

Mr. Convey—I wish to enter a protest against the habit some farmers have of keeping pigs in very close quarters, with low roofs; they are very apt to be damp and they get the rheumatism. I think Mr. Everett is right in regard to the death of these pigs; thumps, or fatty degeneration of the heart is due to high feeding and lack of exercise.

Supt. McKerrow—It is very evident that these pigs died from lack of exercise and too much good food.

Mr. Thorp—I do not wish to be understood that I advise keeping them in a dirty place. That is not so, but I do advise keeping them on the ground, or giving them something that is equal to dirt, because they must have dirt if they are going to be healthy. I had just that experience when I first began farming—keeping them on the floor in the pen—and they died. I never have lost one since I began keeping them on the ground. If those little fellows had had some dirt in their pen I think they would have been all right.

A Member—I find it is too damp to keep them under the barn whether they are on the floor or whether they are not; then, again, I think they had better be in too cool a place than a place too warm. In putting them out where they have to run and exercise, they will do better than in a warm place. I think this gentleman kept his pigs where it was too damp and didn't give them exercise.

Mr. Everett—I would rather feed and care for twelve litters of pigs in the month of June than one in the month of December.

The Chairman—Mr. Thorp says to give them dirt, but I suppose he does not mean dirty dirt, he means clean dirt.

Mr. Kellogg—I have no doubt that the coming of those pigs in the winter is a great cause of their death. Two years ago last February we had three litters of pigs and we only raised one-third of them. May is the time to have your pigs.

Mr. Arnold—I want to protest against keeping the hog in a little, confined place where she has no exercise. The hog does want soil, but not filth, and the hog needs a bedroom and a place to exercise, separate; she wants plenty of exercise and sunlight. If they have sunlight, exercise, and good treatment, they will be all right.

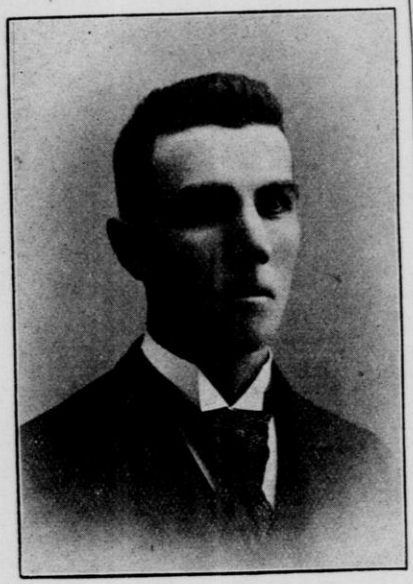
Mr. Briggs—It is more in the type of the hog than in the breed of the hog. I do not think that Mr. Everett means to impress you that Poland hogs or Berkshire hogs are the ones you want, but early maturing types of some improved breeds.

Question—Does Mr. Everett advocate breeding the sow more than once a year?

The Chairman—I don't do it, and another thing, it is not necessary to have an expensive hog house. It is not necessary to spend $150 to $200 for a hog house when you can put the money, or part of it, in these other pens.

GROWING SUGAR BEETS.

JAMES R. WATSON, Sussex, Wis.



JAS. R. WATSON.

The very low price of farm products at the present time in general, is causing the farmers of Wisconsin to study with interest a new industry that promises fair returns for their labor, and for which the soil and climate of Wisconsin seem to be well adapted. This new industry has had a good beginning in this state, in Waukesha county, as one of the best equipped sugar beet factories in the country has been established at Menomonee Falls. As a grower of beets for this new sugar beet factory, I am here to give a statement of the cost of growing sugar beets, together with one year's experience in growing the crop. Being satisfied with a previous experience in growing sugar beets and other roots for stock, that they could be profitably raised at the terms offered by the company, I subscribed to raise two acres for use in the beet sugar factory.

Planting and Cultivating.

Not having a plot of ground just such as the company recommended to grow our beets on, we selected a piece that had been seeded down for seven or eight years with June grass; we plowed it down as deeply as we could, prepared the ground thoroughly, and just about the time of planting corn we planted our beets. We drilled them in with a hand drill, in drills thirty inches apart, put them in about half to three-quarters of an inch deep. We cultivated them as soon as they were up sufficiently so we could see the rows, and about the eleventh day of June we got some laborers and had them hoed. We kept them well cultivated during the growing season, and about the 19th day of July, the season being so favorable for grasses and weeds, we were obliged to have them hoed once more. About the first of October the crop was ready for harvesting, but as the company was uncertain whether they would get the factory completed in time to use this year's crop, we did not begin harvesting until about the 20th of October. We experimented somewhat at the beginning of the harvest and thereby increased the cost, but the method we finally adopted was this: We took the coulter and wheel off a plow and made a deep furrow closely along the side of the rows of sugar beets. This loosened them, and we could then easily pull them up, and throw them along the top of the furrows made by the plow. At the beginning of each

half day, we had raised enough beets so that we would have about a load. After the men became thoroughly accustomed to handling the beets, two men were able to plow, raise up, trim and load into a wagon, four tons per day, working nine hours. The beets were not removed from the wagon until they were shoveled out of it at the factory. We hauled about two tons to the load on the average.

Cost of Production.

Now, I will give you a statement of the cost of producing our own crop, and also a statement of a grower who raised a heavier tonnage than I did, and a statement of the financial result, based upon the contract we have with the sugar beet factory. This is estimated somewhat, because the beets were not analyzed, with the exception of my own, of which I had a sample sent to the Experiment Station at Madison for analysis. The items are as follows:

Plowing the ground	$1 50
Preparing the ground	1 00
Cost of the seed	1 56
Sowing same	1 00
Cultivating crop	2 00
Hoeing and thinning	5 00
Harvesting	9 00
Conveyance of laborers	1 50
Hauling at $1.00 per ton, a distance of eight miles	11 25
	$33 81

The yield per acre was 11¼ tons. The total cost of production was, delivered on the factory grounds, $33.81 per acre. The contract price, based on the Madison test, would be $4.50 per ton, and the 11¼ tons, at this price, would amount to $50.62; deducting the cost leaves a net profit of $16.81 per acre, disregarding the rent of the land.

Now, here is a statement by another grower:

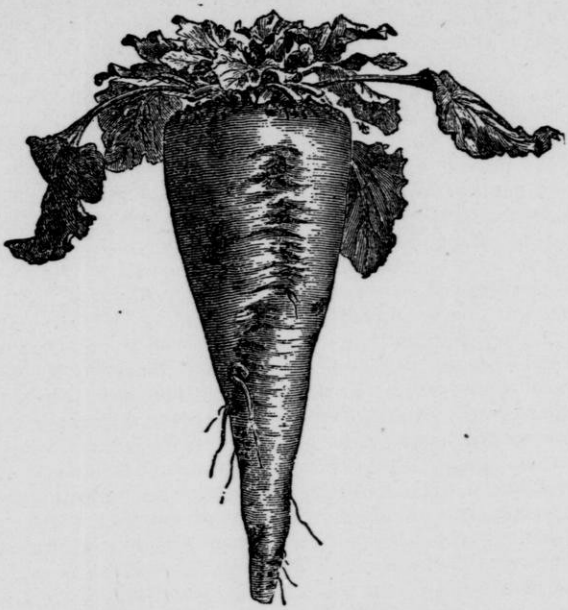
Cost of seed	$1 56
Plowing	1 50
Preparing ground and seeding.	1 50
Cultivating	2 00
Hoeing and thinning	7 00
Harvesting	9 00
Hauling at $1.00 per ton	18 75
Making the total cost per acre raised, and delivered at the factory	$41 31

As this grower did not have his beets analyzed, we can only estimate their value according to the contract, and I think it is reasonable to suppose that they are worth $4 a ton. If this is correct, his crop would be worth exactly $75, and his net profit would be $34 per acre. The help we used in growing our crop was the wives of Polish laborers in Lannon, and one item of labor was for going after and taking them home, which cost us $1.50.

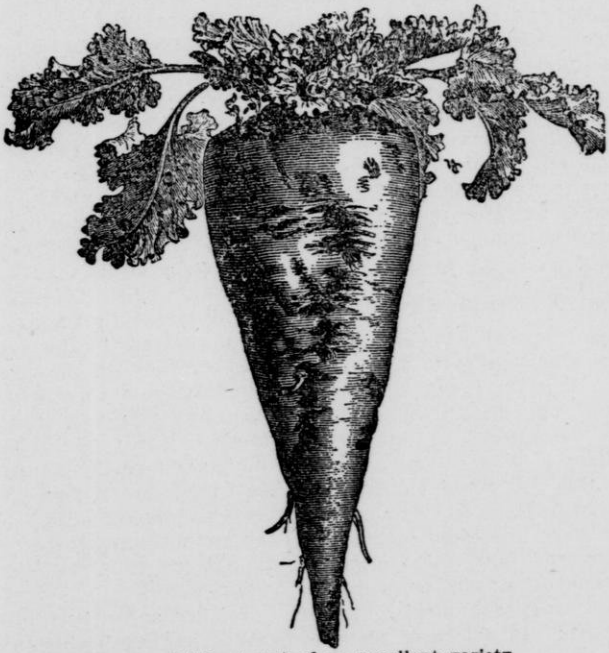
The plot of beets was rather uneven on account of the unevenness of seeding. Attempting to sow as thinly as possible to save labor in thinning, I closed the machine too much, and when we came to thin them we found many spaces blank. The crop was also reduced by some careless thinning. We found a good many places where two beets stood together and neither attained a proper growth; they must be thinned to seven or eight inches apart to give a good crop. Under the same conditions that prevailed this year, I think with the benefit of this year's experience, I could increase my tonnage on the same ground to fourteen or fifteen tons per acre although the results in both my own case and the case of the grower are satisfactory.

What Experience Has Shown.

The fact should not be lost sight of in going into the industry, that there is a good deal of labor involved;



Kleinwanzleben, a model sugar beet root.



Vilmorin, a model beet root of an excellent variety.

sometimes it is pretty hard to get the help necessary, although I may say that growers for the factory this year, as a whole, experienced very little difficulty in getting their crop cared for and harvested. The sugar beet crop this year proved that that crop was the best paying crop. It is impossible to tell accurately how many acres there were raised for the factory this year, but it is supposed that there were upwards of five hundred, and the tonnage between 6,000 and 7,500 tons. I may say that a large majority of growers are satisfied with the result of their year's work in growing sugar beets. Some of them had large overgrown beets on account of growing them under improper conditions, and some of them had a very poor stand of plants on account of too deep planting. Some used horse machines and got the seed in some two or three inches deep. On this account a good many of the growers were obliged to sow twice, and some three times, and that made the crop late. There was just a little bit of dissatisfaction, too, on account of the delay the company has experienced in getting their plant ready for operation, not having begun yet, and consequently being unable to pay for the crop; but if the crop is satisfactorily settled for, I am quite sure that the acreage will be doubled, if not tripled this year.

What I Would Advise.

Now, with regard to what is best for a particular locality to do towards securing a factory, I will mention a few points. The factory came to us, we did not have to solicit its location, but I think if it were necessary I would do this: I would endeavor to get as many farmers together as possible, who were interested in growing sugar beets, and have them organize into an association; get as many as possible to promise to raise small plots of beets. In selecting plats of ground, select fall-plowed ground that has been manured recently; but do not select land that has been manured since a crop has been raised on it. If you do it will be apt to raise large, overgrown beets with small sugar content. The next thing is to secure the proper kind of seed, and this can be done by sending to the company at Menomonee Falls; the manager says he will provide seed if the cash is sent with order. It will be useless to send to city seedsmen, because their seed is not grown with the idea of manufacturing the beets into sugar. After you have plowed your land in the spring, harrow it thoroughly, then sow your beets in drills, not over thirty inches apart. The French experts, who raise the seed, advise narrower sowing. Take good care of them and by the first of October they will be ready to harvest. Harvest them and get them weighed, if possible; if it is inconvenient or impossible to get the whole crop weighed, take an average load and get it weighed, and load your loads similarly, so you can get a pretty good estimate of the tonnage. Then each party should select a sample; select one of the larger ones, a medium sized one and a smaller one, do it up in a bundle, label it with your own name, particularly if several parties are shipping together, ship it to the Experiment Station and have an analysis made. Prof. Henry has said that they will analyze any samples sent to them. Then, send these analyses to the association and the secretary of the association can tabulate these reports and get averages, and you will have the data at hand to show the representative of the Sugar Beet Company, and you will also be learning how to grow sugar beets on a small scale before you have the factory, and attempt to raise them on a large scale without having any experience.

Raising sugar beets I think is desirable and applicable to a great part

of Wisconsin. In regard to the work I might say we do not find it unpleasant, the hardest job was getting the crop hoed, and we hired that done. Our men preferred to work at harvesting sugar beets rather than husking corn. However, growers should not fail to improve the first pleasant weather after the crop is ready to harvest, in getting the work done. Though the work may not be unpleasant in warm, dry weather, it becomes very disagreeable, as well as more expensive, if the weather grows wet or cold.

THE BEET SUGAR INDUSTRY.

W. A. HENRY, Dean College of Agriculture, University of Wisconsin.

I desire to call your attention at this time to what I think we will all concede as the most important question now confronting our people for consideration, namely, the production of the sugar consumed by this country, from the sugar beet plant.

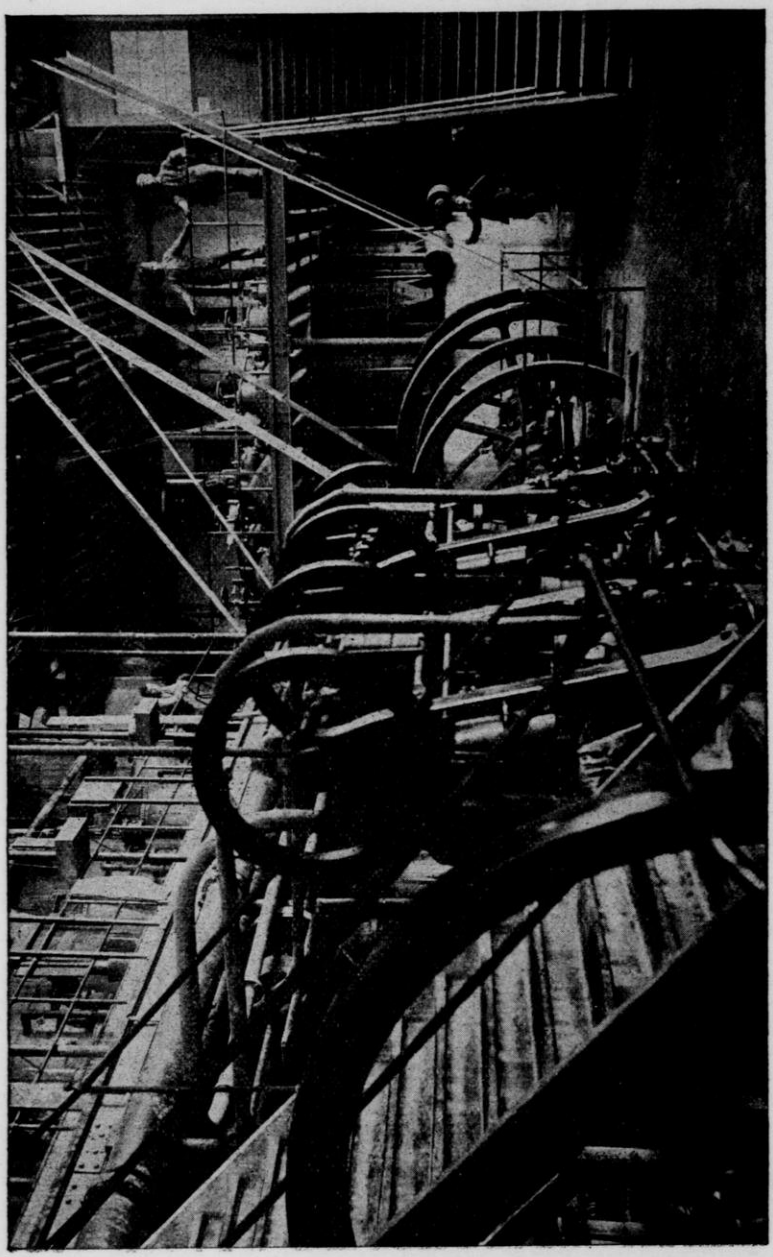
First of all let us consider the cost of sugar to our people and where this sugar consumed in this country cost $540,000,000, while for the same period we exported $736,000,000 worth of wheat and wheat flour. Think of it for a moment, friends! Every season, as summer advances, all over this country the people are watching with the keenest interest the condition of the wheat crop. Daily reports sent

Table showing value of the sugar and molasses imported into the United States, and the value of the wheat and flour exported from the United States to foreign countries, 1891 to 1895, inclusive.

	1891.	1892.	1893.	1894.	1895.	Totals. 1891-5.
Imported.						
Sugar	$105,728,216	$104,408,813	$116,255,784	$126,871,889	$76,462,838	$529,727,538
Molasses	2,659,172	2,877,744	1,992,334	1,984,778	1,295,146	10,809,174
Total						$540,536,712
Exported.						
Wheat	$51,420,272	$161,399,132	$93,534,970	$59,407,041	$43,805,663	$409,567,078
Wheat flour	54,705,616	75,362,283	75,494,347	69,271,770	51,651,928	326,485,944
Total						$736,053,022

money goes. The annexed table gives the value of sugar and molasses imported into the United States for a period of five years and also the value of wheat and wheat flour exported to other countries in the same time:

What American citizen can study the table without being deeply impressed with the enormity of this sugar question? In five years the out from the various sections are gathered by the newspapers which are eagerly scanned by everybody to know the situation. Storms which may help or damage the crop, intense heat or other conditions prevailing, are all reported and carefully considered. Railroad managers watch the yield in sections tributary to their lines, well knowing that a prosperous year for their business depends upon



Interior view of Norfolk, Neb., Beet Sugar Factory, presented to give the reader some idea of the great size and great variety of heavy machinery employed.

the success of the farmers in producing a wheat crop. The shipping interests of the great lakes, the canals and inter-ocean traffic are all alive to the conditions of the ripening crop; and when all of this has been gathered and when all the great exports of wheat and flour are over and the bankers and brokers are settling up the business, $5.00 out of every $7.00 worth of wheat sold must be left over in Europe to pay for the sugar which European farmers have produced and European manufacturers have shipped to this country, and only $2.00 out of the $7.00 can come back to this country after our sugar bill has been paid.

The World's Production and Consumption of Sugar.

Let me next present to you a most interesting table showing the world's production of beet sugar, the total production of cane sugar and the world's consumption of all kinds of sugar:

Remember, please, that all the sugar of Europe is from the beet root. As shown by the table, there was a total of 4,792,000 tons of beet sugar produced in Europe in 1895. In the same year the tropics, including India, Cuba, Louisiana, etc., produced 3,067,000 tons of sugar from the cane plant. In this table we have the answer to the inquiry which I am sure is in your mind, as to where beet sugar is grown and how much of it is produced. You will observe that Germany is the leader in the industry, having produced the enormous amount of 1,800,000 tons, while Austria-Hungary comes second, and France third. You are surprised, I am sure, to learn that more sugar is produced from the humble beet root grown in the temperate regions of Europe, than is yielded by the regal sugar cane plant in the tropics where sunshine is so intense and where labor is so cheap.

History of the Development of the Beet Sugar Industry.

The beet having conquered the cane plant in producing the world's sugar, let us briefly recount how this was brought about. One hundred and fifty years ago a chemist by the name of Margraff studied the different roots growing in his garden, such as parsnips, carrots, beets, etc., and announced that he found sugar in the beet root identical in chemical composition with that produced by the cane plant. About fifty years later a pupil of Margraff by the name of Achard, continuing the investigations of his teacher, undertook to produce sugar from the beet root and constructed a little factory for this purpose. About the same time another small factory was erected in Germany. During the wars of Napoleon ocean commerce was almost annihilated and the price of products from the tropics rose greatly in consequence; sugar sold as high as 25 cents per pound. Napoleon wishing to free his country from dependency on other nations and especially Great Britain, whose colonies were the great sugar producers, set his wise men to seeking sources for sugar. At first their attention was turned to the raisin grape, but the sugar which they obtained from this fruit was not satisfactory, being really glucose instead of sucrose. In 1811 the emperor's attention was called to a loaf of sugar produced by Achard, and at once this wonderful man seized the situation with his usual energy and directness and an appropriation was made to study the beet root for sugar production. Lands were planted to beets, schools for the study of sugar chemistry were established and young men were placed in these schools as pupils. Such was the energy and progress of this man and his people in those times that soon France was producing considerable quantities of beet sugar, and Germany took up the in-

Table showing the world's production and consumption of cane and beet sugar, 1884-1894.— 10 years.

Years.	Austro-Hungary.	Germany.	France.	Belgium.	Holland.	Russia.	Other European countries.	Total European sugar production. (Beet.)	Cane sugar production.	Total cane and beet sugar production.	World's consumption.
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
1884-85	653,000	1,147,000	303,000	116,000	48,000	406,000	18,000	2,691,000	2,177,000	4,868,000	4,640,000
1885-86	370,000	838,000	294,000	63,000	28,000	524.000	22,000	2,139,000	2,238,000	4,377,000	4,640,000
1886-87	550,000	1,024,000	482,000	117,000	40,000	473,000	18,000	2,704,000	2,385,000	5,089,000	5,168,000
1887-88	400,000	959,000	383,000	121,000	42,000	430,000	33,000	2,368,000	2,541,000	4,909 000	5,134,000
1888-89	517,000	990,000	458,000	122,000	38,000	523,000	60,000	2,708,000	2,359,000	5,067,000	5,191,000
1889-90	739,000	1,261,000	778,000	209,000	64,000	446,000	68,000	3,565,000	2,138.000	5,703,000	5,781,000
1890-91	767,000	1,320,000	685,000	181,000	71,000	531,000	105,000	3,660,000	2,597,000	6,257,000	6,038,000
1891-92	774,000	1,097,000	643,000	166,000	43,000	545,000	95,000	3,463,000	2,783,000	6,248,000	6,270,000
1892-93	793,000	1,224,000	580,000	166,000	65,000	450,000	97,000	3,375,000	2,782,000	6,157,000	6,235,000
1893-94	834,000	1,375,000	570,000	220,000	72,000	647,000	119,060	3,837,000	3,197,000	7,034,000	6,932,000
1894-95	1,050,000	1,800,000	814,000	230,000	90,000	600,000	108,000	4,792,000	3,037,000	7,859,000	7,200,000
Increase in 10 years, per cent	61	57	163	99	88	48	500	78	41	64	55

dustry also. It is said that when Napoleon was defeated at Waterloo, there were in operation 300 beet sugar factories, small ones, of course, all of which owed their existence to the wisdom and foresight of this ruler. With the downfall of Napoleon and the return of shipping to normal conditions, prices fell and the beet factories of Europe, crude and illy regulated, succumbed to the general disaster, all being wrecked. Gradually, however, the industry was renewed, the governments of the several countries taking the liveliest interest in all matters relating thereto. And now we have reached the time when the temperate regions of Europe with their free labor have conquered the tropics with their slave or Cooley labor.

The Beet a Temperate Region Plant.

Let me here definitely state a fact which has perhaps already become apparent to you from what I have said. Do not forget that the sugar beet is a temperate region plant, growing and flourishing to the northward of where the sugar plant reigns. The best climatic conditions for the sugar beet plant are those where a summer temperature of 70 degrees F. prevails. Now, if you will examine climatic maps you will see that a line marking a temperature of 70 degrees for the summer months crosses the state of Wisconsin. In your mind draw a line from Racine through Madison, Chippewa Falls and Hudson; this line is the isotherm of 70 degrees for the months of June, July and August. As you well know, the temperature of our state at any given point does not vary materially from that at the points named for one hundred miles on either side, so that all of Wisconsin is practically in the heart of the sugar beet belt. If we pass far north of this line, the summers are too short; if we go to the southward, the days are too hot. Remember that while fine looking beets can be grown in Kentucky and Tennessee and further southward, these roots carry very little cane sugar and are worthless for beet production. Wisconsin is in the sugar beet belt.

Past and Present Condition of the Beet Sugar Industry.

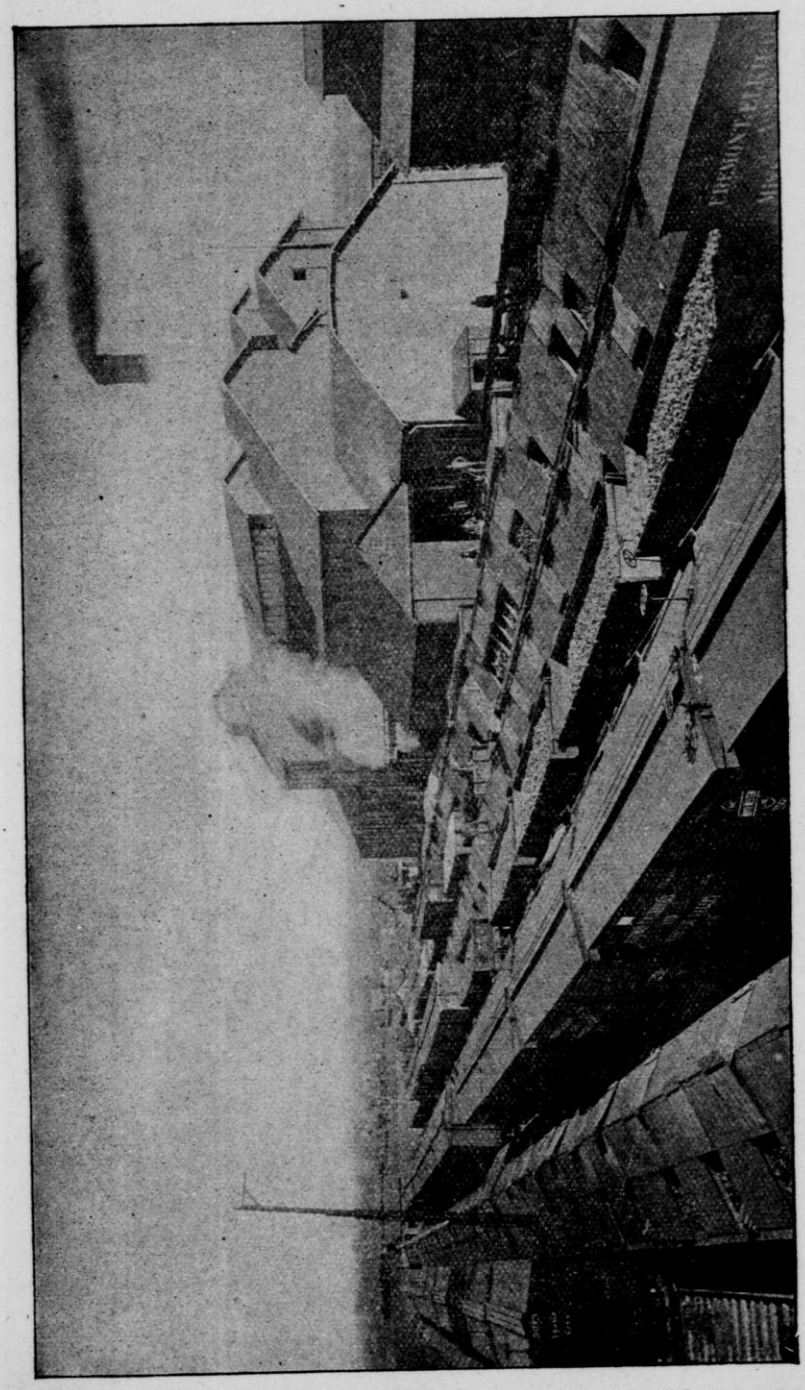
With so much interest in this great question shown by the countries of Europe, it is not strange that our people have for some time past been much interested in beet sugar production, though, I must confess, we have shown far less intelligence and push in this matter than our boasted claims for intellectuality and progress warrant. As early as 1830 efforts were made toward producing sugar from the beet in the United States. Many years ago a factory was established at Chatsworth, Illinois, which proved a failure. The machinery was moved to Freeport and from there to Prairie du Sac in this state. Some sugar was produced but the farmers failed to grow a sufficient quantity of beets to keep the factory in operation and so it failed. At Fond du Lac a factory was started which produced a considerable quantity of sugar. The machinery, however, was taken to California, where failure resulted. Thus we had two failures in beet sugar production many years ago in our state. The first beet sugar factory to be successfully operated in America was at Alvarado, California, this having been in continual operation now nearly twenty years. California now has two other factories, making three in all. There is also a factory in operation near Salt Lake, Utah, and another at Eddy, New Mexico, and two in Nebraska, one at Norfolk and the other at Grand Island. Thus we have seven factories in this country in active operation, and these have turned out during the past year some sixty or seventy million pounds of sugar—say one pound for each individual in this country.

Concerning the Menomonee Falls Beet Sugar Factory.

You have all heard of the Menomonee Falls factory and, I am sure, are interested in this second great effort of Wisconsin to produce sugar. Most unfortunately the projectors of this enterprise have been greatly cramped for money and are struggling for success, with the odds seemingly against them. This factory should have been completed last fall but is not yet ready for operation. This is most discouraging to the farmers about Menomonee Falls who during the past year have grown large quantities of beets. These farmers are intelligent, thrifty Germans, some of whom were beet growers in the old country, and naturally all take a deep interest in their home factory. Let us hope they will succeed, but if failure comes, it is for purely financial reasons and not because the farmers could not or would not grow the beets, nor because the beets were unsatisfactory. At the Wisconsin Station we have analyzed a number of sample beets grown by the farmers about Menomonee Falls, and I assure you these beets are satisfactory.

How Beet Sugar Is Made.

The mention of the Menomonee Falls factory leads you to wish, I am sure, to know just how beet sugar is produced. Let us visit the factory and witness the operations. First of all we notice the many evidences of industry and push. Scores of farmers' teams are coming by every highway to the factory, for it takes hundreds of wagon loads of beets for each day's operations. The wagons drive onto a scale and the roots are weighed and samples taken for analysis. On the other side of the scale railroad cars loaded with beets are being weighed, for beets are coming in from twenty or thirty miles away by rail. Next we find the cars being unloaded of their beets, which go into great sheds. Along the bottom of the great hopper bin holding beets runs a stream of water in a ditch. The beets are kept out of the ditch for a time by planks placed across it. When the beets are needed the planks are slipped out and the beets fall into the ditch, in which they are floated into the factory. Much of the dirt is washed off by the ditch water, but inside the factory the beets fall into a great washing machine which cleans them of all foreign matter. From the washing machine the beets pass upward to the top of the building where they are sliced into pieces about the size of a lead pencil rubber. These slices are next placed in iron cylinders holding one or two tons each. When filled, the cylinders are closed and hot water enters from below, passing upward. The water after it has soaked more or less of the sugar from the beet slices in this cell or cylinder, passes to a second cell where it abstracts more juice; from the second it goes to a third and so on until the same water gathering more and more of the sugar in solution has passed through ten or twelve cells. As soon as a cell has been treated by water it is again treated in the same manner with a fresh supply until the beet slices have been washed with water ten or twelve times, the water passing from cell to cell. By this method the water is finally as strongly impregnated and becomes as sweet with sugar as the beet juice itself. On the other hand, the beet slices washed again and again with warm water lose their sweetness until after ten or twelve washings they contain little or no sugar. The slices freed from sugar are emptied from the cells and pass through a machine which squeezes much of the water out of them, and on into the farmers' wagons, by which they are hauled to the farms for cattle feeding, for silage, etc. In this way the farmer leaves at the factory only the sugar. The sweetened water,



Norfolk, Neb., Beet Sugar Factory, with freight trains loaded with beets in the foreground. No view could better illustrate the magnitude of the beet sugar industry than this.

which corresponds to the beet juice, is next treated with fresh lime, which coagulates the foreign matter and clears it of impurities. The lime is in turn freed from the juice by passing carbonic acid gas through the juice, which precipitates the lime in the tanks. The juice freed from impurities now goes to boiling tanks where it is boiled in more or less of a vacuum to prevent burning. Finally, the molasses, rich in sugar, is boiled in a special vacuum pan, where the art of the boiler is to produce sugar crystals. From this pan the dense mass, almost sugar in itself, is let fall into centrifugal separators, which throw out the molasses and leave the sugar. The sugar after drying is barrelled and ready for shipment.

Beet sugar factories, when in operation, run night and day, never stopping from the opening of the campaign until closed for lack of beets to work further. Hundreds of men are employed, and I assure you it is a busy place.

Wisconsin's Opportunity for Wisconsin's Necessity.

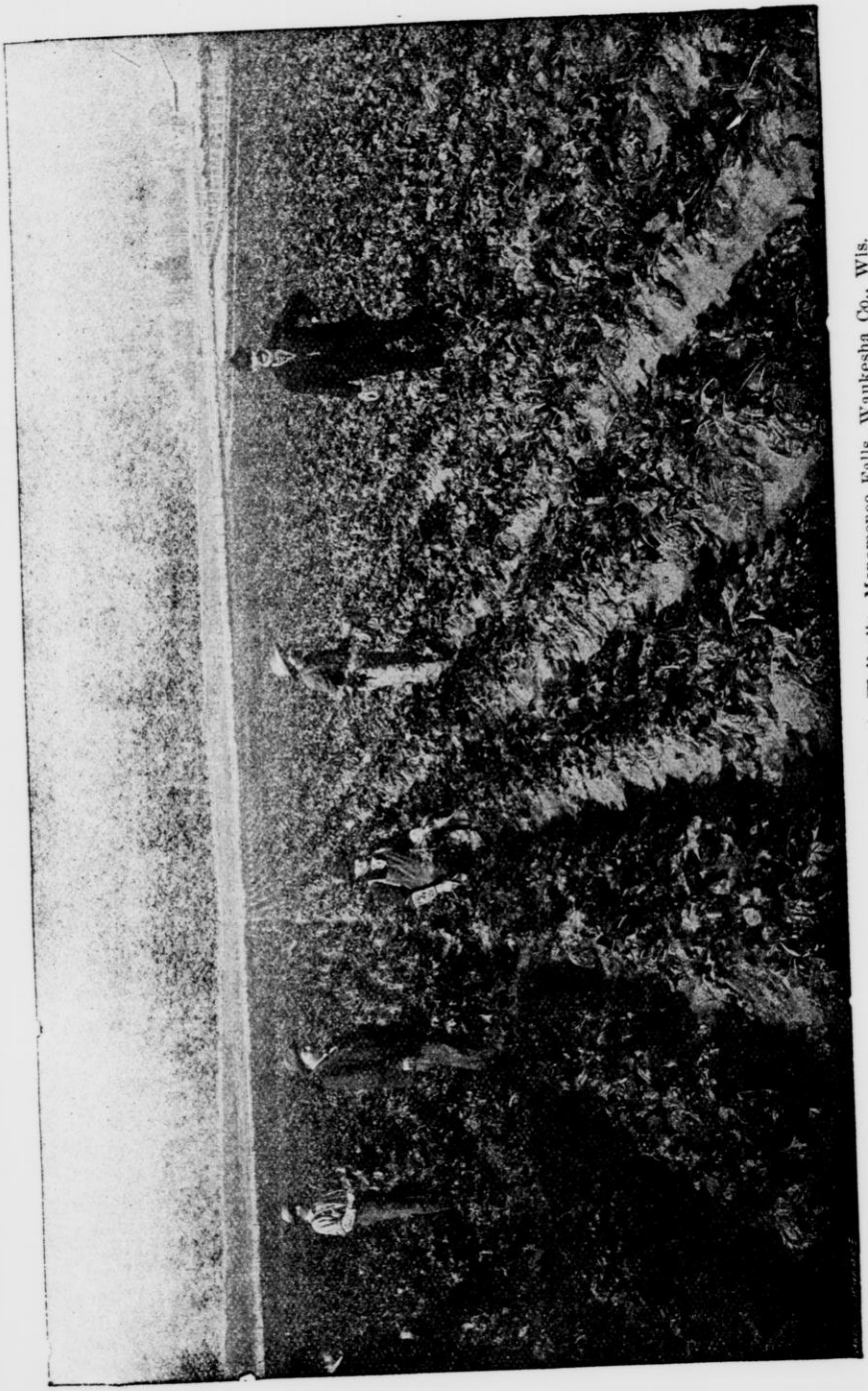
In the United States we consume nearly 70 pounds of sugar for each inhabitant. Allowing 60 pounds consumption for each person in our state, it will require about twenty-five sugar factories like that at Menomonee Falls to produce our own sugar. Annually our sugar costs us over $5,000,000. Think of it, friends! We must gather up each day and send out of this state an average of $15,000 to pay for the sugar we consume, and this sugar is produced in the fields of Germany and France, with a climate similar to Wisconsin and a soil far less rich. We have people begging for work and we are talking about hard times. Is it strange that we have hard times and lack of work when we must gather up $15,000 each day to pay our sugar bill? We boast in this country of our intelligence and progress. We will never admit for an instant that any other nation has people half so bright and pushing as our own, yet year follows year with Germany, France and Austria producing the sugar which should be raised on farms in Wisconsin and other northern states. Here is a nation sending abroad $100,000,000 every year for that which could be produced just as well at home.

Concerning Beets.

Let us come down a little more to detail. In order to be profitable, the juice of the beet root must carry 12 or more per cent. of sugar. Do the beets grown in Wisconsin meet this condition? Yes, and more too. At our Experiment Station we have analyzed hundreds of beets grown in different parts of the state and find that where farmers are careful in growing beets these roots carry from 13 to 16 per cent. and even more of sugar. In Calumet county, not far from where we are holding this meeting, the German farmers have grown beets which run 18 per cent. in sugar. Another point is the purity of the juice. Besides the sugar the juice contains foreign matters which are a great hindrance to sugar production. Beet juice must be 80 per cent. pure to work satisfactorily. Wisconsin beets are again right in this particular when carefully grown. We have found Wisconsin beets running as high as 84 per cent. in purity.

The Sugar Beet a Thoroughbred.

Do not forget that the sugar beet is the greatest thoroughbred known to man. Ever since the time of Achard men have been selecting beets to secure a higher percentage of sugar and a greater purity of the juice. In Napoleon's time the sugar beet carried 6 or 7 per cent. of sugar; now it carries from 12 to 20 per cent., and even higher! Is not this an interesting fact and one full of encouragement



A Wisconsin pioneer beet field. Grown by Francis Walterlin, Menomonee Falls, Waukesha Co., Wis.

to farmers and breeders of plants and animals? It shows us what we can accomplish by selection and what room there is for improvement. Because it is a thoroughbred, the sugar beet must be grown with great care. If weeds are allowed to choke the growing plants, if the cultivation is poor, if raw manures are used, if the land is marshy and contains much vegetable matter, any or all of these conditions tend to produce beets of low quality.

Good Seed of the Highest Importance.

The production of beet seed is a wonderful industry in itself. Let me tell you something of how it is carried on. In the fall the choicest looking beets only are selected. A core is taken out of the beets by an instrument resembling a cheese trier. The juice of this core is analyzed, and if the beet it is taken from carries enough sugar and is sufficiently pure, that beet is laid aside for seed production. In this way the beets are patiently and laboriously selected for seed production. Such beets are called "mother beets." The mother beets are carefully housed and the next spring are planted in rows in the best prepared gardens where they receive careful attention. The seeds saved from these beets are planted the next spring and the beets raised therefrom are selected as before, but a small part of the crop being saved for seed production again. After selecting in this way for several seasons all of the seed produced is finally disposed of to the farmers who grow beets for the sugar factory. You can easily see why beet seed is somewhat expensive and how some seed grown by careless people may sell much cheaper than that offered by careful growers. Some beet seed might be worth 30 cents a pound while other seed carelessly grown would not be profitable to the grower at 10 cents a pound.

Will Wisconsin Become a Sugar Producing State?

My friends, this is a great question now confronting these people. I have shown you that we are in the sugar beet belt. I have shown you that by analyses made by the hundreds at the Wisconsin Experiment Station our farmers have grown beets which are rich in sugar and high in purity of juice. Let me tell you that on our experimental grounds at Madison we have produced in beets as much as three tons of sugar on one acre of land.

We are talking of hard times and realize that thousands of people in our villages and on our farms would gladly have some work to do if there was a sale for the product. There is an over-production of corn, wheat, beef and pork in this country; at the same time we are sending $100,000,000 abroad every year,—most of this $100,000,000 goes to the manufacturers and farmers of Europe for producing sugar from the beet root. Why should not this $100,000,000 be saved to America, in which case 40 or 50 per cent. of it would go directly to the farmers and the remainder would go to the producers of coal, lime stone, manufacturers and builders, to the men who work in the factories, to those who furnish the capital and to the railroad companies whose traffic would be enormously increased through this industry. Five million dollars would annually be saved to the state of Wisconsin to be scattered among our own people instead of being gathered up and sent off to other countries. We would fight to the last rather than allow any other country to conquer us, yet commercially we pay a tribute to other nations of $100,000,000 a year! Wisconsin's share of this tribute is at least $5,000,000, or $15,000 per day! Will we awaken to the situation and avail ourselves of the opportunity to produce our own sugar? Will we cease talk-

ing about hard times and set to work correcting our economic conditions? It is a national disgrace for the United States to be forced annually to gather up $100,000,000 of hard earned money to pay for an agricultural product produced in other countries which could as well be made within our own borders. What part shall Wisconsin farmers take in wiping out this great blot?

DISCUSSION.

A Member—What soils are best for the sugar beet?

Prof. Henry—The sugar beet will grow on a large variety of soils. Those which yielded so well in the vicinity of Menomonee Falls were grown on a heavy clay loam—a hard maple soil. Muck or marsh land or those containing much vegetable matter are not satisfactory for beet growing. Beet lands should not be manured with fresh stable manure just before planting. If possible, apply the manure to the preceding crop, having the land rich with fertility but not loaded with fresh raw manure.

Question—Will worn-out soil produce good beets?

Prof. Henry—Soil to grow good beets must not be worn out. Do not understand that I wish you to grow beets on poor soil. What I wish to impress is that lands rich with vegetable matter or loaded with raw manures, while they will grow large beets, will not grow rich beets.

Question—How will the sandy lands in some parts of the state that produce such fine potatoes, do for beet culture?

Prof. Henry—These sandy lands have puzzled us considerably. We have had beets grown on the sandy soils of Marquette county, which were very satisfactory indeed. On the other hand, some of the beets grown in Waupaca county were not so good as we expected they would be.

A Member—We will give you beets of high quality from Waupaca county the coming year.

Prof. Henry—The Wisconsin Experiment Station will send out a very large number of packages of beet seed the coming season. Now, farmers, remember in growing your experimental beets, samples of which you will send to our Station, to choose a good garden soil and do not attempt to grow large, coarse beets. Our friend here is an old sorghum grower; he will tell you that farmers who have their sorghum patch in an old barnyard or where hogs have been fattened, though it produces a large yield of sorghum stalks, does not furnish cane which will produce nice sorghum molasses. We all know that sorghum grown on over-rich lands gives a juice loaded down with impurities.

Question—What is the proper size for sugar beets—how heavy should they be?

Prof. Henry—The best sugar beets weigh about two pounds each. Do not try to grow great, large beets, thinking they are the best. Years ago when I was looking up the beet sugar question in California I had a conversation with some of the officials of the Southern Pacific Railroad Company in their office in San Francisco. I was urging upon them the importance of beet sugar production in California. Col. Crocker, the leader, showed much indifference, saying that he had lost $50,000 in trying to promote this very enterprise. I told him that that was not necessarily a reason why beet sugar production could not yet be profitable. Later on in our conversation, when talking about California's wonderful productions, he said that in his experiments he had grown beets that weighed 20 or 30 pounds each. As soon as he told me this, I replied: "There, Col. Crocker, is one of the reasons your factory failed. You thought large beets were good beets

when in truth they are poor beets, and helped wreck your factory. You should have tried to produce small beets, but many to the acre; and such, if grown properly, would have been rich in sugar and these would have brought you success instead of failure."

Question—Mr. Watson, what kind of soil do you raise your beets on?

Mr. Watson—Our soil is black loam, but there are beets grown for the factory on all kinds of soil; the very nicest kind are grown on heavy clay land—they were the most even, the smoothest, averaging about two and a half pounds, and the man told me he had nineteen or twenty tons to the acre, and I am quite sure they would analyze very well.

A Member—Will the sugar produced at our beet sugar factories be granulated and white when it leaves the factory?

Prof. Henry—Until recently all the beet sugar produced was raw and had to be still further refined. Now men have learned to treat the sugar in the factory where it is produced so as to make refined white sugar. Some factories, however, still produce raw sugar, leaving the refining to be done in central factories.

Question—Mr. Watson, were those beets that you raised for the experiment, good feeding?

Mr. Watson—Yes. Here is my idea; grow from one to two acres of roots. If you can't afford to pay so much to buy seed, plant a field of mangelwurzels, and plant a few rows of true sugar beets. You will get well paid for growing even these mangels, you would be well paid if you grow the sugar beets, so there is no loss to you either way.

A Member—There are some gentlemen here who did not understand what Prof. Henry said about the black, mucky land.

Prof. Henry—I wish it to be understood that there are dark soils which will grow good beets, but marsh muck land as a rule is not satisfactory; such soil may grow large beets but it will not grow beets whose juices carry much sugar and are pure.

A Member—What can the farmers do to advance the sugar industry in our state?

Prof. Henry—Just now let every farmer endeavor to grow a plat of beets and to push his knowledge of beet culture. Remember, friends, that beet growing is a great art in and of itself. Capitalists will not come to Wisconsin to build factories until they are sure that our people will grow beets in sufficient quantity to keep their factories running to full capacity when once they are erected. Now, let me urge upon you most strongly to form local beet growers' associations. Let every member of this association cultivate from a quarter of an acre to two acres of beet roots. If you cannot get true sugar beet seed for so large an area, then buy mangelwurzel seed for all but a few rows which should be true sugar beets. Study to plant this beet seed in the best possible way and to grow the finest crop of beets you can possibly produce. Let there be rivalry among the different members of the club. If possible, have premiums offered for the largest and best crops of beets. Then send some of the beets produced from genuine sugar beet seed next fall to our Experiment Station. If a hundred or more farmers in your community will all go into beet growing in a small way, and can produce beets of a high quality, I think you will not have to wait long for a beet sugar factory. But do not expect capitalists to come and put hundreds of thousands of dollars into a factory in your neighborhood and carry things on by boom methods while you sit back and wait for everything to be in operation before you begin to study your part of the enterprise. Remember that everything

depends upon you in the beginning.

Mr. Watson—It is useless to experiment with mangel wurzel seed unless you want to, because you can obtain seed from these factory people just as cheap as you can buy it of the seedsmen. The seed last year cost us just twenty-six cents a pound, and you can get it in almost any quantity from them this year, I am quite sure. I used about six pounds to the acre.

Mr. Kellogg—How were the beets wintered that were not worked up?

Mr. Watson—I have not been in the factory. The chemist says that the beets brought there and deposited in pits before the frost took them, are in good shape yet, and the appearance of the beets would indicate that he is correct. This company intends this season to put up a system of storing sheds that are frost proof. They will preserve the beets and hope eventually to lengthen out the season to 180 or 200 days.

A Member—How far will it be profitable to ship these beets by railroad to the factory?

Prof. Henry—Probably the limit for successful shipping is not over forty miles from the factory. The railroad companies realizing the great advantage of this industry to them, will haul beets for a low price per ton so long as they can take many carloads each trip.

Let me here speak to the farmers and business men present about the great value of this industry. Beet sugar money is one of the best kinds of money that can come into a community. I do not call tobacco money good money for Wisconsin, for as a rule farmers who grow tobacco usually impoverish their farms and are not nearly so thrifty as dairy farmers. The beet districts of Europe are today the most prosperous on the continent and beet growing farmers are among the most intelligent people we can find. They have to learn their business thoroughly and this makes them good, enterprising citizens. Then, they can only grow a limited area of beets, for a beet field must be well cultivated and must follow in rotation. To eat up the pulp and waste leaves they must keep many cattle. The beet farmers of Europe keep just about as much stock as they had before the sugar factories were started.

Now, let me tell you of a letter which came to our office the other day. In our sugar beet bulletin recently published I told the farmers that the beet plant did not necessarily impoverish the soil to any great extent for the farmer could feed the leaves to his cattle and also haul back from the factory the beet pulp and feed this, and that if he kept the leaves and pulp on his farm, very little was taken off of it, for, I said, "sugar is made up of the elements which are found in carbonic acid gas and water, and these are free to the farmer." A few days after sending out the bulletin a letter came to us saying: "You say in your bulletin that carbonic acid gas and water are free to the farmer. Will you please send me some?"

The Chairman—Do you mean by this that we can raise sugar beets on a piece of land indefinitely?

Prof. Henry—No, that is not just what I wish you to understand. My point is that beets do not really draw heavily on the soil when we return the leaves and the pulp, before or after feeding to cattle, back again to the land. The proper thing for the farmer to do is to grow beets in rotation with other crops. On an eighty acre farm near a beet sugar factory, the farmer should have from 8 to 10 acres of land in beets and the rest devoted to pasture, hay, corn and other crops. Then the beets will come in as a regular rotation crop.

Let me illustrate how beet culture is a great help to the people. When I visited the Alvarado, Cal., factory I stopped at a hotel in the little village

near by. Right around the hotel building where a lawn usually is was nothing to be seen but growing beets I said to the landlord "How does it come that you are growing beets right about your building in this way?" He replied, "My father is an old man and he cannot now do a full day's work in the field, but he is still ambitious and wishes to make some money for himself. By cultivating the land here about the hotel building he is growing some 6 or 8 tons of beets and will do all the work except that of taking them to the factory. Each ton of beets will bring him $4.00, and I assure you he is very proud of his little income."

Now, friends, if we had sugar beet factories in Wisconsin producing the $5,000,000 worth of sugar which we now buy elsewhere, women and children, young men and old, even cripples could go out in the beet fields and help weed them in the summer time and help top and load the roots in the fall during the busy periods. In this way thousands upon thousands of people who are now helpless and dependent, could earn more or less money and by just the amount they earn would be so much less of a burden to themselves and to the communities in which they lived. As it is, we have very little work which this class of people can do—this piece work. Our farm work is of such character as a rule that one must be either a good full hand, or not work at all. With the beet industry in full progress everybody could have work during the pleasant summer and fall months.

The Chairman—Could not the farmer's son then have money to take him to the Short Course?

Prof. Henry—Most certainly he could. Bright boys could earn from $20 to $50 in their beet patch on a little piece of land set aside for them by the head of the family. Boys and girls, old men and young could all then have a means of earning a little spending money, which they cannot do now, when we try to sell oats, wheat and other grains to bring in the cash. I am sure that if we were growing our own sugar we could get scores of farmer boys to the Short Course where now comes but one because there is not money enough to go around. Besides this form of agriculture not only brings cash money but as I have said it makes better farmers and the young men in studying beet culture and all that goes with it will be full of ambition to learn more about farming.

Mr. Scott—It seems as if we were peculiarly situated in this part of the state for this work; we have the land and the water and soil. Let us, as farmers, secure some of these seeds and try it this summer.

Mr. Cressy—I find a little difficulty in equalizing what this gentleman said with the statement made by Prof. Henry at our State Horticultural meeting at Madison last month. I remember Prof. Taylor spoke about using twenty pounds of beet seed to the acre, and that those seed only cost ten cents a pound.

The Chairman—The price per acre is about the same.

Prof. Henry—I wish to state that in the older beet districts both in this country and in Europe as much as 20 pounds of beet seed are planted to the acre. The reason for using so much seed is this: to get a large tonnage there must be a beet plant every 6 or 8 inches. Now, if a minimum amount of seed is used, there will quite surely be skips and breaks in the rows, and old beet growers would much prefer to plant an excess of seed and avoid these skips than save a little on seed and have their tonnage run low.

Supt. McKerrow—I have in my pocket one of last year's contracts with a Nebraska factory, in which they sold the seed to patrons only at fifteen cents a pound. But there are

different varieties of sugar beets, and different ways of buying seeds, for they are all imported.

Prof. Henry—Then, again, the nearer you are to the mother beet the more they charge you for the seed. One man may charge you twenty cents a pound and the seed be worth it; another man may charge you five cents, and the seeds not be worth even that.

Mr. Kellogg—How much more are sugar beets worth for feed than mangels?

Prof. Henry—Experiments in Denmark show that the value of beets run directly with the amount of solid matter they contain. Sugar beets contain much more solid matter than mangels; on the whole I should say they are worth from one and a half to two times as much.

Question—How will it do to transplant sugar beets?

Prof. Henry—European practice is generally against it.

Mr. Watson—My experience is against it. We transplanted to some extent, and our labor was entirely lost.

Mr. Jones—Are these sugar beet seeds as large as mangel beet seeds?

Prof. Henry—The average size would be about the same, but there are large and there are small seeds.

Question—How small beets will the factory take?

Mr. Watson—The chemist told me that the limit ought to be three pounds as to largeness; they would not limit the size as to smallness. The smaller they are, usually the sweeter they are. I think they charge us a little too much for the seed. I had a conversation with Mr. Currie, in Milwaukee the other day, and he said the very best quality of seed, from either France or Germany, ought not to cost us over 15 cents a pound, but for a little experiment I do not think you will mind the difference. It is for the interest of the factory to give us good seed.

The Chairman—We have had enough said so as to get us to thinking how to save this $100,000,000 Prof. Henry has been telling us about, and if this Institute grows in enthusiasm as it has grown in numbers, we certainly will have enthusiasm whether we have beets or not.

The Institute adjourned till 7:30 p. m.

EVENING SESSION.

The Institute met at 7:30 P. M. Supt. McKERROW in the Chair.

WHAT THE STATE HISTORICAL SOCIETY IS DOING FOR THE PEOPLE OF WISCONSIN.

REUBEN GOLD THWAITES, Secretary, Madison, Wis.

Wisconsin had an historical society while it was still in the territorial stage. As the result of agitation begun in the columns of the Mineral Point Democrat, in October, 1845—three years before Wisconsin was admitted to the Union—a society was formed at Madison, the capital, in October, 1846, by delegates in attendance on the first constitutional convention. Most of the principal men of the territory were present at the initial meeting of the association, the purpose of which was "to collect" from the pioneers then alive, such facts in regard to the early history of Wisconsin as they might possess, as well as to treasure up those concerning the future."

But while the enthusiasm at this meeting was great, the participants were immersed in their own affairs and no one gave the matter any further attention; no records were kept, no money was paid into the treasury, no work was performed. What was everybody's business, was nobody's. Thus the first organization of the society may be considered as having died when the gavel sounded for adjournment.

Early Days of the Society.

On the thirtieth of January, 1849, nineteen days after the opening of the first session of the State Legislature in Madison, a hundred and fifty persons, chiefly members of the Legislature, held a meeting at the American House and formed a State Historical Society, the previous existence of the old society, now defunct, being ignored. Governor Nelson Dewey was chosen President of the Society, as a compliment to his official station. The list of vice-presidents comprised one from each county in the State. I A. Lapham, the distinguished scientist and antiquarian, was elected secretary, but he was able to give no time to the work. Public addresses were given before the society, in 1849, 1850, and 1851, by prominent citizens of the State; but beyond these three addresses, nothing of importance was done during this period. The pamphlet discourses were sent out to perhaps a dozen other learned societies, and a library of fifty volumes was slowly accumulated—all of these books being State laws, legislative journals, miscellaneous public documents, two volumes of the "Transactions of the American Ethnological Society" and a volume of American bibliography. The meagre collection was contained in a small glass-faced case, kept on a table in a corner of the governor's office, and this case is now exhibited as a curiosity in the Society's museum.

First Officers of the Society.

It was evident that the Society would never amount to anything at this rate of progress. Somebody must devote his entire time to the work, becoming personally responsible for the conduct of the Society's affairs, and giving to it life and individual character. The man for the place was imported to Madison in October, 1852. He was Lyman C. Draper of Philadelphia, who had already spent about fifteen years in the accumulation of materials for Western history, achieving such success in his manuscript and book collections, in a time when collectors of Americana

were few, as to attract the attention of scholars throughout the Eastern States. Draper was then thirty-seven years of age; full of vigor and push, kindly of disposition, persuasive in argument, devoted to his life task of collecting, self-denying in the cause, and of unimpeachable character.

For various reasons, not necessary here to recite, it was the eighteenth of January, 1854, before the Society was thoroughly reorganized for work on the new plan. Draper was at that time chosen secretary and at once entered with joyous enthusiasm upon the undertaking of accumulating books for the library, relics and curiosities for the museum, portraits for the gallery, and documents for publication in the Wisconsin Historical Collections. In the course of a few weeks, the little library case was too small. By the close of the year, the secretary was able to report to the Society the acquisition of a thousand volumes and a thousand pamphlets and documents—certainly a remarkable showing, compared with the fifty books which had been the product of the five years preceding his administration. For want of library space, the greater part of the acquisitions were stored in Draper's residence until in August, 1855, a small room in the corner of the basement of the local Baptist church was secured for the Society's use. On the first of January, 1856, Daniel S. Durrie, a bookseller, formerly in business at Albany, N. Y., was chosen librarian, and held this useful and honorable position for over thirty-six years until his death, August 30, 1892. He was succeeded by Isaac S. Bradley, for seventeen years his chief assistant.

Moved to the Capitol Building.

The Society soon securing legislative aid, the collections grew apace until nearly the entire basement of the church was occupied. This place was, however, dark, damp and dingy, and in no way suited to library purposes. In January, 1866, the institution—library, portrait gallery and museum—was removed by the authority of the legislature to quarters especially prepared for it in the then new south wing of the capitol. It was thought that there was now ample room for the accessions of at least a quarter of a century. But such was the rate of increase that in less than ten years' time these quarters were a tight fit. By 1881 cords of volumes, pamphlets, and relics were piled in out-of-the-way corners and rooms throughout the capitol, there being no space to shelve or display them.

Secretary Draper, as the executive officer of the Society, now opened a vigorous campaign for a new building; he awakened interest in many of the leading men of the State, and gained the unanimous support of the newspaper editors. But there were certain complications which made it impossible to carry a separate building scheme through the legislature. A compromise resulted in the Society being given the second, third and fourth floors of one of two large transverse wings ordered by the legislature of 1881 to be attached to the capitol. In December, 1884, the transfer was made to the new and greatly enlarged quarters—the library occupying the second and third floors of the wing, and the museum and portrait gallery the fourth. These several floors are reached by a passenger elevator. Having seen the Society established in its new rooms, Secretary Draper resigned his position on the sixth of January, 1887, with a record of thirty-three years of arduous labor in behalf of the State.* It was Dr. Draper's desire to devote the remainder of his life to forwarding some private literary work, but he was prevented by ill-health from accomplishing his long-cherished plans in this direction,

* He was succeeded by the writer of this paper, Mr. Thwaites, who had been the assistant secretary for two years previous.—Ed.

and died on the twenty-sixth of August, 1891. The Wisconsin Historical Library, which he practically founded, and so successfully managed and purveyed for through a third of a century will remain an enduring monument to his tireless energy as a collector of Americana; while the first ten volumes of *Wisconsin Historical Collections* attest his quality as an editor of material for Western history.†

Management of Society—Anti-Partisan.

From the first, the Wisconsin legislature, with enlightened liberality, looked kindly on the undertaking, and made appropriations with which to purchase accessions, meet the greater part of the running expenses, and pay the salaries of secretary and librarian. The relationship of the Society to the State is not generally understood, even in Wisconsin. It is, however, easy of comprehension. By statute, the Society, which operates under a legislative charter granted in 1853, is the trustee of the State, and holds all of its property for the commonwealth. It can neither sell nor give away any of the property it thus holds in trust, nor remove any of it from the capitol, without special consent of the legislature. As to rooms, lights, fires, janitorial service, repairs, mechanical supplies, stationery, printing, and postage, the Society is on pretty much the same footing as any of the State bureaus. The machinery of the Society serves to remove the management of this enterprise from partisan control; the members are gentlemen of prominence throughout the State, of all shades of political opinion, and for forty-three years there has not been even a suspicion of "politics" in the conduct of its affairs. The Historical Society is an institution which all good citizens unite in declaring should be free from such baneful influences. The work is thus left in the hands of those having a keen interest in it, and trained to its performance. As for the official interests of the commonwealth, they are looked after by the governor, secretary of state, and state treasurer, who are by the law *ex officio* members of the executive committee and serve on its most important sub-committees. The fact that these officers have the power to report upon the Society's operations, and the further fact that the legislature can at any time investigate its affairs, tend to make the management scrupulously careful.

Some Library Possessions.

The Society is actively engaged in several departments of historical and economic research and accumulation, has a fairly-equipped historical and ethnographical museum, and a portrait gallery of Wisconsin worthies, containing about two hundred portraits in oil, about a hundred crayons, and numerous pieces of portrait statuary. About fifty thousand persons visit the gallery and museum annually, the three large halls devoted to these departments being possibly the best patronized exhibition rooms in the State. Yet, whatever reputation the Society may have won among scholars has been chiefly the outgrowth of its library; in this it takes great interest and is doing its best educational work.

In 1875 the miscellaneous books in the State library, at the other end of the capitol, were transferred, by order of the legislature, to the Historical Society's library, leaving the former purely a State law library, under the control of the justices of the supreme court; while the latter became, to all intents and purposes, a miscellaneous State library in charge of the Historical Society. The relations between the two libraries, both the property

†See Wisconsin Historical Collections, Vol. XII., pages 1 to 22, for Secretary Thwaites' memoirs of Dr. Draper.—Ed.

of the commonwealth, are harmonious.

Library Publications.

The Society has published twelve volumes of *Wisconsin Historical Collections*, averaging five hundred pages each; the *Catalogue* of its library, in seven volumes of seven to eight hundred pages each; the *Proccedings* of its annual meetings; two *Special Class Catalogues*, one containing titles of "Books on the United States Civil War and Slavery," and the other an exhaustive "Bibliography of Wisconsin Authorship;" three editions of its *Portrait Gallery Catalogue*, and numerous historical pamphlets.

Number of Volumes.

The Wisconsin Historical Library now numbers about 100,000 volumes and 85,000 pamphlets. The average annual increase is 3,500 volumes and 3,000 pamphlets; nearly two-thirds of the former are purchased, but not over ten per cent. of the latter.

In the West, large private libraries are not so numerous as in the East, and these are generally in the possession of young or middle-aged men. Thus we have not that source of supply enjoyed by the older libraries of the Atlantic slope, in the receipt of books by bequest. Only once have we had a large gift of this character. In 1866, Mrs. Otto Tank, of Fort Howard, gave us the library of her father, a scholarly Amsterdam clergyman named Van der Meulen. The Tank library consists of 5,000 old and rare volumes, mostly in the Dutch language—probably the largest collection of Dutch books in the United States. Nearly half of them are richly bound in vellum, and many are profusely illustrated with seventeenth century copperplate engravings; in the collection are numerous Bibles, atlases and charts, old editions of all the classics, early lexicons and historical works. These old Dutch books are among the most precious of our treasures.

Collection of Newspapers.

The principal daily and weekly newspapers of the State, some three hundred and seventy-five in number, are sent gratis to the library, by their publishers, for binding and permanent preservation. Some two hundred and fifty stout volumes are annually made up in this manner three years of the smaller weeklies being bound in a volume. These files generally reach back to the first issues of the journals represented. We find that the State papers are frequently referred to by judges, lawyers, members of the legislature, and special investigators of every sort, while, as the Society's files are in many cases the only full ones in existence, editors themselves have not seldom had occasion to examine them in the library or write for data contained in early issues. Our collection of bound newspaper files published outside the State amounts to nearly 8,000 volumes. The earliest London file is that of the *Public Intelligencer*, bearing date 1656. From that time on, there are few years not represented by some prominent English or American journal. From 1750 forward the collection is unusually strong, especially in the American department. Newspapers are a fertile source of historical information, and this feature of the library we regard as of the utmost practical importance. An elaborate catalogue of our newspaper files is now being prepared for publication.

An Aid to the University.

Regarding the scope of the Society's library, I may explain that it is a general reference library, with the lines of local and general American and English history, economics, and description, developed with especial care. On account of the proximity of the University of Wisconsin—a mile away—about ninety per cent. of our readers are students from that institution, and in purveying for the State Historical Library their wants are taken into consideration. University students do-

ing original work of some importance are under certain restrictions allowed access to our shelves, the same as other special investigators, as it is greatly to their advantage to have in sight all the resources of the library on a given subject. To be as useful as possible is the aim of the library, and the attendants are instructed to grant to deserving students whatever privileges are consistent with careful management. The University seminars, and some special classes in that line of work, are given the use of rooms adjoining the library. The students and professors are, in fact, encouraged to use our library as freely as they would that of the University itself. The University library, of some 30,000 volumes, is at present more especially devoted to technical works, and duplication of books already in the State Historical Library is avoided so far as possible; the students in history, economics, and kindred subjects appear chiefly to rely upon the latter, as their own literary laboratory.

In addition to the University students, specialists from all parts of the West may be found in the State Historical Library, especially in the summer months. During the past year historical investigators from several of the Atlantic States, north and south, have sought our shelves chiefly to consult our manuscript collection, which now embraces nearly six hundred stout folio volumes. These are particularly rich in material for the history of the West and the South during the Revolutionary War, and the war of 1812-15, and for the history of the fur trade in the Old Northwest. There are few libraries in the United States, where the range of readers is so cosmopolitan as in the Wisconsin State Historical Library.

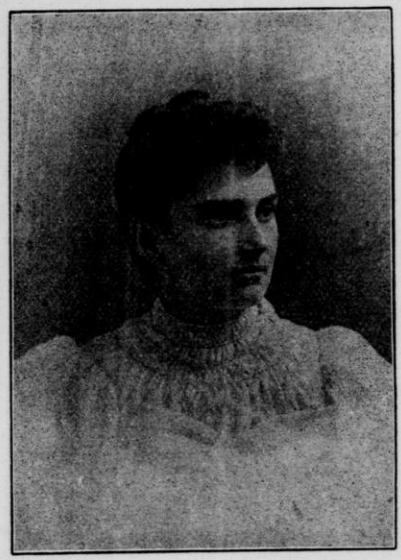
The New State Historical Building.

The Legislature has certainly been generous to the Society; with a few notable exceptions, in earlier years, the latter's relations with the governing body have been harmonious, and it must be confessed that the Society could not have been successfully maintained in this State, without liberal State aid—far removed, as it is, from the intellectual centers of the Nation, and thereby laboring under peculiar difficulties. The great need of the Society has long been a commodious, fire-proof building, designed on the most approved models, for the accommodation of its library and museum, and its several offices. The present quarters in the State capitol are quite inadequate in extent, badly constructed in every way, and in no sense fire-proof; moreover, the State Government needs for the use of legislative clerks and committees the space occupied by the Society. After many years of agitation, the legislatures of 1895 and 1897 came liberally to the rescue, with tax levies which in due time will aggregate $420,000. The desired building is at last in course of erection, upon an ample plot of ground given for the purpose by the board of regents of the State University, in the proximity of that institution. It is anticipated that the removal into this building, to occur, probably, during the year 1899, will be accompanied by considerable private gifts to the library and museum, and a general broadening of the Society's influence and usefulness.

The legislature of 1897 also provided for the incorporation of local historical societies, which shall be auxiliary to the parent Society. The local organizations will each be entitled to one representative at the annual meetings of the State Society, and may make reports to the latter, to be published in its Proceedings. It is possible that an outgrowth of this union may be occasional historical conventions, held at representative points, at which papers may be presented and other appropriate exercises held. As a general result, the prospect is encouraging for a considerable growth of popular interest in Western history, within our State, which will find its best fruits in the public schools, with whose teachers the Society is anxious to keep in the closest possible touch.

THE AIM OF EDUCATION.

Mrs. FLORENCE COLE CLELAND, Columbus, Wis.



MRS. FLORENCE COLE CLELAND.

This world is growing exceedingly full of people, of projects, of needs, of opportunities, and of obligations. The means employed for the education of the human family today are more numerous than ever before, and the educational field more inclusive. First to come to mind would be the public and parochial schools, preparing their large body of students for the university, business college, and more advanced institutions of learning. All would include in the educational field the student, from four to twenty-one or twenty-five years of age, and the instructor. But does not a thoughtful consideration discover a broader field? Is not the object of the press educational? Is there not an educational value in the many books which pass from the publishers' into the public's hands every year? The church as well as the school, assemblies, reading circles, lecture bureaus, conventions, institutes, all must be enumerated as means employed for the education of the people. Life itself is a school in which old as well as young are enrolled as students. This being true, may we not ask, What is the aim of education?

What Should Education Do for Us?

In the minds of parents whose children are to be educated, of teachers upon whom a large share of the responsibility of this work depends, of all who, whether speaking from the pulpit, on the platform, or through the press, are nevertheless interested in the advancement of the present generation, what ideas are formulated regarding the work education should do? What to them and to us is the meaning conveyed by the term "well educated?" Education is a means to an end, not an end in itself. The nature of the end determines the nature and value of the means, while the clearness and definiteness in which the goal to be reached is defined in the mind of the educator measures the success to be attained. Results must first live in thought and purpose. Hence the importance of this question.

Brain and Brawn.

Education is a theme which has occupied the thought and attention of the wisest men of all ages. But one has only to study the historical development of this science to realize that among those who have been interested in education there has not been unity of purpose. In different ages and in different nations numberless systems have developed, the promoters of each having distinct ideas as to what were the elements of manhood and womanhood which it was the function of education to strengthen

and develop. The principal systems of the ancient world, the Greek and the Roman, stand in sharp contrast. The ideal of the one was a man of thought, of the other a man of action; of the one man beautiful, emotional, clever; of the other man, brave, sturdy, warlike. In mediaeval and modern times two leading systems developed, the humanistic and naturalistic, each worked out with various modifications. The standard of the former was purely intellectual. The learner was exalted above the doer. By the latter a broader view was taken of the work education should do. "Our object," wrote Montaigne, a leading author, "is to breed, not a logician, not a grammarian, but a gentleman. 'Tis not a soul, 'tis not a body that we are training, but a man." The results and influences of each of these systems can be traced in the history of the different nations during the time each was practiced. With the experience of the past to guide us, with the best thoughts of the most intellectual men of the present before us, certainly we ought not to err in our judgment.

Essentials of True Manhood and Womanhood.

Treating the subject first negatively, I will mention such attainments, which although they may be included in the qualities that help to make up the ideal product of education, do not of themselves constitute that product; such are accomplishments, business ability, and scholarship. Although a daughter may have completed courses at the best conservatories of music and art at home and abroad, still she may lack the deep foundations on which a noble character must be built, and those enduring qualities essential to an ideal womanhood. I do not say "does lack," for these accomplishments of themselves are not uneducational. But alone they do not supply the essentials. Although a son may possess that shrewd business ability that makes the accumulation of wealth a seemingly easy process, still there may be wanting that general knowledge, that uprightness of life, that breadth of interest and sympathy constituting full-orbed manhood. Those should rather be termed training schools than educational institutions which advertise to prepare students for a business life by a course of six months. The real struggles of life are not for food and raiment, but for ideas, for truth, and for purity. Money is not the object of life, nor does money making necessarily imply education. Not that education should stand in the way of prosperity, nor lessen the ambition to secure a home and provide means against a time of need. Whether farmers, mechanics, merchants or doctors, education should, if worthy of that name, better fit us for our profession. The farmer with no aspiration except in the accumulation of wealth, no patriotism that can be stirred except by national prosperity, no spirit of neighborly interest or kindness except for that man with whom he can make an advantageous bargain, such has not felt the least beneficial influence of a general awakening of their powers; their higher nature is dwarfed and withered. They live and labor for self and the present time, and their labors perish with them. Their desire for knowledge may not be strong enough to bring them to an institute, and if, by experience they have come into possession of any knowledge which would be of value to others, they would selfishly keep it to themselves. I think the conductors and supporters of these Institutes will agree with me that the meeting together of the farmers has a value beside that which can be measured in dollars and cents. It deepens their interests, opens up new lines of thought, broadens their views, and gives birth to a whole souled feeling of brotherly sympathy and good-will.

But perhaps the most frequent misapplication of the term "well-educated" is in using it synonymously with the term "scholarly," and grading people between the limits "well-educated"

and "uneducated," according to the varying amounts of knowledge stored in the mind. This puts a premium upon the work of the memory, ignoring the higher power of reason; not taking into consideration the character, the soul of man, or his fitness to meet life successfully. Probably all have among their acquaintances scholarly people, who are sometimes termed "educated fools," those who lack with all their learning, that most uncommon of all the senses, termed common sense. Knowledge is not everything.

Mental, Moral and Physical Strength.

Let us now turn to a positive treatment of the subject. If merely the accomplished member of society, the successful financier, or the scholar, be not the ideal product of education, it remains to define that product. But there are certain facts which must be enumerated before this can be clearly stated. First, that in education there is not only the intellectual nature claiming attention, but not of less importance the physical and the moral, that implanted in the life of every person are the germs of his or her possibilities and powers, an expression of the Divine purpose concerning that individual; that there are certain means, which if properly employed at the proper time, tend to call forth, to develop and to perfect these implanted faculties. With these facts in mind we can better appreciate the words of Col. Parker, who said: "The harmonious development of every individual, body, mind, and soul, a symmetrical upbuilding otherwise termed character, should be the end and aim of all education." Certainly never has a higher ideal enthused the educator, and we

"Can doubt not through the ages,
An increasing purpose runs,
And the thoughts of men are widened
By the process of the suns."

Opinions differ as to which of the three elements of education should be counted first in importance. Study and investigation, however, are disclosing more and more the dependence of the intellectual and moral natures, and are saying: "Bring up your child robust and healthy, in order that he may be wise in understanding and moral in habits. This attaches to the strength of the physical constitution a new dignity and importance, and discounts the value of any material or intellectual progress made at the expense of health. Regarding the intellectual element, whether faculty or knowledge be the direct aim, the ultimate purpose is to prepare a man qualified to engage in the active duties of life, bringing to bear upon all questions involved that breadth of view, that strength and independence of judgment which marks the free man and woman.

All Our Lives a School.

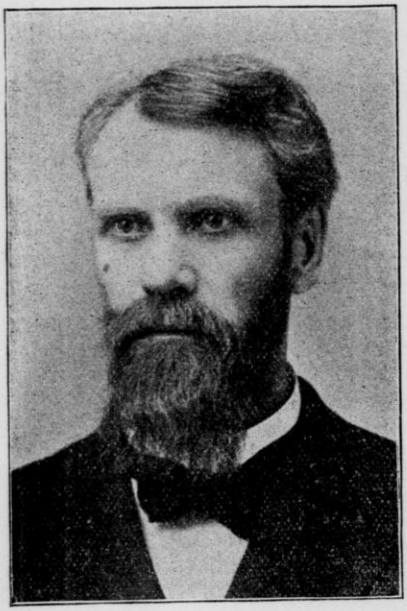
Education should be a preparation for complete living, a preparation which seeks to awaken the soul to a realization of the meaning of life before its opportunities are past, a preparation which in the words of Sully "seeks by social stimulus, guidance, and control to develop the natural powers, making one able and disposed to lead a healthy, happy, and morally worthy life." This educational work certainly is not confined to the school room nor to youthful students. Many of the deep-thinking, whole-souled, inspiring men and women, people of influence and power, have a diploma from no institution of learning. Life and its surroundings may not have permitted a course at college; but with eyes open to see, minds active to think, and hearts quick to feel, life itself has been a school, and its lessons have been well learned.

To those who have been in attendance upon these Institutes many new ideas have come. Let us take them home, think over them, study and apply intelligently, striving to make every day's work count for as much, every head of stock to bring in as much, every acre of land to yield as much as possible. If we are farmers let us strive to be prosperous, thrifty

farmers. But with this, let us be more, —let us be men and women of character, and whether young or old, let us welcome every thought and circumstance in life which makes our minds more active, our hearts more tender, our feelings more responsive, our characters more noble.

LIMITATIONS AND POSSIBILITIES OF OUR RURAL SCHOOL SYSTEM.

State Supt. J. Q. EMERY, Madison, Wis.



SUPT. J. Q. EMERY.

In the discussion of a question which involves the enlargement of the scope of work in our common schools, it is vitally essential that we keep constantly in view the fundamental purposes of the system. No addition to the curriculum should be attempted simply because it is an innovation nor because it ministers to the wishes of any class of people who are peculiarly zealous in reference to the views naturally most strong with them.

Basic Principles.

The ultimate aim of every course of study which is to be most fruitful of results for the general good must be a wise adjustment and apportionment of the multitudinous special claims made on the public schools.

The brevity of the school life of the majority of children emphasizes the need of the careful differentiation of the studies to be pursued, under the well settled maxim, that it is the proper function of our elementary school system to furnish such instruction and training as shall be helpful to every class of citizens. The common schools therefore seek to aid the education of boys and girls, first, on the broad basis of common humanity and, second, on the basis of the individual needs and according to the environment, present or probable, of the child. Where the second seriously interferes with or precludes the first, it should, to that extent, be excluded from the schools. Where the second principle tends to its observance to assist and complement the objects of the first, it would be unwise not to correlate these bases of educational theory.

The common school in conformity with this idea, from its inception has adopted the plan of working through

general elementary principles, not on the narrow foundation of the interests of any trade or profession but on the broad conception of the elementary training requisite for usefulness in the practice of every employment or profession, be it commerce, agriculture, government or any other phase of human activity.

Whatever other controversies there may be relative to our school system, I take it there are these certain, immovable fixtures, concerning whose inherent stability there can no longer exist any dispute or doubt. No one class may rightfully administer the common schools to the detriment of others. All classes are to be benefited in the same general way and in our school system as elsewhere in our free system of government, the greatest good to the greatest number must be the motto.

Now, it follows from these statements that there are numerous limitations to education, inherent in the nature of the common school, and these limitations are applicable to agricultural education, or, stated with more definiteness, education in the principles of agriculture. These principles include, among many others, the origin, characteristics, and possibilities of soils, those underlying modes of tillage adapted to conditions, the laws of plant life and growth, the principles of animal life and development, and the ethics and economics of farm management.

Each of these, though all are closely related, is worthy of the dignity of a separate science, for each carries with it a multitude of subordinate topics. Already the agricultural sciences cover broad fields of knowledge and investigation worthy of the best minds and experimental and explorative equipment. The future promises to increase largely the scope of this work. The extent and diversity of interests presented put the framers of courses of study for common schools to the necessity of the closest discernment and discrimination in selecting from this mass of material what will be of service in the furtherance of the proved principles of education before enunciated. Notwithstanding the difficulty encountered in this selection, if anything from this rich realm of knowledge may contribute "to develop the natural powers of the child, so as to render him able and disposed to lead a healthy, happy and morally worthy life" the children in the schools should not be deprived of its benefits. It is not alone the internal factor or the natural capabilities and inherited tendencies that influence the development of the mind, but as well the external factor of social and physical environment. While the education of all normal children rests on the same principle, the methods of reaching results must vary widely according to the environment of the recipients of education. There must be an adaptation of present means to desired ends. The mind of the child must be brought into right relation to his surroundings.

Some 400,000 children of our state live in rural communities. All about them is the constant profusion of problems that nature offers. Agriculture involves the study and knowledge of nature's laws and lessons in relation to their application to the sustenance of human life and the acquisition of wealth. It deals with the possible and probable life surroundings of the great number of pupils of the country schools. It is therefore conclusive that it is economy and good reason to bring the children to a study of phenomena which for the present may afford good training of the powers of the mind and become, at the same time, a practical preparation for a later successful application of the elementary principles mastered.

Some Limitations.

Being cognizant of the limitations to agricultural instruction because of the nature of the subject itself, and which cannot be removed, the next thing of importance is to ascertain present limitations that need only be

temporary. The city schools, in many respects, can never be so richly endowed with such an abundance of material for the study of a science they may wish to undertake, as are the rural schools in the wealth of object lessons that teem about them. Elementary chemistry is, perhaps, an exception, because its teaching requires some apparatus, a supply of chemicals, and a safe place to keep them. But the difficulties in the way of teaching the elements of physics and chemistry in rural schools are not insurmountable. These necessaries can be procured in the same way and for the same consideration that city schools get them. But if instruction is to be rational, and if it is not, it is valueless, the schools must be supplied by purchase with illustrative materials where nature does not furnish them ready at hand. The teaching in these subjects must be concrete. It is not sufficient to teach about things. The objects, the plant, the animal, the soil, the phenomena should be dealt with as realities in the pupil's experience. The study must be vital, not formal. The chief object in teaching any subject is to fix habits of study and create a love for investigation that shall carry the student far beyond the elementary considerations possible to be given in the school proper.

Favorable Environments.

Children have literally "lived in clover," plucked its sweet scented blossoms, and breathed year after year the waves of delicious breaths from the flowery fields and yet, scientifically speaking, have not distinguished it from timothy or blue grass—it having been thought sufficient to learn on the farm that all these grasses are cut to make hay. Why should not children be taught to observe the broad expanse of leaf surface, to learn of the important work performed by this part of the plant's organism—how these leaves are busy instruments, wresting from the air most valuable materials to enrich the soil, to witness the wonderful root development of clover and investigate its purposes, perhaps to notice the insects and parasites that play an important part in the life of a plant and to investigate the curious head of flowers which the "bumble bee" loves so well to visit. Such things can and should be taught in every school. It is not so much to be deplored that the child may not be able to investigate the value of clover for cattle, horse or chicken feeding, or to be taught how much money can be made or lost in harvesting clover for seed. Every plant raised on the farm could be made the subject of most valuable study. Knowing the habits of plants, studying their soil preferences, their root forms and expansions, their flower fertilizations experimenting with seeds to ascertain the best time and proper depth of planting,—all these and similar topics with a multitude of interesting variations would be a valuable training for any one and especially for the future farmer or farmer's wife, for the farmer's wife has often to be the conservator and custodian of the intellectual activity of the family.

In connection with the study of local geography, soils should be studied, many of their properties observed and the relation of plants to soil retention and preservation of effectiveness. But it is not my purpose to outline a course of study. It is sufficient to indicate that the inviting and profitable field of what might well be termed agricultural nature study has lain fallow and neglected.

Instruction of this character has been recommended in the course of study for common schools and fairly adequate outlines given. Teaching along these lines has in most cases been wholly omitted or very sparsely and ineffectively afforded. It is pertinent to ascertain the reasons for this condition. First is the fact that teachers of too narrow training are very generally employed. The desire to secure teachers for the least possible money stands in the way of getting teachers of force, originality and large

appreciation of a farming community's needs. The farmers in any community can have, under the laws of the state, just as good schools as they are willing to pay for. The law of supply and demand holds here as elsewhere.

Present Laws Ample.

Some think that the only way to get the kind of education indicated is through some supposed power of officials or through the intervention of the legislature. In reality no legislation to this effect is needed The law requires now certain named branches to be taught in every common school. The law, however, authorizes the district board to have any other branch or branches taught in the common school under its control that it may deem wise or expedient. It is not for lack of sufficient law on the subject that the elements of botany, chemistry, zoology, physics or geology or all of them are not taught in our common schools. The trouble is that the want of the districts is not great enough to find expression by raising sufficient taxes to employ teachers of requisite ability and influence.

A year or so ago, an editorial in a leading dairy paper suggested to its readers that they call upon the state superintendent to secure the teaching of the elementary principles of chemistry in the rural schools. The writer of that editorial must have been unfamiliar with the school laws of the state. Those laws nowhere confer upon the state superintendent the power to decree what shall be taught in the rural schools. The statute specifies certain studies usually termed the "common branches" which must have recognition but the district board is distinctly and directly given the authority to add to the minimum requirements of the law such other studies as it may desire to be a part of the school course.

Where is the district school board that has taken advantage of the ample legal authority vested in it, to require in its school the instruction in question? It is well that the subject is receiving so general a discussion and is made the text of frequent resolutions at agricultural meetings. But discussions and resolutions are only of value when they result in promoting definite, intelligent action in the direction of using the means and authority within easy reach.

Certain Conditions.

It may be urged that it would be difficult to find teachers equipped to perform well the work of science instruction. This is undoubtedly true, but, as I have before suggested, the offer of adequate wages will exert a powerful persuasiveness toward proper preparation for such work. Many city schools already afford excellent instruction along the line of elementary science. They afford it because they pay for it. The principles of pedagogy and the teachings of educational reformers call for teaching by concrete methods, the elements of knowledge found in botany, chemistry, physics, zoology and geology—sciences that lie at the root of agricultural training. Concrete teaching in these subjects in cities is fraught with great difficulties and yet in many cases is successfully given. There the school children may not step outside the school room door and stand in the very midst of running brooks, forest trees, rich meadows, waving grainfields, birds, flowers, and sights and sounds of farm life and activity. The advantage for instruction as far as natural means are concerned is all with the rural school. The cities, as a rule, pay enough salary to attract the greater number of teachers who have acquired, in the normal schools and in high schools, a knowledge of scientific subjects and the power to apply this knowledge in their practice in the school room.

Money will not, of course, wholly solve the problem. Intelligent experiment, discussion at farm institutes and teachers' meetings, the close personal observation and constant assist-

ance of those immediately concerned are highly essential to the selection and systematization that must take place before forces and means can be used most economically, order grow out of chaos and this feature of education placed on a basis as well defined as is reading or arithmetic. Certain subjects important in agricultural courses proper have no place in mixed elementary schools. I refer to subjects like breeding, manures, diseases of stock and the like, and no enthusiast should be permitted to trespass on grounds of legitimate school work with a big footed but small brained hobby. Further, the work in language, geography or other common branches should not be abrogated or weakened to give place to geology or chemistry as has been occasionally and foolishly suggested. The established courses ought to be quickened and enriched, not injured, by the instruction under discussion. There is a certain limitation to agricultural education in the rural schools because of the fact that very few pupils now remain in such schools after they reach the age of fourteen or fifteen years.

Township High Schools.

In the nature of things children of such ages, while they may acquire much knowledge, if rightly taught, cannot attain to anything like a fairly satisfactory mastery of the principles of the sciences before alluded to. This leads me to consider briefly another feature of our rural school system that exists almost wholly in law and but very little in fact. For a number of years a statute has been in force that authorizes the establishment of free high schools in towns in which there are no graded schools. Section 491a of Sanborn and Berryman's annotated statutes provides "whenever any town in which no graded school exists or when any two adjoining towns, in which no graded school exists, shall vote to establish and maintain a free high school, as provided in sections 490 and 491, revised statutes, and such free high school shall have been established and maintained in the manner now provided by law for establishing and maintaining free high schools, for at least three months, and when the high school board of such town, or of such two towns adjoining which unite to maintain such school, shall make the report required by section 496, revised statutes, in order to obtain the aid furnished by the state of Wisconsin, in maintaining free high schools, they shall append thereto a certificate, to the effect that such school is established and maintained in a town or by towns wherein no graded school exists." Section 491b of the statutes further provides "upon receiving the reports and appended certificate provided for in section 1 of this act, it shall be the duty of the state superintendent to make a separate and distinct class of the schools thus established and maintained in towns where no graded schools exist, and each such school shall be entitled to receive from the general fund of the state annually, one-half the amount actually expended for instruction in such school, and the state superintendent shall fix the amount to be paid to each of said high schools and certify the same to the secretary of state, at the same time and in the same manner as he is now required to fix the amount to be paid to high school districts, and certify the same to the secretary of state."

Only three towns in the state have, as yet, availed themselves of the provisions and advantages of this law. If such schools were established hundreds of children, who are not able to go to the city high schools after leaving the district schools could continue their education in the vicinity of their homes with little expense to themselves, or, compared with the benefit received, very small expense to the taxpayers of the town. Each such school might become a center of educational interest and leaven the whole educational sentiment of the town. The utter neglect to found high schools

seems to indicate that the people of the towns are not anxious for advanced education at the public expense. The possibilities for systematic and effective agricultural education in such schools is apparent. The courses of study could be shaped and teachers engaged with special reference to agricultural education. Suitable apparatus and materials could be purchased for such schools in each town that might be made a very helpful means of giving object lessons in teaching to the teachers in the district schools.

No outlay for education when wisely expended has ever been an unwise investment. It is not because he gets too much education that the boy leaves the farm. I am convinced that with broader facilities for the education of the nearly half a million of country children would come more profitable, happy and prosperous farm life. There is yet tremendous wastefulness through sheer ignorance. Hard work, thrift, favoring laws nor anything else will take the place of rational intelligence in making farmers prosperous in every sense of the word.

School Libraries.

Every means tending to increase this general intelligence should be carefully fostered. Until recent years the children of our country schools were without the uplifting, stimulating influence of good books. Now every school is provided with the beginnings of a library of choice reading. Besides vivifying the regular school studies, enlarging the scope of thought and interest, brightening the leisure hours of the children, there are possibilities in the school library for furthering agricultural education. Besides the numerous interesting and fascinating books on nature subjects, the department of public instruction has placed on the book list for town libraries one book on the Principles of Agriculture.

Agriculture as a distinct science is young. Most books on the subject are dull and prosaic. They have not been written for children. There are not more than two or three books published that are at all suitable as textbooks for common school use. One of these is on the library list and has been quite largely purchased. When interest enough is taken in the matter to make a demand, no doubt we shall have books on agricultural subjects adapted in style and treatment to the comprehension and taste of the children.

The Farm Institute Bulletin.

The legislature of two years ago authorized the state superintendent to distribute a cloth bound copy of each issue of the Farm Institute Bulletin to every school in the state. Two such distributions have been made in pursuance of this law and there has been abundant testimony that the books are read very generally with enjoyment and profit by the pupils and the patrons of the schools. The work of the Farm Institute is being felt in the state and it seems certain that slowly, but none the less surely, the time will come when farmers and farmers' children will not only be the most independent and contented people but will also be the peers in education, culture, political power and influence, of the people of any other employment or business. This is their rightful due and privilege, and no effort should be spared in promoting agencies to this consummation.

Conclusion.

What I have said in criticism of present conditions has been by a farmer from a farmer's standpoint and I trust it may be of some little service in distinguishing limitations that are functional from those that exist because of our own apathy, and in indicating the magnificent possibilities of extending agricultural education.

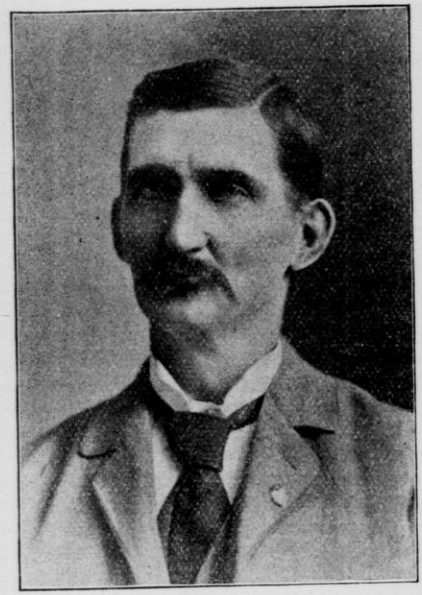
The Institute adjourned till 9 o'clock next day.

SECOND DAY.

The Institute met at 9 o'clock, March 10. Mr. CONVEY in the Chair.

KEEPING BEES FOR PROFIT.

JACOB HUFFMAN, Monroe, Wis.



JACOB HUFFMAN.

The best advice I can give beekeepers is to make all the money out of their bees they can. In the first place there are many ways to work bees for profit. It is true the bee industry has made great progress in the last twenty-five years, but perfection is still in the dim future.

Common Sense Suggestions.

While working with the honey bee is a good time to do some hard thinking and prevent more hard work next year. The most essential thing to do is to prevent waste. There is no occasion for a well person in this country to be poor. Waste in some form makes the difference between poverty and comfort. Are any of your hives, covers, bottom boards, feeders, or other implements of the apiary unnecessarily exposed to the weather? What becomes of your broken combs and pieces of wax? Do you allow the moths to destroy your empty combs? If so get your hand on the stop that controls waste, and bear on; get on it with both feet, if necessary; it will improve your circumstances. Don't chase rainbows. You think you are an inventor, but you are not. That new hive, frame, or other contrivance that you have been planning so long, drop it, and be a little wary of other people's inventions. Your endorsement is not necessary to save a good thing from oblivion, and your money can't save a bad one.

Don't waste time waiting for some promised invention that is to work wonders. The chances are a thousand to one that it won't come, and perhaps if it does come it will prove worthless. Don't get discouraged; be neither elated nor depressed; don't give away your bees, nor don't destroy them; crowd them for all they are worth, but go slow on increase. Add as few to the number of your colonies as possible; feel your way until you know your ground, and stick close to your business. The horse with the best staying qualities is the one to bet on. Strike while the iron is hot. In beekeeping work must be done at the right time; to do otherwise is to give success away. If you do everything at the right time your work will not crowd you at any period. Get everything ready this winter for the honey season and swarming, and then keep up with your work.

Bees—Who Should Keep Them.

While it is true that beekeeping may be made remunerative as an exclusive business, is it not better for the average beekeeper to diversify employment

by joining with it some other industry? If you answer yes, then what other employments, naturally profitable, go with it? Beekeeping in the past was almost exclusively carried on by farmers. This is one reason of so many failures; they did not require a rest of this nature; their labor was diversified enough already. Because a man is a good farmer is no reason why he is adapted to the bee business, in fact it is a reason why he is not. If he delights in his growing crops, if he wants to spend all his working hours in the field, he will generally be too far from his apiary, and too tired when the bell rings for dinner, to give his colonies the needed attention. The hurry of spring work and the exhaustive labors of the summer will, in most cases, cause him to neglect the very little but very necessary attentions which the bees require at these seasons to make the balance on the right side of the ledger in the fall. I would not try to discourage farmers from keeping bees, but unless they are adapted to it by nature, unless the bent of their mind is toward the details, the little things, and unless they possess energy to do the right thing at the right time, whether tired or not, they can sweeten their pancakes more cheaply with glucose than with honey of their own production.

Study Your Locality.

One of the most important factors of successful beekeeping is a thorough knowledge of the locality in which we reside. Many beekeepers do not seem to realize the importance of this, as their actions show, for if they did they would not be asking along the last of May if the basswood had blossomed yet, as did a farmer not long since. All work with the bees, to be successfully done, should be done with an eye open to the probable time of the blossoming of the main honey plants in our locality. For instance, if white clover is our main honey crop we must commence operations with the bees at least six weeks previous to its blossoming, in order to insure a good yield from it, for it takes at least six weeks to build up a colony so it will be able to do the best work on a given field of blossoms. Hence, as white clover blossoms in this latitude about June 15, we commence to get our bees ready for it as early as the first of May. Now, by so doing we get the bees in time for the harvest which means success. But supposing basswood, which opens July 10 to 15, to be our main harvest, and we have but little white clover, not more than enough to keep the bees breeding, then the commencing to stimulate the bees for this harvest as early as the first of May would be labor thrown away as well as a useless expenditure of honey used in producing bees to loaf around, waiting for the harvest. What man is there having a field of wheat requiring labor of twenty men to harvest the same, who hires these men two weeks previous to the time the wheat is ripe? When shall be learn to use common sense in regard to bees as we do other things? For a man to talk of getting his bees strong and ready to swarm in April by means of artificial heat in this latitude, as some have, shows a lack of common sense on this point.

Again, if our bees are weak in the spring and we do not get them ready for the harvest until after the harvest is over, they become merely consumers instead of producers, or worse than useless. It would be like the man hiring his twenty men to harvest his wheat after it had become ripe and soiled in the ground. Thus it will be seen that to be successful we must have a full force of bees just at the right time to take advantage of the harvest. In order to do this we must study our locality and know the time our honey producing flowers open, and then we shall gain a knowledge that will enable us to reach a rich harvest of honey when honey is secreted in the flowers.

The Queen Bee.

I will say the queen is the all important factor. She lays the eggs, and the more eggs the more bees. The time from the laying of the egg to the hatching of the bee is twenty-one days; from the hatching of the bee until it goes into the field to labor, is sixteen days. From the day the egg is laid until the bee is a field worker, is thirty-seven days; hence it will be seen that the time when the eggs are laid is very important.

There are a great many ways to devise a profit from keeping bees. One is honey exclusively, queen rearing, raising bees and selling them, and in some localities they run their bees for wax. Swarming and prevention of increase is one thing to be looked after in keeping bees for profit. There can be but little question in many localities as to the utility of keeping all the working force of bees in one hive together during the main honey flows when it can be done without interrupting the work of the bees too much, and the manipulation of frames and hives not too great to be profitable. Through the methods I have practiced for the prevention of increase, I have found not only a larger yield of honey, but that such colonies were usually in better condition for winter, and require less attention during the balance of the year.

Swarming Season.

My first work before the swarming season begins is to see that all queens are prolific, then I operate in view of two things, viz.: first, that different strains of bees vary in amount of swarming, and second, that while there are plenty of empty cells inside the brood nest but little swarming will occur. Those colonies which gather the most honey and show the least disposition to swarm are selected to rear queens from, to replace those in hives where the bees are less inclined to stay at home and attend strictly to business. In producing extracted honey, swarming is kept in check by putting empty combs in the brood chamber, or like that in working for comb honey, by giving plenty of surplus room, which keeps the brood chamber from being crowded. If some colonies still persist and swarm after these accommodations, the queen should be caught, caged, and placed under the honey board, when the swarm soon returns and at the end of three days she is released in the hive. Usually this stops any further swarming during the season by colonies thus treated.

Wintering the Bees.

Next comes the problem of wintering. I believe that bees can be wintered as successfully as horses or cattle, if we but learn the necessary conditions and then set about it with a will to secure them. A little effort rightly directed will accomplish wonders, and I know no line of human industry where persistent and well directed endeavor will be more lavishly rewarded than in apiculture, and in no branch of this noble science does it apply with stronger emphasis than in providing a comfortable winter home for our little friend, the honey bee, which certainly ranks as the noblest and the best of God's insect creation. In my mind a properly kept cellar is that comfortable home.

Now, in conclusion I would say, don't get excited about new things or new ways. Follow present plans until in your coolest moments you decide a change to be the best. Let others try novelties first. Exercise your intelligence and keep your head level. Sleep well at night and keep wide awake in the day time, and success and profit will be yours.

DISCUSSION.

Mr. Crescent—How do you winter? You say you have considerable trouble in wintering, and yet you said we could winter as well as we could our horses and cattle.

Mr. Huffman—No, I said I believed we could if we studied how. I think

that problem is going to be studied as well as many other things, as I mentioned in my paper. I find the best and most successful way is wintering in a good warm dry cellar about 45 degrees. A great many use building paper on top of the hive, but I use burlap. Some colonies will winter all right, while others will not. Hives with honey boards on in winter will mould in spite of you, caused from the steam of the bees.

Mr. Crescent—Do you winter with the bottom board on or off?

Mr. Huffman—I winter with the bottom board on, and give plenty of ventilation in front of the hive. I have tried both ways.

Mr. Crescent—Did you ever have any difficulty with foul brood?

Mr. Huffman—No, sir, I never have, and do not want to have. Avoid it, if possible.

Mr. Crescent—What causes the bees to leave their hives in winter?

Mr. Huffman—They have instinct enough to get out of the hive, as they are old and going to die.

A Member—Bees live two days after they leave the hive.

Mr. Huffman—You must have some light there.

The Member—No, there is no light in the room.

Mr. Huffman—Then I should think they were not healthy—either diseased or not satisfied.

The Member—I thought it was because it has been too warm this winter. In warm days the cellar is quite warm.

Mr. Huffman—Do you have your bees in a house below ground, and what is the temperature?

The Member—About 40 to 45 degrees, and perfectly dark.

Mr. Huffman—I believe if you put in a thermometer you will find the temperature about 50 or 55 degrees.

Mr. Kellogg—Can one farmer in ten keep bees profitably?

Mr. Huffman—That is a hard question to answer correctly. If they would follow the same plans we beekeepers do I can see no reason why they should not be successful. The trouble is they are apt to look after the farming and do not give the bees the attention they ought to have. It has always been a query in my mind why farmers do not raise more honey—enough for their own use, if no more. In many instances I have gotten two or three hundred pounds of honey from one colony.

Mr. Chadwick—What does it cost you on the average, and do you make prime comb honey or a strained honey?

Mr. Huffman—The question of cost is also a hard one to answer. Those of us in the business consider it like this: The bees board themselves and work for nothing, so what we get is clear gain. I have never kept a correct account of what it cost or what I made. I make it what we might term a side issue, along with my farming, although I have quite a number of colonies. It is all owing to pasturage. The last three or four years the bee pasture has been poor in our locality on account of the drought.

Mr. Cressy—When the gentleman speaks of this yield does he refer to comb or extracted honey?

Mr. Huffman—I usually run for extracted, because I find it more profitable, easier to get, and less trouble with swarming.

Mr Kellogg—How about the artificial swarming? Do you recommend it to farmers?

Mr. Huffman—No, I do not, unless they thoroughly understand it. If it had not been for the enthusiasm of certain beekeepers we would be away back in the sixties today, along the line of beekeeping. We have a man we are proud of, James Doolittle, of New York, who can take a colony of bees and handle it as he pleases. Get all the theory you can, but do not believe a word of it until you get a colony of bees and demonstrate those theories yourself. I used to think when we started in the business, that what was told me was absurd. I could not believe it, but when I saw

it worked out I had to believe it. Few people have an idea what can be done with bees.

Mr. Cressy—What hive do you use?

Mr. Huffman—I use the frame hive. I get my style of hive of Mr. Grim; they called it the modified Langstroth at that time. I would advise the frames straight, with the entrance not crosswise.

Prof. Henry—What kind of bees do you keep?

Mr. Huffman—Pure Italian.

The Chairman—Registered?

Mr. Huffman—Yes, they are registered for business. As for combs, I have a supply that I use for extracted honey.

Question—What does it cost you a pound?

Mr. Huffman—I have never estimated the cost of a pound of honey; time and labor is the principal expense.

Mr. Cressy—When the gentleman speaks of hiving a swarm into full combs, he is speaking as an extract honey producer, not as a comb honey producer. You lose a good many pounds of honey.

Mr. Huffman—I hive on full combs, for it takes a good many pounds of honey to build a hive full of comb; by so doing they are gotten ready for winter easier.

Mr. Chadwick—I have known Mr. Huffman for more than twenty years, and he is a successful beeman. I know he made and sold enough honey one year to build himself a good sized barn, clear of all expense.

Mr. Huffman—Well, I didn't say what it cost me.

Mr. Kellogg—How do you keep your comb that is not occupied from the moths?

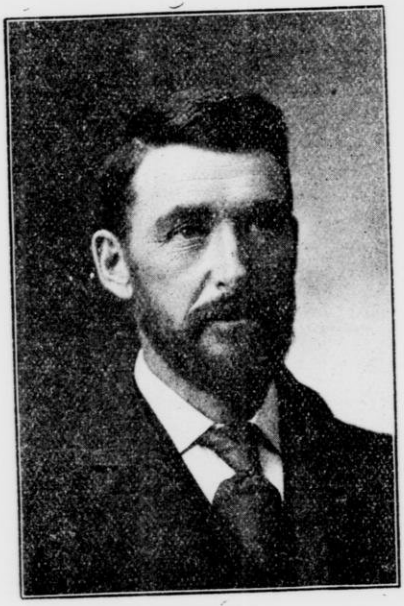
Mr. Huffman—I generally keep them on the hive until after the trouble with the moth is over with; then I put them away. The worst trouble is in the spring of the year. I store them in the upper story of my shop, fill the top hive full of comb, tier them up five deep, with a cap on top to keep the moth out.

Mr. Arnold—Will crossbreeds get honey out of red clover?

Mr. Huffman—Yes, to a certain extent. I do not think the pure Italian will, any more than the hybrid; the Italian bee will not gather honey from all red clover. They cannot get to the bottom of the cell or the cup of the flowers, but they take small blossoms that their proboscis can reach. That is the reason we beekeepers recommend Alsike clover.

FOUL BROOD AMONG WISCONSIN BEES.

N. E. FRANCE, State Inspector of Apiaries, Platteville, Wis.



N. E. FRANCE.

The extent and importance of the beekeeping industry in Wisconsin is not realized by the masses of Wisconsin people.

Like all occupations beekeeping is a trade to learn and study. There are many valuable books on modern bee culture, and several subscription papers published. Three of these papers have over a thousand subscribers in Wisconsin. As secretary of the Wisconsin State Beekeepers' Society, last year I was requested to ask of its members and beekeeping friends the extent of our industry in Wisconsin for 1896. Owing to the dry seasons previous many bees had starved, and a large majority of owners of bees do not belong to any beekeeping society, or take any paper upon bee culture, so that I was able to get only a very small report, which shows:

51,709 colonies of bees in hives, valued at	$258,545.
2,585,450 pounds of honey sold,	180,981.
Beeswax and queen bees sold,	9,500.
Total	$449,026.

Foul Brood: What Is It?

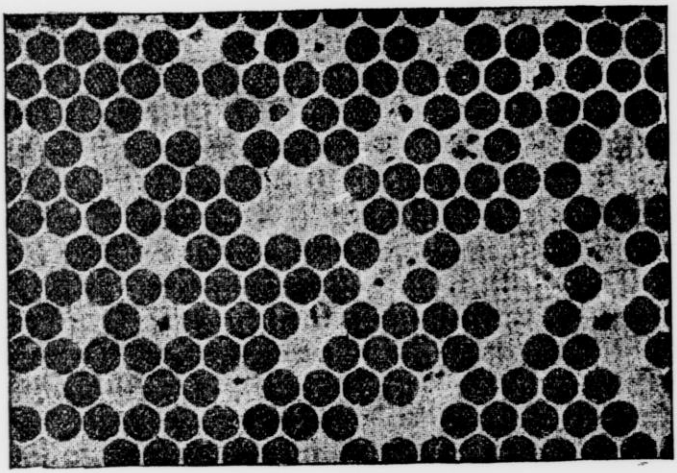
Several hundred cases were also reported of a fatal and contagious disease among Wisconsin bees, known as "foul brood." This disease preys upon the larva of the bee, usually causing death from six to ten days from the egg of the queen bee. The honey from affected colonies is quite certain to contain the germs of disease, which are not easily destroyed, and if left where bees can get at it out of honey season, they will surely carry the disease home. The germs multiply with marvelous rapidity by division, so that a single infection will soon cause ruin to a whole bee-yard, if not properly and carefully treated. As I find many beekeepers who do not know the symptoms I will briefly describe some of the most common.

Symptoms.

1. The colony of bees seem weak, with lack of energy—loafing around—sometimes with litter around entrance of hive.

2. Inside the hive, some of the brood in patches, fail to hatch, the cappings shrunken, with here and there a cell with perforated capping, as shown in the engravings. The dead larva usually to one side of cell, shrunken, of a dark brown color.

3. The ropiness is one of the best indications. Insert a toothpick in the larva, and in removing it, if the larva adheres to it, drawing out in fine



F IG. 1.
Showing Comb containing foul brood.

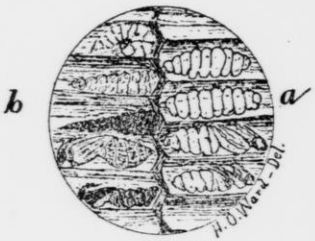


FIG. 2.

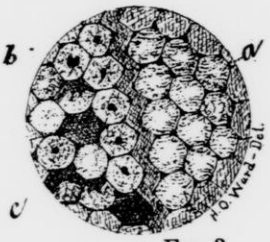


FIG. 3.

Figs. 2 and 3 contrast between (a)—pickled brood, and (c)—foul brood.

thread-like appearance, then springing back as rubber being stretched, it is a likely case.

4. The peculiar odor of foul brood resembles a cabinet glue-pot. In the early stages of the disease it may not be noticed, but a little later it will upon opening the hive. I have seen some cases where this peculiar odor was offensive several rods away.

There is also a great amount of dead brood in the hives this year in Wisconsin, owing to the extremes in the weather. In some respects this dead brood, called by Dr. Howard "pickled brood," resembles the early stages of foul brood, and seems to be contagious. The cappings in some cases are perforated, and the larva within has dark color, heads shrunken to a point, and often the entire larva standing on end against the side of the cell will not be over half the natural size. Upon removing this larva the skin will be found quite tough, containing a watery matter, free from smell, or the ropy appearance found in foul brood.

In such cases during honey flow season it can be cured if treated as foul brood, and in many cases by removing

the queen and a few days later removing all queen cells and giving plenty of healthy bees and brood combs containing eggs from a sound colony, it can also be cured. Fine salt sprinkled on the dead larva does no harm, and in some cases hastens bees to carry it out. If this dead brood continues in the hive for some time, and becomes a foul matter, I have known of cases this year in Wisconsin where it either developed into real foul brood or was a proper medium to receive and propagate the germs.

Please do not forget that no old combs, hives, honey or dead brood in any age ought to be left exposed where bees can reach them, as that is too often the cause of seriously spreading the disease. In several apiaries this season I have found large piles of hives, some containing old combs with diseased honey and brood in them, and bees from the same and neighboring yards carrying home the disease.

It is poor practice to borrow combs and implements, or to buy queen bees, unless you know they are not diseased. If all colonies are kept strong with plenty of unsealed honey near the brood, and surroundings perfectly clean, it is a great preventive.

Treatment.

The best time to cure foul brood is during the honey gathering season, but with great care and plenty of good feeding it can be treated at other seasons. If you have hives that you know to be clean and free from the disease, use them, and later thoroughly clean the old hive, as it may contain germs of disease. To cleanse this hive give it a good scraping, and then use boiling water, long enough to melt every particle of comb in it. Drive corner nails in to prevent the hive from warping, and dry in the shade. This may not be necessary, but it is always safe. In the evening after the bees have ceased flying, cage the queen while removing all the combs.

Either place a clean hive of the same color on the old stand, or the old hive, well cleaned, putting five clean frames in it with foundation starters two inches wide. Shake all bees with caged queen on the starters, closing the hive, not the entrance, for four days. At the end of four days in the evening, remove all frames and replace them with full sheets of foundation, and shake the bees with released queen on frames. Should the colony be weak, it is best to double them up, as a few strong colonies are worth more than several weak ones.

Necessity of Thorough Renovation.

All combs and frames first taken from the diseased colony should be burned, letting nothing escape, as there lies most of the danger. True, the wax may be melted and the honey boiled and saved, but nothing short of a half hour's honest boiling and stirring will be safe. Solar extracted honey or wax is not safe to use. If you wish to save all brood from diseased hives, it can be put in clean hives in outside of beeyard, filling a hive with such combs, closing entrance two days, and keeping the hive shaded. Then open the entrance when much of the brood will be hatched, and the bees should be treated with foundation starters, the same as the old, diseased hive. The starter combs and old brood combs should be burned or boiled. I do not believe in destroying property that can be saved, and there is no need of it in curing foul brood, if properly treated, but in very many cases it is not economy to save the little wax or honey that would be obtained from the first set of diseased combs.

Any Wisconsin beekeeper who wishes a copy of the book upon the subject of foul brood can get it free of charge, by writing me for the same.

POULTRY KEEPING ON THE FARM.

Mrs. A. W. LEHMANN, Neosha, Wis.

MRS. A. W. LEHMANN.

The old Scotch adage, "It's many a mickle makes a muckle" can well be applied to our poultry raising on the farm. There are very few who realize the vast amount of poultry and eggs used in our own country alone. The principal fresh meat of our southern people is poultry and eggs, because a chicken can always be had fresh without the necessity of ice boxes. The poultry output of our country far exceeds its beef and pork production, and nine-tenths of this is raised upon our farms in small amounts. There is no meat that brings a better price the year around, and that will give us such constant returns.

The Wife's Share.

The average farmer thinks it is a waste of his time and feed to pay any attention to the poultry; as a natural consequence they are generally poorly cared for and poorly housed. Before the days of creameries, the eggs, poultry, and butter constituted the wife's income, to furnish her household supplies, consequently the cow and chicken got what nothing else would eat, or what they could find for themselves, as it was considered the height of folly to give feed of any value to them, simply to fill the wife's pocket book. The product was carried to the country store to be bartered for goods. The creamery and cheese factory have turned the cow over to the other side of the house now, and she, at least, is tolerably well cared for. But the poultry still remains in the woman's possession, often times to roost in the trees or on the wood pile, and feed with the pigs, what they cannot get by scratching for, and the farmer, unless his wife has the good fortune to sell for cash and the proceeds come in very handy to pay his taxes with, will denounce the whole lot as a nuisance, and will positively declare that they eat their heads off every year.

A man who made a business of feeding sheep, hogs and cattle, and made money at it, was one day admiring my poultry, and said to me, "How do you do so well? I can't." I replied: "Where does your poultry roost?" "Oh, anywhere." "What do you feed?" "Oh, nothing they run and get what they can with the stock." Now, do you wonder he made a total failure of it. He would have been horror struck had I advised him to feed his stock in the same way, and this was in the winter time, too.

Poultry for Profit.

But my object today is to show you that poultry can be made a paying business on the farm, where every-

thing is furnished at its first cost, and give many a dollar for spending money, help many a boy or girl to get an education, give the wife many a luxury she could not have otherwise, help to buy the long-wanted pretty cloak or new gown, and bring rosy cheeks to the wan, pale face and cut down the doctor's bills. But you will say "that means work;" yes, but what do we do that we make a success of, that does not mean work, steady work, attention and willingness to do something regularly on time, and thoroughly.

Ducks and Geese.

You can raise guaranteed fresh eggs for market, stamp them with your name, send them onto the market for just what they are, and it will not be long before they are in demand at a little more than the market quotations, because they are always good. One farmer had over $300 a year in that way from his poultry and eggs; another sold $180 worth of geese. From these geese he had all the feathers and 16 geese left over, and he sold them all at market price. He took 90 geese to market in his buggy. The next day he took two large wagon loads of hogs, and the two loads did not bring as much money as his wife's geese, and he said he knew the hogs ate twice as much corn. James Rankin, of South Easton, Mass., says he turns three or four thousand dollars worth of grain every year into eight or nine thousand dollars worth of ducks. He has of course the great eastern market to supply, where they bring much higher prices than here. But there is no fowl that will grow as fast as a duck or goose, and he markets his ducks at ten weeks old, gets them out very early to catch the first markets and high prices.

The country tributary to Watertown, Wis., is noted for its stuffed geese. Anything weighing seventeen pounds commands a price of as many cents a pound as the goose weighs. For instance, a goose weighing twenty-four pounds brings 24 cents a pound. These geese are sold to Jews in neighboring large cities. The liver, which gets to be abnormally large, some weighing three and one half pounds, is considered a great luxury, one liver selling as high as $2.50. All the largest cities of the United States constitute a market for these geese. This year one man had sixty-one geese weighing twenty-seven pounds apiece, which brought him 27 cents a pounds, netting him $444.69. Another had eighteen which brought him $86. These are accurate figures, as I have endeavored to get the truth of the matter.

Turkeys.

Perhaps one drawback to raising early poultry near our small towns, unless we have a larger town for shipping to, is that the people in our northern states have not learned that poultry is good always as other meats, and does not cost very much more, if any. We are all bound by habit, more or less, and poultry is considered a sort of holiday meat. Consequently just before these days the markets are glutted and poultry goes down to almost nothing; we lose money on it and become discouraged. The rest of the year poultry is high and people buy it as a luxury. You never lose money on young and growing turkeys and chickens if you keep them until after the holidays are over. Turkeys are light eaters on the whole, and constantly growing until one year old, and it costs no more to raise a good turkey than it does a little one. They do not require the attention of other fowls after they are feathered, so cost much less care. I have learned by experience that the more you let a turkey alone after it is big enough to hunt, the better it is off. Feed them regularly, let them roost out of doors, and they are a very healthy fowl. If it has been raining and they are all wet, and it suddenly turns cold and snows, drive them under shelter, as

such storms will kill them quicker than the coldest winter weather.

Incubater Fowls for Early Market.

The old saying, "It's the early bird that catches the worm," is very applicable to the poultry business. The earlier fowls are much easier to raise, are not nearly so subject to disease, and vermin does not bother them nearly so badly. They are in a nice condition to catch the bugs and grasshoppers. The only safe way to raise early fowls is with a good incubator. You can attend to a 200 egg machine just as easily as you can tend one sitting hen, and I know you can keep your temper a good deal better. One hundred chicks hatched in March or April, are worth 200 hatched in June. An incubator, if well cared for, is always ready to set; a hen is not. If we lose an incubator of eggs, which is a rare thing, if it is a good incubator, we feel that it is a big swindle, but if twenty hens lose the same number we think it is just what we may expect from them, and patiently do it over again. You don't have to turn a basket over it and weight it down with a stone to keep Biddy in her nest, and then when you go to feed her find Biddy gone, the stone where the eggs should be, and the chickens counted before they were hatched. If obliged to set her have a place where only sitting hens can get to it. Keep your nests perfectly clean. A good plan is to set three hens at a time, then divide up the chicks between two of them if all do not hatch well. Be sure and give the hen her chicks before you take her off the nest, and if there are different colored ones among them do not mix them up, for Biddy draws the color line, and she knows her color every time, and woe betide the chick of another color that crosses her line.

Feed for Young Chicks.

Place the old hens in coops until the chicks are three or four weeks old. If you use brooders have them warm, light, and dry; these three things you must have. Raise them above the level of the ground so no surface water can possibly get in. Feed for the first week brooder or incubator chicks or turkeys, dry bread crumbs or rolled oats. Then you can begin to add other feed, a little at a time, especially for turkeys, as whatever you begin on they seem to want that and nothing else. Cheese curds, corn and barley meal scalded or baked in a cake, with sour milk and soda, cracked rice baked in sweet skim milk are also very good; bread and milk, plenty of grass for young chicks and goslings, especially clover; then middlings and milk after they are older. I feed all the sweet skim milk they want to drink, all the time, putting it in jugs and turning them up into large saucers so they can only get their beaks in. Don't cook cheese curds too hard, just enough to get the whey out. I shall use Bowker's animal meal this year in connection with other foods. Well baked food does not sour nearly so quickly as scalded. Don't feed sour food to brooder chicks. Lettuce, cabbage, and all such things are very good food for young ducks and goslings.

In getting your chicks off early you accomplish two things: you have pullets for winter laying, and can turn all the rest off for broilers if you do not want to raise them for winter market. Winter eggs are the profitable ones and can only be had by having warm houses and early pullets. I haven't them myself yet, but I have always believed in scratching sheds. Small, warm roosting places and large, light sheds I think will be the coming house for winter eggs. If you notice the man who has a nice, warm house, be it ever so small, and his chickens have access to the straw stack, always has winter eggs.

Other Points on Poultry Keeping.

I would build houses running east and west, facing the south, with large, sunny windows in the sheds. The New Jersey men advocate cloth curtains

instead of windows. That may do for New Jersey, but I am certain it will not for Wisconsin.

Feed a warm mush of cooked roots and bran and middlings mixed with skim milk; if you have it add ground beef scraps or Bowker's animal meal for the morning meal in their feed boxes; then throw grain in the deep straw in the sheds and let Biddy work as hard as you do for a living. She will do it and make a sucecss of it, too. Give her cabbage and beets to pick at for green feed and a good box of dust, with plenty of water and oyster shells and bone to keep her from laying soft shell eggs, and she will be happy.

I like to hear them sing in the morning for their breakfast, they are so contented. Interest the boys and girls in them; give them fancy poultry as pets; they will soon take care of them as well as you do, and take a pride in it. Last, but not least, keep good fowls; it costs no more to feed a nice fowl than it does a poor one, and you will enjoy it better yourself. If I have left anything out that you would like to know I will try and answer it.

DISCUSSION.

Mr. Scott—What kind of poultry would you recommend for the farmer?

Mrs. Lehmann—What do you wish them for, winter laying or for market? For winter laying the Brown Leghorn or the Langshans are really the best I think, but for market the Plymouth Rock or any of those that feather out quickly, are the best. I like a cross between the White Leghorn and the Brahma for a broiler; they have a nice, white skin and look well. For turkeys I myself have the Mammoth Bronze.

Mr. Kellogg—How large a crop of chickens are profitable?

Mrs. Lehmann—If you have them separated in small pens you can keep as many as you wish to. I do not think that over fifty ought to run together unless you have a good large yard. Mine are separated into twenty-five in a pen; I use wire netting for dividing them.

Mr. Arnold—On a good sized farm do you think it would be profitable to keep five or six hundred chickens and have them separated during the winter?

Mrs. Lehmann—I do think it would. You can build your houses large and divide them off into small pens for roosting places, then make these sheds and divide them with wire netting and the expense is very little. They will run and scratch and go back into these pens for roosting and for their morning's feed. I think there should be cheap sheds on the south side, with big sunny windows and plenty of straw.

The Chairman—What height netting do you use?

Mrs. Lehmann—I have mine clear to the top, but I think most chickens will keep within a six-foot netting.

Mr. Porter—I wish you would mention one, two or three different diseases that are prevalent among poultry, and state how you would best cure them; for instance, roup.

Mrs. Lehmann—You can generally tell when they have it, by their swelled heads, and you will hear them sneezing and coughing. It is brought on by cold draughts or damp places; I don't very often have to cure it, but if I do, I use tincture of iron in the drinking water; you put in a spoonful to a gallon of water, although it will not hurt if you put in more. I find Sherman's condition powders or Pratt's condition powders, put in their morning's food, to be a good thing.

Question—Is it catching?

Mrs. Lehmann—It is catching if you let it run very far. I suppose it is the same as influenza with people; the same condition that brings it on with one, brings it on with another.

Question—Why do you consider Brown Leghorns better than White Leghorns?

Mrs. Lehmann—I don't know that there is really any difference, only my

Brown Leghorns have been very good about laying this winter.

Question—Is this roup the same as cholera?

Mrs. Lehmann—Oh, no; they are very different. I never had cholera among my chickens, but they say that the condition powders will cure it. There is a remedy that a great many use and call it very good, and that is common Venetian red in the food.

Mr. Meyer—How often do you clean out your chicken coops?

Mrs. Lehmann—I whitewash every spring and fall, and they should be cleaned every single week and plenty of land plaster scattered around with plenty of straw in it, the deeper the better.

Mr. Alsmeyer—How does the chicken manage to keep the pores open?

Mrs. Lehmann—I use a dust bath generally, and sifted coal ashes is very good; they like it, and they will eat a good deal of ashes, too. Wood ashes are very apt to make their crops eat up.

Question—Do you always keep your poultry confined?

Mrs. Lehmann—Oh, no; they have large yards, and I let them run out through the fields in the fall, but not in the summer time for they would do too much damage in the garden. I have good yards for them.

Question—Do you have any trouble with your Leghorns flying over the fence?

Mrs. Lehmann—Yes, I generally have to cut their wings.

The Chairman—I saw you had a homemade brooder that I thought a good deal of. Please describe it.

Mrs. Lehmann—I have a homemade brooder, one of my own get up, and I like it better than I do the small ones. It is built on a sidehill with a furnace. I have a little box stove and the chimney runs through under the ground the whole length of the brooder. It is filled with sand, the top of the stove is covered with a pan filled with water and it is always warm. The trouble with a great many brooders is the top heat above. You must have bottom heat to make a success with your chickens. They can lay down anywhere they want on that warm chimney and keep thoroughly warm and when the days are wet they can stay in there and not be let out at all. If you have a large warm room you can always keep them there as contented as though they were out doors, and in feeding the chickens they don't get all wet as they do in small brooders. I find it the nicest way to raise them. I have ducks, geese, and turkeys all in the same brooder. I have two of them about eight by sixteen feet and the chimney runs clear through under the floor and comes out above, making the sand warm all the way through. The floor is covered with sand, and it is masoned up around so the rats can't get in; put your wall deep enough in the ground.

Question—What make of incubator do you use?

Mrs. Lehmann—I like the Monarch best. Do not get a cheap one under any consideration; they are expensive in the end.

Question—What do you use for the red mite?

Mrs. Lehmann—I use a cheap cure, carbolic acid. I spray it all over the hen house and then I whitewash. I take a pailful of water and put in a half pound of carbolic acid and a pint of kerosene; it comes at about fifty cents a gallon. I take a common buggy pump that will throw the carbolic acid into every crack and crevice, and then whitewash it with a little kerosene. That is sure death to them.

Mr. Curtis—You said that you must have bottom heat in order to make a success of your chickens. I have had something to do with incubator chickens, and we had a sort of tradition down east that bottom heat is sure death.

Mrs. Lehmann—It is not. They lay down along on the edges as contented as possible. I make a cover, with lath nailed around, making a square of about two feet, and cover that with

woolen cloth, nailing on tight and follow on the side; it makes curtains and that is all the top cover I have. You go in there at night and you will see their heads sticking out all around. Bottom and top heat are good, but the top heat alone is good for nothing. They must have a certain temperature; it must be warm enough so that they cannot get chilled at all. With my arrangement the floor never gets cold—two fires a day will keep it plenty warm all the time.

A Lady—What do you do for scaley legs?

Mrs. Lehmann—Dip their legs right into kerosene; that is about as good as anything you can use.

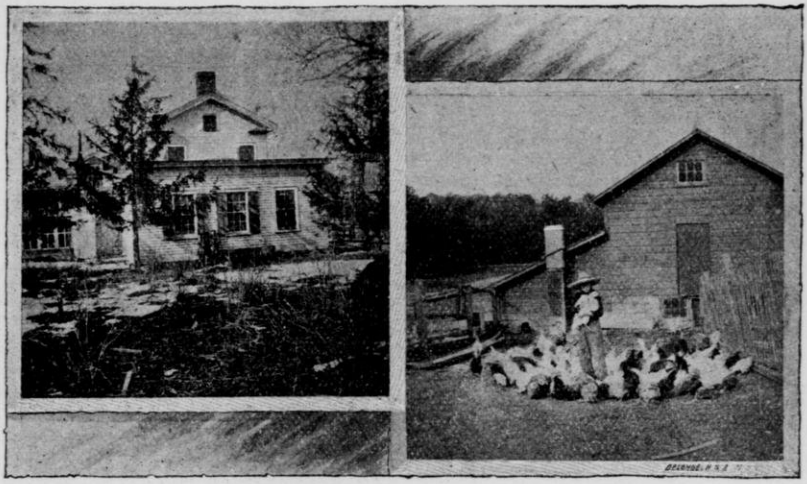
nice to use for poultry. The water arrangements must be so made that the chickens can never get into them. It is a good thing to give them a little tincture of iron once in a while; it keeps the chickens free from disease.

Question—How do you fatten geese?

Mrs. Lehmann—You have got to stuff them; make food into little balls and stuff it down them, corn meal and other things that will make them very fat.

The Chairman—Where do country people get cyster shells?

Mrs. Lehmann—I used to have to send to Pennsylvania. You can get them now at Milwaukee and Watertown. They are not very expensive;



Farm Home and Poultry Yard of Mrs. Lehmann.

Mr. Hardy—I was going to have a grout wall in my side hill hen house.

Mrs. Lehmann—If you did that I would advise lathing and plastering inside the stone wall to make an air space, then it will probably be dry; otherwise, it will not, because stone gathers moisture; it settles on there.

Question—Do you run your chickens and goslings together?

Mrs. Lehmann—Yes, when they are little. There is a water keg; we get them at Watertown and they are very

I think they sell a hundred pounds at Watertown for a dollar or a dollar and a quarter, and a hundred pounds goes a long ways.

Question—Would not lime answer the same purpose?

Mrs. Lehmann—No, sir; for some reason it will not.

A Member—You can buy oyster shells at Watertown, put on the cars for ninety cents.

Mrs. Lehmann—I paid a dollar in

Milwaukee. Watertown is the best place to get Bowker's animal meal.

Mr. Huffman—Would you advise feeding green cut bone?

Mrs. Lehmann—Yes, if you have some one to grind it. I can't get our men to do it.

BREEDS OF POULTRY FOR SPECIAL PURPOSES.

F. W. JENKINS, Eau Claire, Wis.

This is the question, the correct solution of which forms the chief corner-stone in the building of success in the poultry business. Do not be misled by this and think that, after the proper selection of a breed or variety for your special purpose, you have nothing more to do or learn. But my topic will not lead us into the mysteries that lay at the root of the business, such as care and feeding, proper construction of buildings, light and ventilation, science of mating, breeding, etc.

It is my purpose to assume two things: 1st. That you have had practical experience in poultry raising. 2nd. That you are raising poultry for eggs and the market.

It would not be profitable under this topic to enter into a discussion of the strictly fancy branches of the poultry business.

The first suggestion as to your selection is a breed or variety that you have a special liking for as we all have more success with things we have a fellow feeling for than we do with those we do not like, but this will not always do, as we may have formed a great friendship and liking for bantams but want to engage in the broiler, dressed poultry or egg business and certainly bantams won't do. This brings us directly to our text, the selection of breeds for special purposes.

The Breed for Laying.

We will first take up the breeds best adapted to laying and supplying the egg trade at the least cost. The best strictly egg breeds are the Hamburgs and Mediterranean classes as they will lay younger, with greater regularity, and many more in a year than any of the other laying fowls. The Polish, while good layers, belong more to the strictly fancy classes and are not practical fowls for the egg trade, as they are rather delicate, hard to raise and fall an easy prey to hawks. This latter fault is quite common to all birds with large top knots.

BROWN LEGHORNS.

The Hamburgs and Leghorns easily stand at the head of this class (and the Leghorns probably lead) for the reason that they mature younger,

commence laying younger, and with proper care and feeding will lay the year around. They are never idle except during the moulting season and they never or hardly ever set, so no time is lost that way. The young of both these breeds are veritable vest pocket editions of their parents as they are feathered out almost as soon as hatched and the sexes are easily distinguished by the combs when three or four days old. There are several varieties of both of these breeds and the choice among them simply rests on the fancy of the owner. They are to the egg business what the Jersey cow is to the dairy; they are great for eggs but not much for meat.

The Breed for Broilers.

The man who engages in the dressed poultry or broiler business must look elsewhere for an ideal breed It takes Hamburgs and Leghorns about fourteen weeks to make small broilers, while the Asiatics are ready at nine weeks old.

The principal breeds to be considered as strictly market and broiler birds are the Brahmas, Cochin and Langshans, as they attain the greatest size either as broilers or as matured fowls, but there is no half way ground, if not slaughtered at broiler age, nine or ten weeks, they will not be again fit for the block until nearly matured as from broiler age to near maturity they grow a large frame without putting on much of any meat or fat. In fact, while growing it is almost impossible to fatten them.

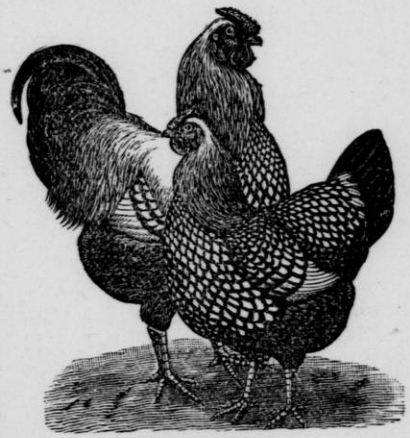
These breeds are also good winter layers, so they are not idle during that time of year. There is one objection to the Asiatics for market purposes, that is, the feathers on the legs. When dressed, if the feathers are left on the legs they make a bad appearance, and if they are pulled out they leave the leg looking bruised and somewhat unsightly. Of course the offending members can be removed entirely but most dressed poultry goes to the market and is weighed with legs and head on. The trade demands and will have yellow skinned and clean yellow legged birds and the successful poultry man will cater to their wishes.

Advantage of Light Colored Fowls.

In choosing among the Asiatics your market fowl, one thing that should be taken into consideration after selecting the breed, is to select the white or light colored varieties, as the White Cochin, Light Brahmas, etc. Every housewife's experience in dressing fowls teaches her that the dark feathered fowls are the hardest to dress clean on account of the dark pin feathers, while the white or light colored fowls always look better with the same amount of labor than their dark feathered cousins. I know of no point of excellence as market fowls in the dark varieties that cannot be urged equally in favor of the white birds of the same breed.

The General Purpose Fowl.

The next class to be considered is the American, by many called the general purpose class for the different

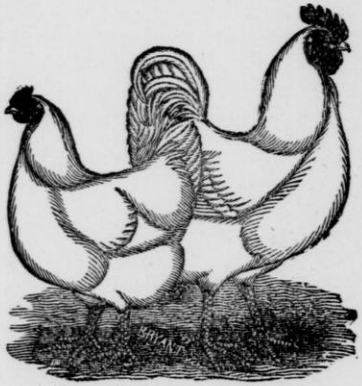


WYANDOTTES.

breeds as the Wyandottes and Plymouth Rocks make excellent broilers, though not as good as the Asiatics,

good average layers and a quick developing medium sized market fowl with yellow legs and skin. They are not the best fowls for eggs, broilers or the market but combine these three qualities nicely. I consider them good birds for the farmer or any person who only wants to keep one variety of fowls, and who has neither time nor place to bother with different breeds. They will set and hatch their young, furnish the table with both eggs and meat.

There are several other breeds of fowls that are good for both eggs and table use, but do not set, so lose one of the essential qualities of the perfect general purpose fowl. These are the Houdan, a French fowl of good size and laying qualities, well adapted to our northern climate on account of having a very small comb and wattles and a large protecting tuft of feathers around them.



White Plymouth Rocks.

The English Red Cap are a very handsome fowl with much the same characteristics as the Houdan but have an enormous comb or cap in place of the tuft of feathers.

The Minorcas are also a general purpose fowl in a way, being fair size and very good layers but carrying a little too much comb and wattles to suit me.

Breeders of the Dorkings claim for them a high place among the market and general purpose fowl and they at least should receive some mention. I have never had any experience with them, but from what I have seen of them I think they would make a good market bird.

The Best Crosses.

At the Rhode Island experiment station some very interesting and valuable experiments have been carried on in crossing thorough bred fowls of different breeds for special purposes. I believe for egg production no cross has been found that can improve on the Leghorn and Hamburg. There they are very well satisfied with the Cornish Indian Game and Light Brahma Cross, both for broilers and market purposes. I have never tried that cross but can see no reason why the first cross should not be all right as the young birds are plump and uniform throughout. I would however say that as a general proposition I am very much opposed to the crossing of thorough-bred birds and only assent to the use of a thorough-bred male with a common flock of hens as one way to improve the stock, but when thoroughbred birds or their eggs can be bought as cheaply as they can today, the breeding up plan is a slow and unsatisfactory way.

Experiments We Have Made.

Mr. W. E. Dorland and myself at our farm at Chippewa Falls, known as the Mansfield Poultry Yards, have conducted for the past five or six years a series of experiments in crossing thoroughbred fowls and have determined to our satisfaction at least that for special purposes or for general purposes the thoroughbred bird is the most profitable, easiest to handle and generally most satisfactory to raise. In support of that statement it will be necessary to digress slightly from our subject. Each distinct breed has certain characteristics peculiar to itself and they are so marked that the differ-

ent breeds cannot run together or be fed together with good results. For instance, Light Brahmas and Leghorns cannot be reared together and kept together after maturity successfully, as the Brahmas while growing require more feed than the Brahmas the Leghorn as they grow faster and larger. After maturity the Leghorn require more feed than the Brahmas because they are more active and lay more often than the Brahma. The feed required for a laying Leghorn hen would fatten a Brahma hen up so she couldn't lay but would in a short time die from over fat. A hen to give the best results should have what feed she requires but her attendant should know better than to over-feed her. He should also understand that the different breeds have different natures and should be fed and cared for differently. One of the secrets of success is not to get too many birds together in one pen or coop and to keep together only those of the same natures and disposition.

Crossing Thorough-bred Fowls.

Where thorough-bred fowls of one kind are kept together the characteristics of the birds should be alike and the same proper care beneficial to the entire lot. Cross-bred birds are sure to have different natures and require different care and feeding and if kept together in numbers cannot do well. When we have so many different breeds, some best suited to one purpose, some best suited to another and still others best suited for a general purpose fowl, there can be no excuse for crossing thorough-bred fowls. When they are crossed it must be done for a purpose and tell me your purpose and I will select a thorough-bred fowl much better suited to the purpose than the cross-bred bird, unless possibly the single exception of the Cornish Indian Game and Light Brahma Cross. Usually the first cross only make fit birds for one purpose as those birds bred together the next year show a marked inferiority, and so on each succeeding generation. While in the chicks produced from the first cross there will be a fair average uniformity, the succeeding generations of these cross-bred birds will be all sorts, sizes and color. There should be no trouble in selecting among the various breeds of water fowls or turkeys, as size, color and the owner's fancy should govern. The Bronze or White Holland turkey should suit almost any one, while the Pekin ducks and Toulouse goose meet all requirements.

As to climatic condition, I believe any of the foregoing breeds are well adapted to a cold climate and my experience is that they all want good comfortable quarters and care to get the best results and if the conditions surrounding them are proper they will be a source of profit to their owner.

DISCUSSION.

Mr. Arnold—What chickens do you recommend?

Mr. Jenkins—The general purpose fowls are Plymouth Rocks, and the Wyandottes. I personally prefer the Wyandottes; the strain is a matter of fancy.

Mr. Briggs—Which are the better, barred Plymouth Rocks or white?

Mr. Jenkins—That is a matter of fancy.

Mr. Reed—Isn't it true that a white fowl is the easiest cleaned for market, and for that reason it is the best, other things being equal?

Mr. Jenkins—Yes, I made that statement; a white bird is always better than a dark one for market purposes.

Mr. Reed—Is not the white Plymouth Rock a larger chicken than the barred?

Mr. Jenkins—No, it shouldn't be.

Mr. Reed—How do you like the Cornish Game for general purposes?

Mr. Jenkins—They are not as good as the Wyandotte or the Plymouth Rock.

Mr. Kellogg—Can you successfully use artificial heat in hen houses for the winter?

Mr. Jenkins—If you understand it,

Mr. Kellogg—How did you come to understand it?

Mr. Jenkins—By experience.

Mr. Kellogg—That is a dear way.

Mr. Jenkins—It is the best way. I think the best way to do is to have your chickens where they do not need it, but if you are going to use artificial heat at all, I would use it more for ventilation than for heat, and in that way you don't get a great deal of heat out of it.

A Lady—I read in a paper once that very early pullets would moult in the fall the same as hens, and then they would not lay any better than hens. Is that so?

Mr. Jenkins—That depends on the breed. I would just as soon have the Hamburg or Leghorn hatch the first of July as any other time of the year. The Brahmas and Wyandottes must be hatched as early as possible.

A Lady—Are the different strains of fowls affected by their age in laying?

Mr. Jenkins—Yes; a Plymouth Rock hen, after a year and a half old, is rather a poor layer; that I think is due to the fact that they fatten so easily; it is hard to keep them in laying condition. I have known of Leghorn hens being good layers up to nine and ten years old.

Mr. Arnold—Then we judge that a hen that is of a thick fleshy formation that will thicken with age, is not a good hen for laying?

Mr. Jenkins—Yes, that is true.

Mr. Arnold—How old would you recommend keeping hens?

Mr. Jenkins—That depends on the particular breed. I would watch them pretty close; as long as a Leghorn hen lays pretty well, I would keep her.

A Member—When this spring chicken gets to be eight or nine years old, what are you going to do with her?

Mr. Jenkins—I would answer that as the Jersey cow man told me once with reference to the selling of his cow. He said that he could well afford to erect a tombstone over that cow after burying her.

A Lady—Which do you prefer, the single comb or the double comb brown Leghorns?

Mr. Jenkins—I don't think it makes a particle of difference, but I prefer the single comb.

Question—How is the black Langshan for laying in winter?

Mr. Jenkins—Good. The single comb is more apt to freeze than the rose comb, but when the rose comb is once frozen, the only way to thaw it out is to chop the head off. A hen with a frozen comb won't lay, but of course I do not think it advisable to keep hens where the comb will freeze.

Mr. Hopkins—Do you find any objection to the size of the eggs of the Brown Leghorns for selling?

Mr. Jenkins—I have seen Brown Leghorns' eggs that would average with Brahma eggs. I think where the Brown Leghorns are bred principally for show purposes, bred without regard to the size of their eggs, the eggs are small, but you can breed them up to be good layers.

Supt. McKerrow—How would you do that, by selecting the largest eggs for incubation?

Mr. Jenkins—Yes, I would.

would not the white lay the larger

A Member—As between the two, eggs?

Mr. Jenkins—I have never noticed any difference.

A Lady—Where you have a strain of fowls, all of one color, how do you distinguish the younger hens from the older ones?

Mr. Jenkins—Well, after they get two years of age, you can't very well.

A Lady—Can you tell them by the wrinkles on their legs?

Mr. Jenkins—I don't know whether the wrinkles are there or not.

Question—What do you think of Houdan fowls?

Mr. Jenkins—I like them first rate.

The Chairman—Do you handle ducks also?

Mr. Jenkins—Yes, and goslings.

The Chairman—Are they profitable?

Mr. Jenkins—Yes; of course they re-

quire treatment different from that of other fowls. I find that they should be yarded pretty close, so as to keep out of the rain and dew, and to keep them from exercising too much. Exercise is a good thing for a chicken, but a poor thing for ducks. A duck is an enormous eater and requires more bulky food.

Supt. McKerrow—How about the turkey?

Mr. Jenkins—Well, I think the less you have to do with the turkey the better you are off.

Mr. Hayes—You only mean when they are shut up, you cannot keep them in pens. Can't you raise them on the farm as easy as any fowl you raise?

The Chairman—Mr. Hayes wishes to know if you can't raise them on your neighbors?

Mr. Hayes—They will clear your farm of grasshoppers.

Supt. McKerrow—What do you mean, that you would not raise turkeys at all?

Mr. Jenkins—No, I mean that if you are raising turkeys you want to let them alone.

A Lady—Isn't it a fact that the most profit you make out of turkeys is that they feed off your neighbors?

Mr. Jenkins—Yes, if the neighbor don't feed off the turkey.

Mr. Huffman—Don't you think eggs ought to be sold by the pound?

Mr. Jenkins—You can adapt yourself to the market. If they are sold by the dozen, keep a hen that will lay fancy small eggs.

Mr. Huffman—Where do you keep your incubator?

Mr. Jenkins—We have always kept it in the house. One hundred and sixty eggs capacity. Simplex.

Question—Would you advise any larger?

Mr. Jenkins—Why, I do not see any reason why two hundred cannot be run as easily as one hundred and sixty.

A Lady—What does an incubator cost?

Mr. Jenkins—The various makes have their own prices. While the Simplex is the cheapest machine, if it is properly handled it works all right, but it is not every one who can handle it. It is almost as much trouble as some hens are.

Question—What is your idea of the Excelsior machine?

Mr. Jenkins—We have one of them and we don't like it at all.

Mrs. Lehmann—It is not good for anything.

Mr. Jenkins—The trouble is it does not hatch as well as the other kind, and it does not regulate itself.

Question—How many chicks will you raise from one hundred and sixty eggs?

Mr. Jenkins—I have run from thirty to one hundred and fifty, but I do not think that is due to the machine.

Supt. McKerrow—About what is the average price for an incubator?

Mr. Jenkins—From 150 to 200 egg capacity will range from $30 to $50.

Question—What is the price of the Monarch machine?

Mrs. Lehmann—The Monarch is a high priced machine, but it is a good one. It is on this principle: it is a hot water machine, and very good at regulating, and you need not look at it once in twelve hours; you can go to bed and sleep every night, and you cannot do that with the Excelsior nor with a good many others.

Question—Does it have the top and bottom heat?

Mrs. Lehmann—It has just the top heat and hot water at that, so that if the light goes out, or anything, it is so arranged that it will stand the changes in the atmosphere, which the cheaper machines will not do.

Question—Do you keep them in a dry cellar?

Mrs. Lehmann—Yes, a cellar is a splendid place to hatch them if it is not too damp, because the temperature don't change there, as a rule. Mine is in the basement; I have a basement to the hen house and I keep my vegetables, cabbages, and such things in there, and part of it is partitioned off for the incubator room.

Question—What is the trouble when

chickens break the shell before they are ready to come out?

Mrs. Lehmann—Too much moisture. I do not know what is the trouble, but in some way there is too much moisture.

Question—Where is the Monarch incubator made?

Mrs. Lehmann—Southeastern Massachusetts.

Mr. Arnold—Is there any machine invented for testing eggs?

Mrs. Lehmann—You can tell an egg every time after it has been in three days, whether it is all right, if you hold it to the light.

Mr. Arnold—I mean when we go to the store to buy them.

Mrs. Lehmann—I don't know unless you do as a party in Minnesota did, break them.

The Chairman—I know Mrs. Lehmann is quite successful with ducks, and I would like to know how she handles them, and what she thinks of them as far as profit is concerned.

Mrs. Lehmann—I have the Pekin ducks and they are one of the best layers, but they seldom set successfully, so you have to set them under hens, or in an incubator. In feeding ducks do not feed raw corn meal; that is where so many people make a failure with ducks; it is sure death to them, every single time; about the third day they will turn over and die, and some will say it is one thing and some another, but it is nothing in the world but the raw corn meal. They will grow on skim milk like little pigs; mix middlings in the skim milk, that does not get sticky, and they will eat it up all right. I feed a great deal of cheese curd; we have lots of skim milk and I feed a great deal of it with cheese curds to both chickens and ducks, and I feed a great deal of it sweet, because we run it through the separator and we have it sweet and warm, right from the separator.

Question—What particular turkeys do you have?

Mrs. Lehmann—Mammoth Bronze; they grow to be very large, some of them weighing twenty-eight and thirty pounds, and they are clean and nice to dress and they sell well.

Mr. Arnold—Is not the size objectionable?

Mrs. Lehmann—Not at all; I never found any objection at all. I never sell mine for market so large—only those left over in the spring. I had a few left over in the spring and I sold them last year at fifteen cents a pound and there was no complaint made of their size.

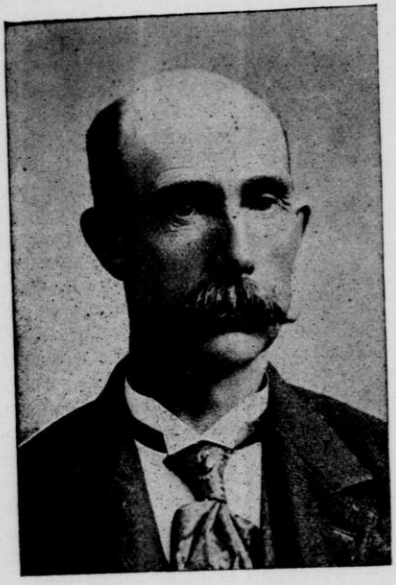
Mr. Arnold—The market demands about twelve pounds.

Question—Can you raise ducks successfully without ponds?

Mrs. Lehmann—Yes, very successfully; my hen house is on a side hill and my well is on top of the hill, and I have pipes carrying water to barrels. You must have something that the ducks can get into and not drown. I turn the faucet enough to let it drip and let the ducks get water that way. For the old ducks I have a kerosene barrel, cut off about a foot and set into the ground. I think this year I shall try to have a hole dug and cemented for them because we have plenty of water, and keep the water running into it; have it not over two feet deep and slant it out, so that the edges are easy to get out of onto the land. Ducks will drown as quickly as a chicken. I let the water drip and keep it full all the time; let the ducks go in whenever they want to. Do not let little ducks have too much water as they are apt to go in and play too long and get chilled. When they begin to feather out they can have all the water they want, but before a duck or goose is feathered out, it must not get wet. I keep the water dripping into this trough and it stands there for the old hens. We sometimes have to sweep it out with an old broom, but if it is kept running fresh all the time it is not apt to get so dirty. You must not forget that you must have grass for your chickens; for ducks it doesn't make any difference.

COUNTRY ROADS.

A. C. POWERS, Beloit, Wis.



A. C. POWERS.

Mr. Chairman:—Among the foremost subjects claiming the attention of the people at this time and one that merits thoughtful consideration at the hands of every tax payer is that of good roads which stands paramount. Notwithstanding the fact that for the past fifteen years there has scarcely been a gathering whether called to discuss theology or law, the rights of women or the wrongs of men, that have not passed resolutions setting forth the deplorable conditions of our country roads, and asking that something be done for their betterment. Wisconsin took no steps towards changing her laws in favor of road improvement until the session of 1893 when the Apple bill became a law. Although it has its weak points, it's a long stride in the right direction and we trust it's a stepping stone for other and better laws.

Good Effects of the New Road Law.

In the southern portion of the state quite a percentage of the towns are working under the new law and the improved condition of the highways in these towns is very marked, as they have accomplished more in three years since its passage than has been done in any twenty years under the old slip shod system, thus proving that a moneyed tax is one of the first requisites towards good roads; but in a large portion of the state, however, they are practically under the old law, with old results. What is needed is a change that will produce a permanency of good qualities in the highway, and not something which at best shall only be a temporary makeshift, as makeshift was the basic principle of our early, and in fact, I might say, our only road law, the one under which we have been working, or perhaps a better term now would be, *not* working, for nearly sixty years with the result that in many places the highways are not as good as when civilized man wrested them from the followers of Black Hawk. They stand out in bold relief a monument, as it were, to our folly, a stretch of sand or an uninviting hog wallow, a terror and an insult to the teamster and the traveling public, which chief utility would seem to be to divide the broad acres of "A" from the broader ones of "B" and not for a public thoroughfare.

Good Roads Improve Business.

It is a self evident fact that in a section possessing good roads, there is a greater business activity than in one

where no pains are taken to smooth down inequality of surface, cut away hills, fill in low places, build solid and permanent bridges or look to the interest of the community by displaying the same degree of enterprise in the way of road making they would in any other line of business, losing sight of the fact that no investment will pay as large a dividend as a tax for good roads if the money is judiciously expended.

How the Ancients Built Roads.

I recently read a short article in the Rural World which I wish to reproduce at this time. When Appius Claudius started out to build the now famous Appian Way, he didn't wait for carriage builders, bicycle clubs and farmers' picnics to pass resolutions on the subject. He simply put men to work and constructed a road 330 miles in length by 16 feet wide from Rome south through Capua to Briudisi and, although 2206 years have passed since then, the Appian Way is still the best country road in all Europe.

When Napoleon determined that France should have the best highways on earth for the rapid movement of troops and the ready supply of armies with provisions, he didn't pause for the adoption of a constitutional amendment, but at once took his men out and built the roads, and they are today in nearly as perfect conditions as when constructed. This dictatorial way of doing things is of course neither possible or advisable in a republican country, but we cite this bit of history for the several lessons it teaches. First, that if we expect better roads we shall have to build them. Second, that one man at the head is better than a thousand, and last, but by no means least, that roads thoroughly built will be as lasting as time itself.

A Few Benefits of Good Roads.

Good roads will pay from almost any standpoint. They will pay in satisfaction. They will pay in a saving on wagons and teams and a saving of time, as you are often compelled to make two or even three trips to market to draw what would be a light load on the macadamized road, and the enhanced value of property adjoining such a road would doubly pay the investment.

Perhaps there are some who doubt the soundness of this assertion and say we lack the proof. Let me say it has been tried in hundreds of cases and in no one instance has it failed to produce such results. And I am informed by a gentleman residing in the northeastern part of Illinois that land lying contiguous to the proposed Sheridan drive has materially advanced in price, in some instances enough to make quite a payment towards the improvement.

We can expect the same result in Wisconsin as has been shown in the eastern or older states. Admitting that we need better roads and we think the most fossilized old fogies we have will not argue that we are wrong, the only controversy then is in the mode of application and if we have 70,000,000 population, it would seem that we have nearly as many ideas as to what should or should not be done, from those that would bond the state, county and town, while others like Micawber, sit by the wayside waiting for something to turn up when good roads, like the Gospel, can be had without money and without price.

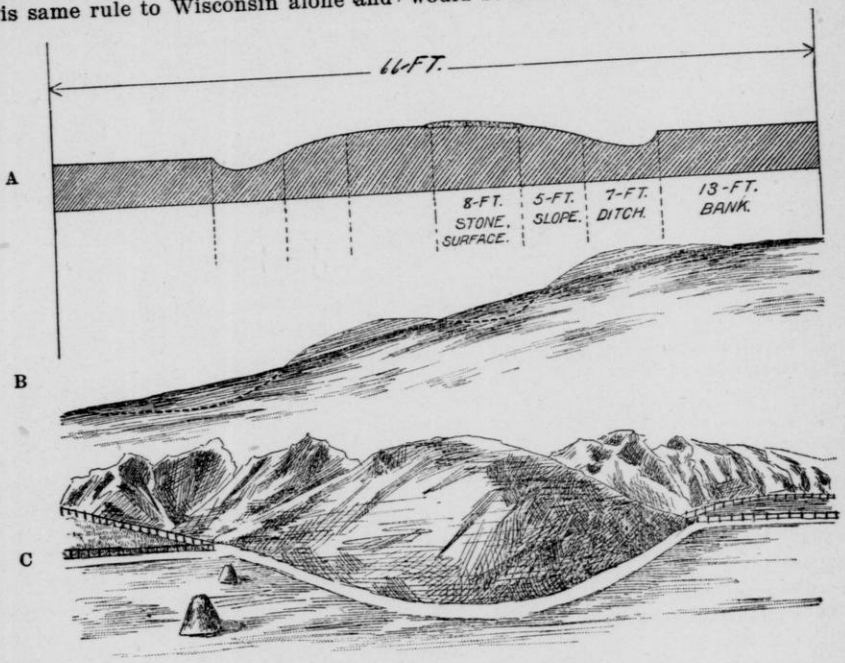
Some Surprising Figures.

Few people take a correct view of the actual profit to farmers and business men in general, of good roads, or how much they could afford to pay for them. Is it not a fact that in some seasons for weeks together all business is at a complete standstill caused by the impassable condition of the roads, and the loss incurred amounts to millions of dollars annually, caused by not marketing grain or other crops in proper season and to the merchant, who finds his shelves filled with unsea-

sonable goods. In round numbers there is said to be 700,000 farmers in Illinois, Iowa and Wisconsin. Now, suppose that on the average there are ten loads of grain and produce to be marketed, and feed, fuel and other material to be brought back, say at a cost of two dollars a load. Macadamize these roads and the same labor can be performed for less than one half the cost, and this saving in one year would build 15,000 miles of good road at an outlay of $500.00 a mile. Apply this same rule to Wisconsin alone and the saving in twenty years would build a stone road over every mile of highway in the state and the saving in wear and tear upon vehicles would keep it in repair.

How to Build Country Roads.

In building a road we would cut down all hills of any magnitude to an easy grade. We would draw crushed rock or gravel upon the center line of this highway to the depth of eight or ten inches, eight feet wide, placed between planks that serve as temporary curbs, then with a road grader we would reinforce our stone work at each side twelve feet wide with earth taken from the sides, making our embankment when completed 32 feet at the top, sloping gradually to the outside gutter. For quite a portion of the year this outside part of your road would be fine for light driving and the stone part for heavy traffic. Such a road as this would be available at all times, over which at all seasons of the year the market of the cities would be accessible and protracted rains and general break ups would be no terror to the traveling public, and the weight of the load be limited only by the strength of the wagon.



A Outline of 4 rod road with 8 ft. stone track.
B Grade of hill.
C Distance around hill no greater than over it.

To bring about this result it would not be needful to issue bonds or even impose burdensome taxes. Put the best men you have at the head of your road commission. Commence at your city limits and work into the country, having the tax payer perform the labor, if he so elects, subject to the same rules that govern other laborers, and it would be but a few years until Wisconsin roads would be models for the world. It matters not what principle or what material we use in the construction of roads so long as the narrow tire reigns supreme; were it built of adamant and coated with steel it would give way before this fell destroyer which must be banished from the face of the earth before we reach the acme of success of good roads.

Not only exempt the broad tire from taxation but place a premium upon its use, and if that does not have the desired effect, then make it a state's prison offense to draw a load on a wagon with a tire of lesser width than four inches.

DISCUSSION.

Supt. McKerrow—Do you work out the taxes?

Mr. Powers—We work it out on the cash basis; we allow the tax payer to work it out if he wants to, but he cannot come out at nine o'clock in the morning with the idea of loafing. We pay him thirty cents an hour for himself and team.

Supt. McKerrow—Do you use any of the improved machinery?

Mr. Powers—Yes, I think we have almost everything in our town now in that line. We have two road graders, and we have eight wheeled scrapers that we use to cut away the hills with, and then we have an Austin stone crusher.

Supt. McKerrow—Do you allow your town treasurer to collect five per cent. on the taxes that the farmer has worked out?

Mr. Powers—No, sir, we do not. We make that provision with our man that we must not charge up to the road warrant or for road receipts.

Supt. McKerrow—I think that is the reason that law has fallen into disrepute, on account of our town treasurers collecting three or five per cent. on tax worked out.

Mr. Briggs—What kind of stone are you using for your road?

Mr. Powers—We are using lime rock to some extent, but we prefer river bed gravel for the crusher.

Question—Sandstone would not be good?

Mr. Powers—No, and lime rock is a little too soft. I think, however, that our lime roads are all right after three years' use.

Mr. Briggs—How about these hard heads, or prairie granites?

Mr. Powers—That would last as long as time. Probably the Appian way is built of that stone. The stone crusher handles them all right.

Mr. Briggs—How long will lime rock last?

Mr. Powers—We cannot tell anything about it. Three years ago is the first we put on. In northern Illinois I was on a lime rock road not long ago, that has been in use ten years and it was in perfect condition yet.

Mr. Briggs—If you had plenty of lime rock?

Mr. Powers—I would use it by all means, and not crawl through the mud.

Supt. McKerrow—We had a road leading out of Milwaukee, covered with crushed lime rock twenty years ago, and it is a good road yet. There is one road that is longer than that; it runs out of Wauwatosa; it has been there longer than the other, and it has been repaired but very little.

Question—Do you know what would be the cost to repair this road each year?

Supt. McKerrow—I couldn't tell you. I have noticed somewhere the figures put at an average of ten dollars a mile.

Mr. Hayes—What would it cost a mile to fix it as you advise, Mr. Powers?

Mr. Powers—So far the three or four miles we have in the town have cost us from four to six hundred dollars, at that rate, but that is no comparison, because we are not doing enough of it, and here is the great cost of our machinery standing still the greater part of the year. We are calculating on $500 a mile in our plan, if we could do this right along and get enough of it. I was on a crushing plant last year where they were crushing gravel at eleven cents a yard; that was the entire expense, taking it out of the bank and crushing it, and putting it on the cars, but they were doing it with a big plant.

Supt. McKerrow—The last three years we have found we can crush lime rock very cheap; that was delivered on the wagon at 25 cents per cubic yard.

Mr. Powers—That would not make a very expensive road. You see it takes but little. It does not make a perfect road, but it is a good deal better than mud. There has not been a day this winter that our road has not been as good as this floor. The planks I spoke of we use temporarily, then we take them out. There were about ten or twelve rods at a time, I think. You asked about the preparing of this road. The first road we made, we took and run straight through; we put in eighty rods, then we leveled it down, but I would prefer to level it as fast as we got it ready, because if you leave it long it is packed so hard it makes harder work and will not pack evenly.

Question—Do you roll?

Mr. Powers—We never have, but it would be the better way.

Mr. Church—How deep do you lay this gravel?

Mr. Powers—From eight to ten inches, according to what is below.

Mr. Church—I know of a good road of only four inches on sand.

Mr. Powers—Sand is the best foundation on earth for a stone road; there is nothing better.

Mr. Arnold—How many cords of stone will a good crusher handle with a ten horse power, in a day?

Mr. Powers—I could hardly tell in that way, but we can crush from 100 to 135 yards in a day.

Mr. Arnold—And there are five yards in a cord; with us they crush as high as seventeen cords of lime rock, twenty cents a yard would be good pay, wouldn't it?

Mr. Powers—Yes, a machine that had any business to do could do work for that. This machine I spoke of did it for seventeen.

Mr. Briggs—What kind of gravel is this you speak of as crushing; is it coarse gravel, sand, or wheat?

Mr. Powers—Ours was taken right off from the banks of the river. The better way to use it is to have your machine put on a depression and run it off the hills with a wheeled scraper, and dump it right in. Your sand will run out; in some places they can utilize a certain amount of sand. You get nothing but pure crushed gravel from the machine.

Mr. Kellogg—Do you know the cost of crushing stone at Janesville?

Mr. Powers—No, I do not.

Mr. Kellogg—Janesville has a very heavy roller and the crushing machine right at the quarry, and they are making a great deal of this city graded road; they are doing quite a business, but I have not posted myself in regard to the cost.

Mr. Scott—I think that the ordinary crusher will only crush about nine or ten cords a day, a ten horse power machine. They had a crusher in the village of Rio for nine days and they run it for nine hours a day. It crushed eighty-one cords of stone and they applied it to their road; it was run nine days, about a cord an hour. It was more than a ten horse power; they had a twelve horse power engine on it, a heavy threshing engine.

Mr. Powers—If you were crushing these hard heads, you would have to

have heavier horse power. You can use six horse power for ordinary limestone.

Mr. Reed—In the city of Grand Rapids they have been buying rock all winter from the farmers to the west of us, bringing in these hard heads, and granite boulders and they have been paying the magnificent price of $2 a cord, delivered. The farmers have brought it from ten to twelve miles. They haven't got rich out of it, but the village thinks it will get some good roads.

Mr. Scott—The village of Rio has a contract with the farmers and they are bringing in stone, grading it about eight by eleven, at $1.95 a cord.

Mr. Everett—Mr. Powers, what is the amount of the road tax in the town of Beloit?

Mr. Powers—We have raised three mills on the dollar until we don't know how to raise anything else. It amounts to about $1,900 with the poll taxes.

Mr. Everett—Is it not a fact that prior to three years ago that that outlay of money in the town of Beloit had not improved your roads one iota?

Mr. Powers—The fact is you cannot draw as large a load as you could fifty years ago, before the upper soil broke through. A man twelve miles west of Beloit told me he could not draw as big a load into town as he could fifty years ago.

Mr. Everett—I wanted to emphasize that point. They have very much improved their roads. Both towns have a similar cash system; they have a rock crusher and scrapers and we employ the same methods that have been described. We used to work out $1,800 a year in our town, and prior to three years ago our roads were no better than they were forty years ago, but they are being very much improved. The farmers have the privilege of working out or paying the money. Most of them work out their tax, but others, like myself, prefer to pay cash.

Mr. Powers—We get enough out of the people who do not care to work out the tax to pay for our machinery, our cash purchases. Of course we have to buy machinery and keep it in repair. We purchased all our machinery, crusher and all, with the tax.

Mr Bradley—Wouldn't you recommend in putting in a stone road that it be feather-edged?

Mr. Powers—My experience is to keep the embankment down as near the surface as you can. If you raise that in the center, with your crushed rock, it is always raised enough. If I had an embankment too high I would prefer to cut it out. We feather-edge altogether; we have never cut away, excepting through the hills.

Mr. Bradley—There are many places in the state where it will have to be cut out. Mr. A. P. Weld, of River Falls, says it doesn't do in clay land, or in light soil, to put it down there, but it might do in sandy places.

Mr. Powers—I should think as a general proposition it would be a useless expense to cut away that road, unless your embankment was too high. I will say we have very little clay in our town, and no red clay at all.

Question—Would not under-draining be necessary in red clay?

Mr. Powers—Undoubtedly there is land that would have to be drained, but I don't think we have a mile of road in our township that would ever need any draining at all.

Mr. Watson—Do you use the same grade of crushed rock right straight through?

Mr. Powers—It would be better to make it about two grades for country roads. We have used the same grade, but I think it would be better to put your coarser rock in the bottom and then finish off with your finer rock.

Supt. McKerrow—Where you are feather-edging the road you have got to have something finer to keep your stone from rolling out.

Mr. Scott—On our stone roads that we have used three years, I don't see anything the matter with them; they put it on, first, five and a half inches

and the next inch finer, and then top-dressed with the siftings, about seven inches deep altogether

Mr. Powers—I wish to say that last spring I went over our road records, and I found that we had paid out over $100,000. I suppose a good deal of that was worked out under the fence, but we claimed to have worked out that amount. Now, for that money we could have in the township, a good stone road, sixteen feet wide, over every single road we have, and we haven't anything at the end of that time, except a few bridges, and they are pretty poor.

Question—How large stone will go through your crusher?

Mr. Powers—I think the capacity of our machine is said to be about ten by eighteen inches, or ten by twenty, but it is better not to have your stone too large, because it takes longer; it is better to have them a little smaller.

Question—If there should be a quicksand bottom, what would be necessary to do to make it a good road?

Mr. Powers—I don't know; that is a hard thing to handle. I know where we crossed a little bit of a stream, it bothered us a good deal, and we just dumped our stone right into it; it is standing right up so far; it don't seem to settle any more. The crushed rock seems to be better than big stone for that; it has held up so far without trouble.

Mr. Arnold—There is a sentiment throughout Wisconsin that people in the cities want roads built for their accommodation, and the farmers are going to pay for them. That has been the sentiment expressed throughout the state. The idea that we want to encourage is this, that we farmers are going to have good roads and are going to build them, and going to do it without levying any more taxes than we have already. In the town in which I live we pay $3,000 road tax; one-half of that is paid in money and it is spent under the supervision of the supervisors, the idea being that in this way we get the village people to pay a portion, that if we do not, the farmers will have to work it all out. Now, we are entering upon a system, that is what I insist upon—that we have some system—and in my opinion the system should be just this: That all of us should start at our market towns and commence building line of roads under some system, running out into the country from each market point, and the result will be that they will come together and in that way we will have good roads all over the state, and I think if we work in that way, with system in each town, something can be done, otherwise it will not.

A Member—When the gentleman speaks of building a road, I suppose he means a stone road.

Mr. Arnold—Nothing short of it.

The Member—I would like to ask Mr. Powers how these gravel roads work in case of mucky bottom, such as we find in the marshes.

Mr. Everett—Keep piling on the gravel.

Mr. Powers—You certainly have to get a foundation in some way, and it might be necessary to drain such a road as that. If you could not do that, it would be desirable to raise your embankment up so that it will drain itself. We have dumped in a lot of this crushed stone and are having good success so far.

Mr. Scott—We have found underdraining to be far more successful than high embankments. If you did underdrain, would you have it in the center of the road or on the side?

Mr. Powers—It might be necessary if it was bad, to drain right through the center; run a tile row straight through the center of your road.

Supt McKerrow—There are a good many miles of road in Kenosha county that are tiled right in the center.

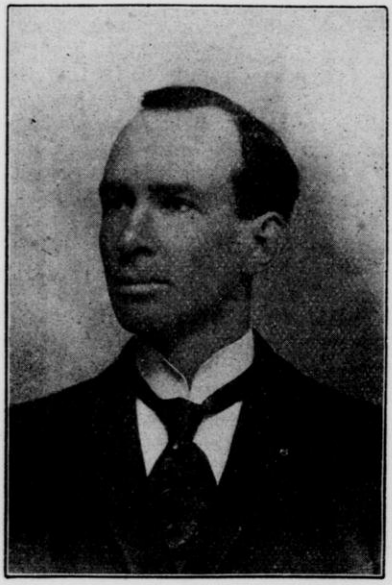
A Member—In Illinois they have adopted the system of draining in the center of the road; they couldn't do it on the side.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. Supt. McKERROW in the Chair.

SHEEP FEEDING EXPERIMENTS.

Prof. C. F. CURTISS, Agricultural College, Ames, Iowa.



C. F. CURTISS.

Ladies and Gentlemen—It gives me pleasure to meet such a large and most excellent audience of Wisconsin people as I see before me today. I have long entertained a very high opinion of Wisconsin's methods of conducting Farmers' Institutes, and I want to say that my good opinion has been much strengthened since I came among you.

Wisconsin as a Sheep State.

I have been asked to discuss sheep feeding experiments today, and in that connection I want to say that I believe Wisconsin is one of the states that is exceedingly well adapted to sheep raising. In coming into your state yesterday I passed through a good many acres of agricultural lands that are better adapted to sheep raising and dairying than any other branch of the stock business, and I want to commend you upon your excellent judgment in making the most of your opportunities in the dairy line; I want to commend you for the excellent work that your dairymen of this state have done, but as sheep men I do not believe you have made the progress that your conditions warrant. I believe that the sheep is entitled to a more favorable consideration by the farmers of Wisconsin, of Iowa, and of other agricultural states, than it is receiving today.

The sheep has been the football of politics; it has been through times of prosperity and of depression. It has, I believe, more than any other animal, suffered from the American characteristic tendency of rushing into things and rushing out again. I want to say at the outset that so far as the political relations of the sheep to agriculture are concerned, I believe in according the farmer just as great a degree of protection as is accorded to other industries, but I want to say, also, that the sheep business does not depend upon protection, or the tariff on wool. I believe we could make mutton profitably on the farm lands of Wisconsin and other states regardless of the wool feature, and I believe that what I have to say bearing upon this subject will confirm that statement.

You have a good many sheep in this state, but not as many as you ought to have, nor have you in all cases the kind that is demanded for the most profitable production.

Our Experiments Outlined.

We took up some experiments at our Station about two years ago when the sheep business was at its lowest tide,

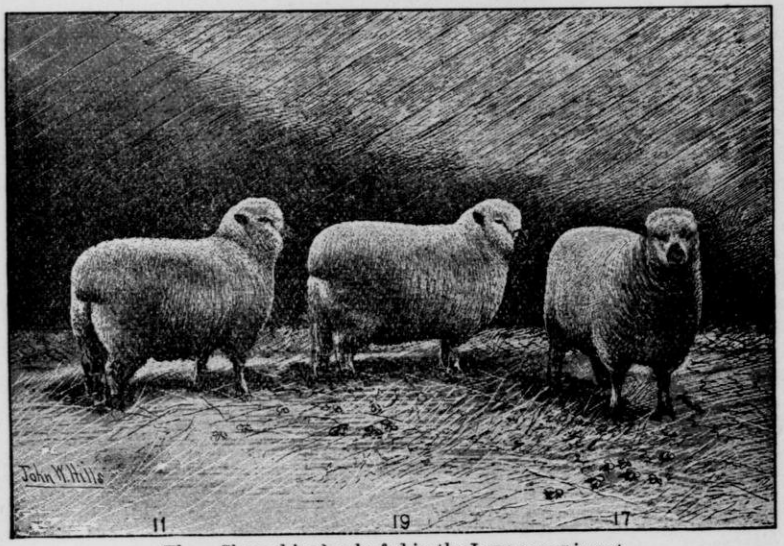
when everybody was wanting to go out of sheep raising, as one speaker expressed it in an address in our state, they were on the free list and nobody wanted anything to do with them. The flock masters were unloading. It was with a view of establishing some fundamental facts in reference to the sheep industry, that we took up this work and we have been continuing it since; part of this work has been accomplished already. I will say in the way of outlining that work that it merely consisted in taking ten representatives of the leading breeds, carefully selected, with a view to securing the best representatives of each breed that it was possible to obtain, placing them all under uniform conditions and keeping a strict account of everything that was given in the way of food, and keeping an exact record of everything that was produced. These ten representatives of each breed were selected without regard to expense within reasonable limits, we determined the exact cost of producing a pound of mutton from each, placed them on the market on their merits, sold them for exactly what they would command upon the basis of a carload of each kind, determined the percentage of mutton in each case, its value upon the block, and the relative amount of meat in the high and low-priced mutton cuts.

Now, that of course, involved in a measure a breed test, although the breed test was not, strictly speaking, the object of the experiment. As I stated before it was more to establish some fundamental facts in relation to the sheep industry and to take the utmost pains to ascertain those facts, and make them entirely reliable, that we undertook this work. We felt that the sheep industry was in need of it for the reason that there has been such a constant depression and fluctuation in all the states. It is true that a great many of the things that have most influenced our agricultural work and are supposed to be facts and established principles, are not facts and principles at all, but otherwise.

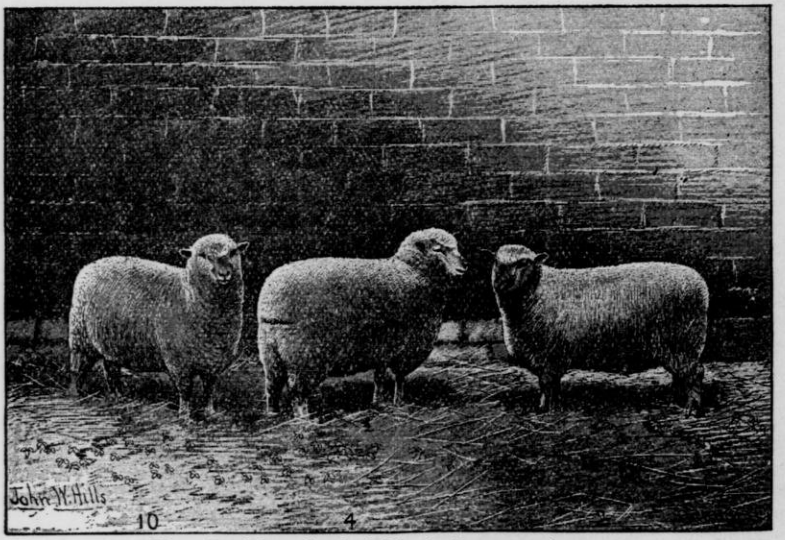
Now, as to the results of our experiments, you will understand that the figures I shall quote, except where otherwise stated, will refer to the sheep that we used as a whole, all of the breeds, and the result from the different breeds will be summarized at the close.

Sheep Feeding vs. Cattle Feeding.

We fed 109 lambs in this work ninety days, in which we gave them 34,501 pounds of feed, grain and hay, grouping all the food together and figuring out the percentage of moisture that was in it. We have to get some definite, tangible basis upon which to make the comparison, so we figure out the moisture and group so many pounds of dry matter in the feed. We fed 34,501 pounds of feed and made 4,678 pounds of mutton; the ratio, as you will see, is 1:7.37, or for every 7.37 pounds of feed given, we produced one pound of mutton, and that mutton was produced at a cost of 2.93 cents a pound for the feed consumed. We charged for every pound that the animal consumed, hay and everything else, at the market price, which was a little more than the price that the farmers would realize. These figures are for all the breeds together. The best work that we have ever been able to do with cattle was obtained during the same winter on a bunch of high grade Hereford cattle coming two years old, that were being fed in an adjoining lot on a similar grain ration, figured at the same prices. In that experiment it required 8.9 pounds of this feed to make a pound of beef, at that age, and covering an extended period. Of course, for a short time a man may be able to feed cattle and get higher gains. Here the cattle were on feed a year. It has been found that the average amount of feed required to produce a pound of beef on cattle at the different Experiment Stations and other places where feeding



Three Shropshire lambs fed in the Iowa experiment.



Three Southdown lambs fed in the Iowa experiment.

experiments have been conducted in the United States, is 10.25 pounds. In all these experiments the sheep has had the advantage; it will make a pound of mutton for less than it costs to make a pound of beef, even when you give no credit whatever for the fleece. That fact has been clearly demonstrated by all the best work done at experiment stations.

Further Comparison of Mutton and Beef.

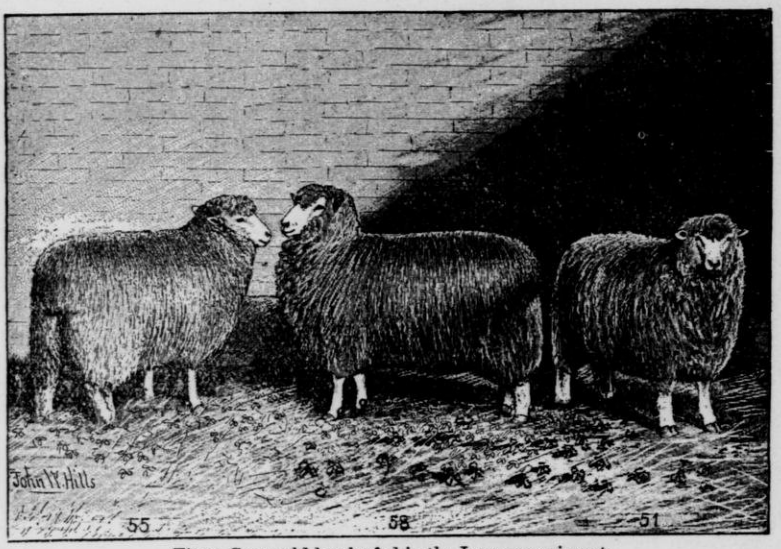
The thing that the sheep industry needs is establishment on a more substantial basis. When we go into it, we want to do so with the understanding that we are producing mutton at a profit as long as it sells as high as beef or a little higher, and that it is a permanently profitable business one year after another, even if we do not get anything for the wool; but even in times of depression we can figure on an average a dollar a head for wool, and in some cases considerably more than that. The figures that I gave you in reference to the lambs applied to the entire lot; it included Merinos, it included the Dorsets, and the cross-bred Merinos and Shropshires and all the rest, many of which were not strictly mutton breeds. By dropping out these and taking only the strictly mutton breeds we find we had 23,792 pounds of feed, which produced 3,281 pounds of mutton, or one pound to 7.25 of food consumed, and that that food charged at the market price and the gain credited gave us mutton at a cost of 2.88 cents a pound. Now, those sheep sold from $4.50 to $4.75, and it only cost us $2.88 on the mutton breeds to make 100 pounds of mutton. Now, we figure that if we can make gain on cattle for even one to two cents a pound, more than the cattle will sell for, that we are making money, provided a satisfactory price is realized. I have known men to pay ten cents a pound for gain put on cattle in the feeding lot, when they could not sell the cattle for over five or six cents a pound. A great many pay six and seven cents when cattle will not sell for over four and a half or five cents, but here in the sheep business we produced from all those breeds a gain in the weight for very much less, only a little over one-half what the product was worth when it went to market.

Larger Gain for Food Consumed.

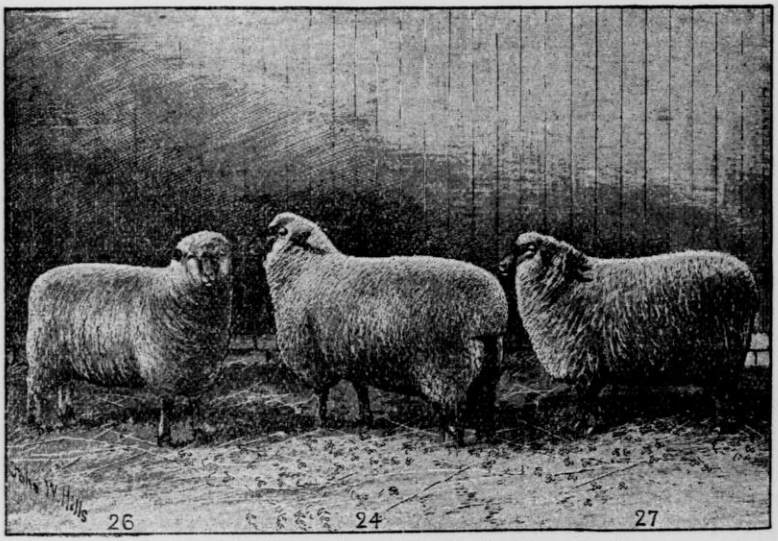
There are some other features in reference to this. It is sometimes said that cattle and sheep eat the same amount of food per thousand pounds of live weight. I have been asked very frequently at Farmers' Institutes, How many sheep can be kept on an acre of land, or how many sheep can be kept on the same food that it will require to keep a cow or a thousand pound steer, and it is frequently stated that a thousand pounds of live weight in sheep will eat as much as a thousand pounds of live weight in cattle, no less and no more. Now, that is another erroneous doctrine; that statement will not stand the test of investigation. We found in this work that cattle ate 19.6 of dry matter per thousand pounds of live weight; that is, if we had a steer and it weighed about a thousand pounds, it would take 19.6 pounds of food each day for that steer. We found, however, that when we would take a thousand pounds of sheep, representing all breeds, that it required 29 pounds of food a day to sustain them and feed them up to their full capacity; so you see that sheep consume more per thousand pounds live weight than cattle, something like 48 per cent. more food, but, on that food the steer gains 2.14 pounds a day, while the sheep gain 3.73 pounds a day; in other words, while the sheep were consuming 48 per cent. more food, they made a gain of 75 per cent. more weight. There is another comparison in favor of the sheep.

Early to Market.

Now, another point that was brought out there in the work, and one that



Three Cotswold lambs fed in the Iowa experiment.



Three Oxford Down lambs fed in the Iowa experiment.

was of practical interest, not only to the sheep men, but to the producers of all live stock, is the advantage of feeding animals for the market when they are young, producing early maturity to as large a degree as is consistent with the best results. I know that in the cattle business it is not always most profitable for men to force an animal from start to finish; it depends very much upon what the agricultural conditions are and the surroundings. For instance, last summer I spent a day among the cattle feeders of Kentucky, down in the famous blue grass region. I found cattle grazing in those excellent blue grass pastures in June, that were coming four years old, and I learned that those cattle had no grain or feed, except some corn fodder during the winter, but blue grass from the time they were taken off milk until they were ready for market. The winters are mild, the grass is good, and they can afford to carry a steer longer than we can where we have to feed through the long winters; they grow them at a very moderate expense, until they have attained their growth, and then they finish them off on corn. If we are feeding high priced grain all the time, it is a different matter. The fact of the advantage of the younger animal over the older and more matured animal, is one that has an important bearing upon this subject. One of the objects of our experiment also was to determine the relative cost of producing a pound of mutton from lambs and from sheep a year old or over. We had in here a bunch of Shropshires, coming one year old, and another bunch coming two years old. I have given you the results of all the sheep coming one year old and the Shropshires are just about an average, but we will compare the results from all the lambs with the yearlings. For those yearlings it required eleven pounds of food to make a pound of gain; it required in that case 56 per cent. more grain to make a pound of mutton on a yearling sheep than it required to make a pound on a lamb under the same conditions. It also cost 4.44 cents for that food for each pound of increase on the yearlings. There was the difference between 2.88 and 4.44 cents upon exactly the same food, the same surroundings, and the same care. There is a very striking illustration of the advantage in the sheep market of putting the animal on the market at an early age; it required 56 per cent. more to make a pound of mutton on a yearling Shropshire than on a Shropshire lamb, and it sold for 37½ cents less on the market. It is time to consider this influence in relation to the mutton business; other things being equal, you see early maturity has a decided advantage, and if we are going to produce mutton we must produce it most economically, and we must produce mutton that the market will pay the price for. Those are the two important factors that should be uppermost in the minds of the farmer all the time.

Why We Should Raise Sheep.

There are some other features in reference to the sheep business that I want to call your attention to, briefly, and it seems to me that they are some of the most important reasons why the farmers of this state and of other agricultural states should turn their attention to the mutton industry and the wool industry, rather than to the production of grain. I know you are not doing as much in the way of grain raising in this state as we do in Iowa, but you are doing too much of it; you are not condensing the product, you are not manufacturing at home as much as you should. You may sell $1,000 worth of wheat today, and with it you take from your farm $400 worth of fertilizing material. You will probably think that I have put the figures too high for Wisconsin, because you do not buy very much in the way of commercial fertilizers, but if you were to go on with your cropping and taking from your farm and shipping off these products, in a very short

time you would be placed under the necessity of buying these fertilizers and when you do it, it will cost you about $400 for every $1,000 worth of grain that you take from the farm. For $1,000 worth of sheep at the price prevailing today, you only sell about $50 worth of matter that is of any value as a fertilizing agent on your farm. These are conditions which exist, making it strikingly important and essential to finish our products and send them to market in a condensed form and keep the greatest amount of matter that is of value upon the farm.

Further Advantages of Growing Mutton.

Another phase, the sheep is not given the consideration as a corn condenser, and a freight condenser, and a condenser of other farm products, that it is entitled to. You ship $1,000 worth of wool to Chicago today for about $75. Go down here to your railroad station and load up $1,000 worth of grain to ship to Chicago, and they will charge you $500 to get it there. When we get down in Iowa the farmer takes $1,000 worth of grain to market and the railroad charges him an even $1,000 more to put it down in the market. We need to condense our freight charges, need to condense the products at home, send abroad the things we do not want. You Wisconsin people are ahead of us a good deal because you can sell $1,000 worth of butter and not sell 50 cents worth of fertilizing material off your farms. Gentlemen, the time is coming when we are going to make our own beet sugar and save a great deal of the money that is now going out of this country. We have been paying Canada during the past five years nearly a million dollars for mutton, and yet they pay 20 per cent for getting those sheep over the borders. You might just as well be making that mutton here and making a profit on it, as well as your sugar.

I have here a detailed record of the results of the tests of all these various breeds, representing ten lambs each. It will not be necessary for me to take the time to read it.

You see the Cotswolds made a little the best record in that experiment, and we have gone over the same ground again during the past winter, duplicating the experiment in every respect and adding one or two additional features.

All of this wool was rated by experts who knew nothing about the breeds; it was carefully marked without any breed names attached to the labels, and appraised on its value on the market.

Stay by the Sheep.

I think that these are some of the reasons why the sheep business ought to be established upon a more permanent foundation than it is. I believe there is no reason why the agricultural lands of Wisconsin will not produce mutton of the highest quality and at comparatively low cost. There is no reason why we should not be producing mutton, not only for our home markets, instead of allowing it to be supplied by the Canadians over there, but we should produce mutton for export and we should also produce wool to the extent of our home demand. We paid $30,000,000 last year for wool brought into this country, wool that we might just as well have produced here at home. We have all the advantages that will enable us to conserve the fertility of our soil and make our land worth more, enable us to condense our freight products, and supply the home market.

DISCUSSION.

Question—Is lowland good for sheep?

Prof. Curtiss—As a rule it is not. Breeds vary in that respect; the Cotswolds and some others are breeds better adapted to the lowlands than the medium sized and smaller ones, and

they are adapted to lowlands because they have been produced upon that kind of land, but for the breeds that are probably most numerous in the United States, low land is not favorable. However, there is very little difficulty on that point. I know there is a general idea that our land is too wet for sheep, but there is no difficulty about that. You may have some very low land, some bogs and swamps in this state that would not be adapted to sheep production, but the ordinary farming lands and pastures that have been reasonably well drained are well suited to the sheep business.

Mr. Hyatt—I kept one hundred sheep upon a reclaimed swamp, and I never had sheep do any better.

Mr. Hays—I have been in the sheep business a good while, and my sheep are pastured principally on lowland. I have ten acres and I have kept 150 to 200 sheep on it, at times. My sheep have done well on both high and low land until this season when they have been troubled with worms.

Prof. Curtiss—That has been a very general trouble.

Mr. Hays—What was your loss in those sheep in a year?

Prof. Curtiss—I presume we lost ten to fifteen per cent., mainly from worms.

Mr. Hays—I have been in the sheep business a long time, and I never lost but one head until this winter. How does the Oxford compare with the Cotswold and the Lincoln?

Mr. Hyatt—Hadn't we better petition McKinley to protect us from dogs and never mind the tariff?

Prof. Curtiss—That is a good suggestion.

The Oxford is a large breed and a heavier shearer than the other Down breeds but hardly as heavy as the Cotswold and Lincoln. They, as you understand, belong to the Down breeds; they originated by a combination of the Down breeds and the long wools; they are a large, heavy breed, well adapted to good agricultural conditions.

Mr. Hays—Did you give your sheep anything for this disease?

Prof. Curtiss—Yes, and I think there will not be nearly as much difficulty with that trouble in another season. It is the first time in years that we have experienced any such loss, and the great trouble has been that all the flock masters have allowed the disease to progress too far before beginning treatment. A sheep that is badly infected with worms cannot be very profitable, but I think that if we begin early and feed worm remedies and things of that kind to keep the worms from establishing themselves in the flock, we won't have much trouble. There are a number of worm remedies, some of them are patented and on the market, and a number are prescribed by veterinarians. Turpentine is one of the best, but it is a little more difficult to administer in the food as a preventive. I would rather use a powder, something that can be fed with grain, without the necessity of drenching each sheep.

Mr. Hays—Did you ever make an examination of the sheep's stomach after it died?

Prof. Curtiss—Yes; our veterinarians have repeatedly examined all we lost, and we found as many as four different kinds of worms infesting the sheep.

Mr. Hays—I had a veterinarian examine one of mine and we found on the fourth stomach, the last stomach it looked like high inflammation, but you would scrape it off and look through the glass and see little worms as big as a cambric needle, just sticking in there thick. That sheep had no blood at all.

Prof. Curtiss—That is one of the first symptoms; the sheep will become pale and apparently bloodless.

Mr. Goodrich—I am thinking of going into the sheep business. It seems from your experiment that the larger the breed the less food it takes to make a pound of gain. Does that rule hold good?

Prof. Curtiss—No it does not. The Cotswold has proven itself a very responsive feeder in our experiment, but

it does not hold good that the larger the breed the smaller the amount of food required to make a pound of gain. You will see that from the report.

The Chairman—Did these large, long wool sheep sell for as high a price a pound; the Cotswolds and the Lincolns?

Prof. Curtiss—No, on an average they sold for twenty-five cents a hundred less. We need to study the demands of the market for everything not only for sheep, but everything that we produce, and the thing to do is to produce what the market wants and will pay for. I recognize the fact also, that these were selected sheep, good representatives. We did that in order to have all the breeds fairly and equally represented, but, at the same time, some of the best sheep that we had there came from the farmers within a few miles of the college where there are no pure bred animals at all, except the pure bred sire. Some of the sheep we sold during this present winter at $5.65 a hundred were bought from a neighboring farmer who raises sheep for market, and they were raised under just such conditions as are common to every farm in this state. He is a man who has always taken care of his stock and used a good sire, but has never taken any pains whatever to keep up the pedigrees of his flock. His sheep went in and sold right up at the top price.

A Member—Does this man allow other people to pick his best ewes out?

Prof. Curtiss—He allowed me to pick his best ones, but as a rule he does not do that. He took an interest in the experiment. This particular bunch were high grades.

Question—What are the general symptoms of worms?

Prof. Curtiss—One of the first indications will be a loss of blood, a paleness, a pale skin and a blue tint to it, a sluggish circulation, and sometimes a little swelling occurs under the throat and a general weakness and depression, then a very laxative condition of the bowels—scouring and severe coughing is common.

Dr. Palmeter—Would not a rape pasture prevent these worms?

Prof. Curtiss—I would not say that it was a preventive, but I can speak in high terms of rape. I think that every man who grows sheep should grow rape. The Canadian sheepmen say that there is no crop they can raise that will put a bunch of lambs ahead or put an old flock in good condition, as satisfactorily as a field of rape.

Mr. Hyatt—What would you feed lambs three or four weeks old, aside from what they get from the ewes?

Prof. Curtiss—I would be governed somewhat by the market price of grain in that respect. Corn and oats with us are the most valuable and economical grains. You have other feeds that would be cheaper, perhaps; peas is one of the best feeds for sheep; we cannot grow them, but if we could we would use them extensively; oats and bran and a little oil meal are good.

Mr. Arnold—I understand you to draw the conclusion that you can make a pound of mutton cheaper than you can make a pound of beef?

Prof. Curtiss—I will say that you can make it at not to exceed the cost of producing a pound of beef. Our investigations, as well as the investigations of other states, have proved that.

A Member—What age were these Hereford cattle?

Prof. Curtiss—Coming two years.

A Member—Did you compare the price it would cost to produce a pound of beef with sheep of the same age?

Prof. Curtiss—No; we compared it with the cost of feeding the lambs, but the cattle were marketed at the minimum age and the sheep were marketed at the minimum age. You cannot establish an accurate comparison at the same age because a sheep matures earlier in life than a steer.

The Member—But suppose you took a herd of cattle at the same age, don't you believe you could make the meat cheaper than at two or three years old?

Isn't there the same advantage with beef as with sheep?

Prof. Curtiss—Yes, certainly. In that particular case we had sheep coming two years old and we had cattle coming two years old, and it required eight and nine hundredths pounds of dry matter for a pound of beef, and it required eleven pounds for a pound of mutton at that age; but you must consider that those yearling sheep were mature when they went into the experiment, while the cattle were being matured.

A Member—I maintain that a pound of beef, before cattle are a year old, or about the time they are a year old, can be made a great deal cheaper than after that. What sized flock is it most profitable to keep?

Prof. Curtiss—Well, usually a small flock will give you the best results but that question cannot be answered in an exact way for all conditions, all localities, or all breeds. Some breeds will bunch up in larger flocks better than others, but in a general way, with mutton breeds I think the best results will be obtained by keeping the flock down to a hundred, although it frequently happens that a man will have two or three nundred together and do well. It depends on the man a great deal.

Question—Do you feed your grain whole or ground?

Prof. Curtiss—We do not grind our feed for sheep that have a full mouth of teeth.

Question—What breed would you prefer?

Prof. Curtiss—Well, that breed question is something like the question of the size of the flock; each man must settle for himself. We did not take this up to get into a breed controversy, but to establish facts with reference to each breed, and to present what information we could concerning the merits of all the breeds.

The Chairman—Let me ask you, Professor, if you consider that experiment as valuable as it would be if it had started back with the birth of the lamb, or even previous to that, and the comparison been carried on with the same kind of feeding right up to the marketing?

Prof. Curtiss—No; we would not consider it as valuable and in the last case we took the lambs immediately from the ewes, beginning at an earlier age in order to make that point more satisfactory and also to put the lambs on the market at an early age; it would be still better if we could take the ewes and keep an exact record from the day of their birth until the day they go to market, but it was an impossibility with the funds we had, to buy the kind of ewes necessary to raise these lambs and conduct that experiment.

Mr. Hyatt—How old were the lambs when you took them?

Prof. Curtiss—In this last case, about five months, I think; they were with the ewes yet when we bought them, and they were taken right off and carried on from that time. We are doing some work in the hog line in something the same way and we have taken the pigs the day after birth and carried them from that time on until they are ready for market.

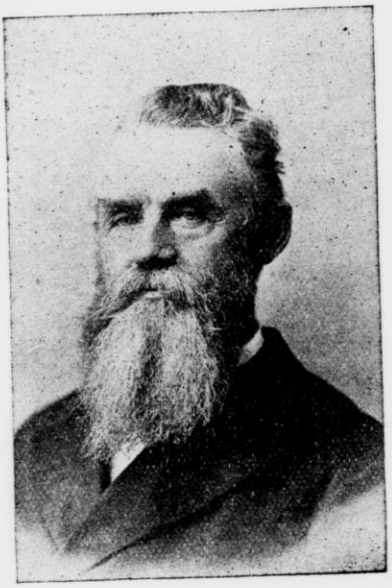
A Member—Would it pay to raise sheep on land that cost $50 an acre and compete with those parties where the land cost only $25?

Prof. Curtiss—England is a great sheep and mutton feeding country; they are producing a vast amount of mutton over there on land that is worth $100 an acre, and they find it as profitable as any other branch of their business. One county of England has more sheep than the entire state of Wisconsin, twice over. Scotland has had as high as 1,380 per thousand acres of agricultural land. I don't know what you have in this state, but in Iowa we have only about twenty-five sheep to a thousand acres of agricultural land, and I don't think you have much more. There is no reason, so far as the value of the land is concerned why we can not raise sheep profitably. Canada is raising sheep on land that

is worth as much or more than yours and they are paying twenty per cent. duty to cross the line and sell mutton in your market at a profit. A question has been asked about grinding peas. I have not fed peas extensively but I think it would pay to grind the pea crop for sheep.

PROSPECTS FOR PROFIT IN BEEF.

ALEX A. ARNOLD, Galesville, Wis.



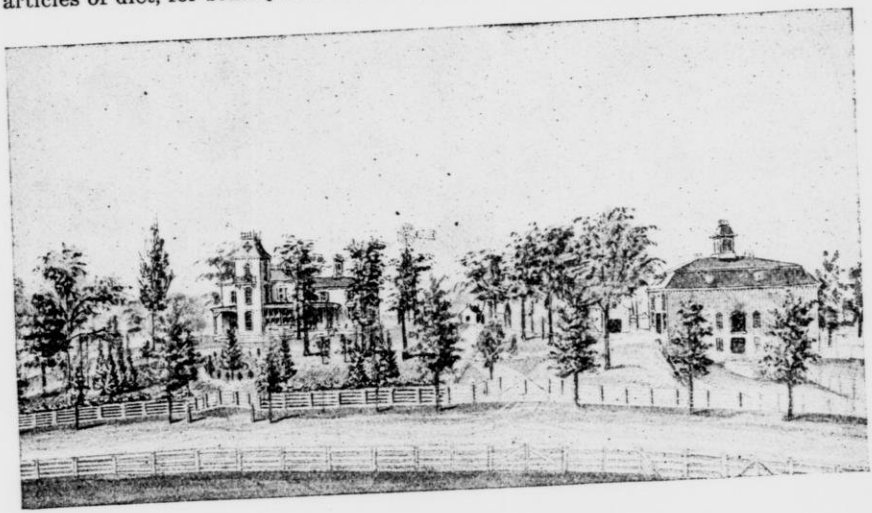
ALEX A. ARNOLD.

I am limited to "Prospects for Profit in Beef." Experience has proved that "the hind sight is better than the foresight." However there are indications that point to future profits in this branch of farming (to my mind better than in any other), if we wisely avail ourselves of the opportunities.

Some Important Statistics.

January 1, 1896, there were 16,137,586 cows and 32,086,400 other cattle. January 1, 1897, there were 15,941,717 cows and 30,508,408 other cattle, a decrease in one year of 1,771,860 head, or a decrease of 1.3 per cent. of cows and 4.9 per cent. of other cattle, a heavy decrease of all kinds of cattle, especially so of animals for the block, thus showing that this production is not keeping pace with the consumption. Our population in 1870 was 38,558,371, cattle 25,484,100; in 1880 the population was 50,155,783, cattle 33,258,000; in 1890 the population was 62,622,250, cattle 52,801,907, and in 1897, according to the same rate of increase (about 1,200,000 per year), the population must be about 70,000,000. With an increase yearly in our population of 1,200,000 and a decrease of 1,771,860 of cattle, it is easy to see that the supply is not keeping pace with the demand. Supply decreasing, demand increasing. Were most of these cattle cows the shortage might quickly be supplied, but not as promptly as in the case of the prolific swine. At present there is about one cow for each family of five, and a beef creature (of various ages) for every two persons in our nation, and only cows enough to produce a young animal for every five yearly if all their calves were raised. With a beef ani-

mal for every two of our population, with this number of cattle in our country and plenty of cheap feed, in 1896 and 1897 the yards at the various slaughtering points are comparatively empty and it is easy to see that with a supply of only one beef to every five where we now have one for every two and the population fast increasing, there must from this on indefinitely, be an under supply, therefore beef must run high as compared with other articles of diet, for some years to come. compared with the cost of production. Prices at retail do not advance in proportion to the advance in the price on foot, in fact the profits in the butcher business seem to be in an inverse ratio,—the cheaper the beef is on foot, the greater the profit; the dearer the beef cattle are the smaller the profit for the money invested, whereas in other lines the retailer expects to make a percentage of profits on the investment proportionate to the wholesale cost. With present inspired confidence



FARM HOME OF A. A. ARNOLD.

There is no reasonable doubt but what there will be the same demand for export as in the past, or that there will be any less demand for beef or veal at home.

Beef as a Food.

Beef is recognized as the most healthful and nutritious muscle forming diet, and it is only a matter of financial ability with the people whether there will be an active demand in the future, or not. It is evident now that the only reason why beef is not still higher is that our people are too poor to eat it. Good beef is now worth more than any other product as I am satisfied that we may safely look forward for better times for the productions of the farm, the mine, and the factory, the prosperity of each tending to the prosperity of all. Therefore we may confidently expect a brisk demand for this most healthful article of food.

There has been a sentiment that the facilities for cattle raising on the range is so great that we cannot much longer make beef at a profit in the states. When we consider that most of the watering places are occupied, and that the croppings on the plains are constantly making them less productive of wild grass, we may not look

for great additions from that quarter, and if a large number of cattle are raised they must come from cultivated farms, that will only increase as more farms are opened. The dairy business must always be safe and generally profitable, and whatever is done in that line is in no way antagonistic to good beef production, but tends to scarcity of the good beef animals, therefore higher prices for the only kind of beef that pays for the making.

Breed and Feed for Beef.

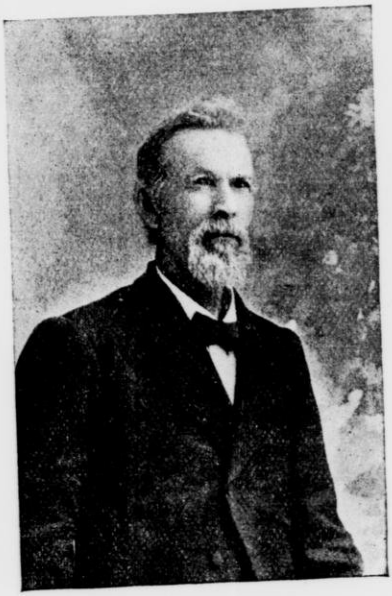
To be profitably fed cattle must be intelligently bred. There is little chance for profits from a steer bred from a first class dairy sire and dam. The valuable meats cannot be in the carcass. The tendency to make the butter fat in the milk centralizes in the vitals, and when fattened appears in intestinal and leaf tallow, or in bunchy excrescences on the carcass, just the conditions to make them objectionable. The well rounded, fat all over, juicy beef, ripened quickly, having a soft, fluffy touch in the animal, is the kind that pleases the palate of the connoisseur, and there is no use trying to humbug the butcher with any other at long prices.

Care of Beef Cattle.

The farmer should seek to build up the frame and muscles of the animal in early life, by exercise, pure air, and plenty of sunlight, with pure water, proper shelter, and a ration composed largely of protein and minerals. As they grow older more carbonaceous foods may be added, so that at maturity or when finished off they may be fed a wide ration, composed largely of carbonaceous or fat forming elements. For best profits in the future as in the past, the feeder must take advantage of the early life of the animal when it is full of vigor and before the muscles are rigid; this makes the best beef. Finish them off rapidly, and when ripe, market. Profits often come by reason of little expense in the way of labor, food, and shelter, and in this regard the steer feeder has an advantage. The grain fed to a steer is sometimes worth as much as it costs to fertilize the farm. Again the croppings should be left long to insure good fattening grasses, thus keeping the pastures well mulched, nature's best condition to maintain fertility. The farmer who watches both ends of the business,—buys well and sells well,—has gone a long way on the highway to success. With these conditions and considerations future profits may confidently be expected. Buy, breed, feed, care for, and sell well, and a farmer will be happy, and grow to be a broader man, his purse will be wider as the years go by, and when he lets go of his fragment of time, he can leave with no pangs of conscience because of giving his brother the dyspepsia.

BABY BEEF AND SILAGE.

JOHN W. HAYS, Alderly, Wis.



JOHN W. HAYS.

Mr. President, Ladies and Gentlemen—Forty years ago it was the practice to keep our steers until four or five years old, before fattening them. At that time land was cheap and pasture cost almost nothing, but as our lands rose in value, and the almost boundless prairies of the western states were dotted with vast herds of cattle feeding upon cheap pasture and cheap corn, we soon found that we would have to adopt better methods or be left in the race. Fifteen years ago we came to the conclusion that by better breeding and better feed we could take a shorter course.

How I Feed Young Beef.

I have turned all steers raised on the farm at two years and even less, with good results. Four years ago we experimented with seven calves, five of April and two of May. All were high grade short-horns. Five were fed by hand and two continued to run with their mothers. Those that were hand fed were given whole milk the first four weeks, gradually changing to skim milk and a small ration of whole flax seed boiled to a jelly, and a small ration of oats as soon as they learned to eat. The hand fed calves were kept in the stable until June 1st, then turned into good pasture with stable, to run at will. They were regularly fed twice a day on milk, and once a day on grain. In September, when the pasture began to fail, they were fed pumpkins and sugar beets once a day, with a continuous grain ration. They were put in stable November 1st, and averaged in weight 500 pounds each, while those that ran with their mothers were fully fifty pounds lighter. Being heifers with first calf, and having had no grain, they did not do well for the first month after being put in the stable, as they were wild and unused to grain ration. They were put into a large, well-ventilated box stall, were well bedded, kept free from lice, and were gradually put upon full rations of silage, corn meal and bran, oil meal, and clover hay. They were watered once a day and were on full feed by December 15th.

They were sold April 15th to a retail butcher at Menomonee Falls, for five dollars per hundred pounds. They were weighed at home and the lighest weighed 780 pounds, while the heaviest was 1,050 pounds. The shrinkage was

25 pounds. The average price per head was $43.75. The only fault found by the patrons of the butcher as to the meat was that the supply did not equal the demand.

Time of Cheapest Growth.

It is a fact, well known, that the cheapest growth of a steer is during the first six months of his life. Let me give you some figures as to this:

Value of calf at birth,	$2.00
New milk for six weeks,	4.00
Oats,	1.50
Whole flax seed and oil meal,	1.25
Skimmed milk,	4.00
Pastures, pumpkins and sugar beets,	2.00
Total cost at six months,	$14.75
Cost per hundred pounds,	$2.95

Now I will give the stable cost:

180 days at 9 pounds per day of corn meal, bran and oil meal at $15 per ton,	$12.15
2½ tons ensilage,	4.00
One-half ton clover hay,	2.50
Total 6 mos. stable cost,	$18.65

Gain in weight while in stable, 400 pounds, making the cost of every hundred pounds gained while in the stable, $4.66.

Costs per hundred pounds at time of sale, $3.80.

After paying for all the feed there was left a profit of $10.36 for each animal sold.

Mistakes We Are Liable to Make.

Let me caution the young feeder to remember to always commence with a small ration, less than half of full feed, and gradually increasing. It will require a month or more before getting on to full feed. One of the greatest faults with the new beginner is the over feeding at the start. If the animal is overfed and made sick at first it seldom fully recovers. You can safely feed all the animal will eat after the first four or five weeks, and with good results.

Another matter of the utmost importance is the looking after the comfort of the animal, giving it a good, clean bed, and a roomy, well-ventilated stable. Let me relate an experience of my own, showing the mistake that I once made. Some years ago I made a practice of weighing all my cattle once a month to ascertain the gain in weight. The cattle were tied in the stable and each weighed separately. The first month I found that one of the very best of the steers had made a gain of only ten pounds, but I thought that there must have been a mistake in recording the first weighing, as the balance of the herd made a gain of sixty pounds each. The second month that one steer made a gain of fifteen pounds while the rest of the herd made a gain each of eighty pounds. I then knew that the mistake was not in the scale record, but that the animal was not being treated right some way. I made a thorough examination and found that the floor of the stall having too much slant the cords of the animal's fore legs were strained and sore, although the steer was not lame. I put him in a box stall and he made a gain of ninety pounds a month for the next three months. He had eaten his full ration from the first. Thus you see that I had a loss of 115 pounds because of one little mistake.

What the Market Demands.

The demand today is for well fed beef, young and ripe, meat being well marbled, with large proportion of lean, tender and juicy, and cutting with little waste. I think the demand will increase, and believe that we of eastern Wisconsin can grow such beef at a profit, if our work is conducted upon business principles, and our methods are right.

I have thus briefly described my mode of growing baby beef, and think that if the methods I have described are followed in detail, the result will be even better than I have recounted. The foregoing is what I call the short course.

We have followed another course with larger profits. We have always made a practice of buying what young stock we could at a reasonable price turning them into pasture and feeding the following winter, selling them at two years of age or less. We now have fourteen head that cost us on an average about $15. They will weigh by the first of April 1,100 pounds each, which will leave us a good profit upon a small expenditure.

The Silo Necessary for Success.

The person who is going to make a business of cattle feeding should follow it right through, feeding every year. We will strike bad years in this business, as well as in other lines. There is plenty of opportunity to learn more each year. Though I have followed this business for the last forty years, upon a somewhat small scale, I find that I have lots to learn yet. There are very many little details of the work that can only be learned through practical experience, and it takes time to learn them. We of southeastern Wisconsin, where land is valuable, cannot profitably pursue the methods in use among those living upon the cheap western lands. To make our business pay we must practice rigid economy. The great thing is cheap feed, and as to this there is nothing that will take the place of good ensilage. Nothing will pay better than a well constructed silo and good corn silage. This is the cheapest feed for roughage that we can raise, and of the very best for making good beef; in fact, without silage we might as well abandon this business.

DISCUSSION.

A Member—What kind of corn do you raise for silage?

Mr. Hays—Corn that will raise ears; the more ears the better.

Question—How much milk and the amount of increase per week have you for your calves until you put them on full feed?

Mr. Hays—We don't feed them very heavy; we commence with small rations. There are more calves hurt with overfeeding than underfeeding. I estimate sixteen pounds a day.

A Member—Do you consider Stowell's Evergreen sweet corn good corn for the silo?

Mr. Hays—No, there is too much sugar in it; it will develop too much acid. Dent corn is all right.

Question—How is your silo built?

Mr. Hays—It is a stone silo, built in 1882. My barn is a basement barn, a ten-foot basement. I dug down in the ground level with the floor and put up a wall the same as if I were going to put up a building, a two foot wall, and I put a frame on that wall, a six-inch frame. I had eighteen inches for a wall on inside of frame and I continued the wall right to the top of the silo, twenty feet; then I plastered it well with water cement, good and smooth.

Mr. Hyatt—Nearly every farmer in Sheboygan county is a dairyman, but a great many of them would like to combine the making of beef with it. What would you do; keep two sets of cows, one to raise heifers for the dairy and another set to raise beef?

The Chairman—I think we had better refer that question to Captain Arnold first.

Mr. Arnold—I would say that if Mr. Hyatt is going to be a dairyman he had better be a dairyman.

Mr. Hyatt—Now we can't get the cows all milked.

Mr. Arnold—You are a kind of a general-purpose fellow, are you? If you are a general-purpose man you had better have a general purpose cow. The woods are full of that kind of men. The cow that will do fairly well at the milk pail and will produce a good calf that will make a good steer, is a profitable animal for that kind of farmer, but you cannot make a good steer from a good milking breed.

Mr. Hyatt—Our butchers say that

Jerseys that are well fatted make the sweetest beef they get.

Mr. Arnold—I want to say this,—we have the finest prospects ahead of us that we ever had in the United States, not so much in the swine industry as in beef and mutton. Prices are not up as high as they ought to be, but just as soon as the consumption comes up to what it ought to be, prices are bound to be better. We have an under-consumption at present, but with our increased population and the smaller number of animals fed, there are good prospects for the future. We have one-sixth less swine in the United States today than there has been since 1892.

The Chairman—I hold here in my hand a letter written by the butcher who bought this baby beef of Mr. Hays, to which he referred. This butcher says: "Dear Sir:—In regard to the fat stock I bought of you a number of years ago I would say those twenty head of pony steers were No. 1 beef, the best I have retailed in my shop in a long time. But the nicest of all were those seven head of calves or baby beef, as we termed them. Their average weight was about 900 pounds and they turned the scales at 58½ pounds to the hundred. I would say in regard to the quality it is excellent both in color and taste, although it is not as rich in beef flavor as pony steers. My customers wish I could procure such beef to retail the year round; they say it is the best to be had, but, as you know, there is not enough such stock fed around here, so I cannot furnish them with the baby beef and I must fall back onto pony steers. In regard to the cost, I paid you five cents per pound on foot; as you well know that brings baby beef to a good round price to retail. I paid you very near $1,400 for twenty-seven head, and I think there is money in raising beef for market if done in the right way."

Mr. Everett—Mr. Hays, did you feed this baby beef ensilage through the winter and about how much? And did you feed clover hay?

Mr. Hays—They were fed silage and clover hay, all they would eat of ensilage, and they did not eat very heavily. After the first month they got a good heavy grain ration, commencing on five pounds a day, and after a while they got up to ten.

Mr. Hyatt—Did you ever feed roots instead of silage?

Mr. Hays—Oh, they were fed both roots and silage. I fed sugar beets. We did not open the silo at first; they were probably fed a month before the silo was opened.

The Chairman—What is this silage, sour or sweet?

Mr. Hays—Sweet silage means when the corn is too ripe—gets too dry, and there are little mouldy pockets in it. The sour silage is a little greener. I like to have the corn just well glazed, not too dry. The silage isn't sour. I don't want any of this big corn.

The Chairman—The sweet silage is a kind of sweet pickle.

Mr. Everett—Will it ever pay to feed cattle that are not high grade beef cattle?

Mr. Hays—It will not pay as well.

The Chairman—From your experience what kind of a silo do you like best?

Mr. Hays—Of course I am prejudiced. I like the stone silo. The shape, of course, is according to the man's fancy; it doesn't make much difference, if you don't build it too big and you build it well. I would build it deep by all means, and the principal thing about a good silo is a good foundation, then a good frame, well tied together at the top so it won't spread. I know of many silos that have cracked open because the frames are not tied.

A Member—Does your silo freeze?

Mr. Hays—No, silos do not freeze to amount to anything.

Mr. Arnold—Would you make a hole in the ground for a silo?

Mr. Hays—It would keep the best if you had good drainage. The only trouble is in getting it out.

Mr. Everett—Don't you think that ensilage is as profitable to feed to beef cattle as to dairy cattle?

Mr. Hays—Yes, more profitable. You would have seen the sheriff around there long ago if it hadn't been for silage. You cannot make baby beef steers 900 pounds, a little less than a year old, on dry feed.

A Member—Isn't it best to make beef and finish them when they are about two years and three months old, and on the average farm make as much money as to feed them early?

Mr. Hays—Probably it will pay better for some men but not for me. You see our land is worth $75 an acre.

The Member—Ours is worth $100.

Mr. Thorp—Mr. Hays, do you feed lambs ensilage, and if so, is it profitable?

Mr. Hays—Yes, I don't think you could feed lambs without it unless you had roots.

Question—Is it best to feed more than three times a day?

Mr. Hays—If I could have just my own way I would prefer to feed them twice a day and bed them good, and I don't want a man to go in the stable or to look at them; let them just go and lie down, and not take much exercise. I don't want them out roaming around through the fields, if they are to get a good growth.

Mr. Thorp—Can't you get calves to eat a good deal more skim milk by feeding them three times a day than two?

Mr. Hays—I think very likely.

Mr. Thorp—I find there are a great many in the state who are prejudiced against feeding ensilage to lambs or sheep, and I know that Mr. Hays has been successful with them, as well as with cattle.

Mr. Hays—I will tell you one thing about silage. You don't want to get it too dry for sheep. I would cut it a little bit greener for sheep than cattle, and cut it pretty fine. It wouldn't hurt if it got a little sour, if you will feed dry food with it. I would not feed ensilage altogether, anyway.

Question—How do you cover your silo?

Mr. Hays—We cover ours with boards. We fill it very full, then let it settle over night. Then we cover it with boards and weight it with stones. We could probably cover with straw, but we have not room enough.

A Member—I have been using a silo for nearly ten years, and I have experimented with several different ways of covering my silo; the best success I have ever had was to put on about three inches of very fine straw and paper, and weight it down thoroughly. I have had it so that we have only had a half an inch of spoiled ensilage.

The Chairman—Mr. Hays, you speak of a stone silo, built, I suppose, with an air space. Does that give you as good satisfaction as a wooden silo would?

Mr. Hays—I had a wooden one and it has been a constant expense to me. I had to keep repairing it, and I finally got it lathed and plastered. We were troubled with that because our fork would go right through it when we were throwing out the silage.

The Chairman—Is this stone wall strong enough to hold your silage?

Mr. Hays—Oh, there is a frame around it. My silo was built on the outside of the barn, a separate building entirely. I built up a frame on the stone wall foundation, the same as you would for a building. It is boarded on the inside next to the wall with rough boards, and then this wall is continued right up. Now, in building a silo that way, let me caution you. You take a three-eighths rod and make a hook, fastening it every six or eight feet. I know of a silo that was built this season, built very high and rather a light wall, and they did not tie it together well at the top, so the whole thing has spread out. You must have a good frame and a good foundation.

The Chairman—Your stone silo is practically a perfect cistern?

Mr. Hays—Yes, plumb from top to bottom, and it will last as long as you want to keep a roof over it. It has

been filled sixteen times, and it would cost probably five dollars to plaster it over.

A Member—Cannot one be successfully made with stone alone?

Mr. Hays—They are too expensive and they would be apt to crack. The frost would go through it, too.

The Chairman—Suppose you had lots of stone.

Mr. Hays—It would cost a good deal to lay it up. I would put the frame on. Brick would do as well as stone, and eight inch hard brick. I know of several made of brick.

Mr. Lloyd—What thickness is your wall above the stone foundation?

Mr. Hays—It is eighteen inches. It is not necessary to have it that thick, but I have the stone and I could just as well build it eighteen inches; eight inches would do, provided there was brick and a good frame.

A Member—What is the gentleman's opinion of the stave silo, one thickness?

Mr. Hays—I don't know much about it. I do not think any of the wooden ones have given very good satisfaction.

Question—Would you not prefer to keep your calves in the stable all summer?

Mr. Hays—Oh, yes, if they are well fed; they would want a good deal of attention and a good place.

Question—How many openings have you in that silo?

Mr. Hays—Only one, at the bottom, a seven foot door. We dig up. Mine is about twenty-three feet long and twelve feet wide. I cut mine down in sections two feet till I get about half way across, then I have it on a slant.

Mr. Goodrich—Would you advise anyone to build just that way?

Mr. Hays—No.

Mr. Goodrich—You know we didn't know anything about it when we built. I know but little now.

Question—Why wouldn't you advise the same way of building?

Mr. Hays—Oh, well, I think I could get a more convenient way. If I had to have a big one I would build it longer and narrower, and cut it off in sections of two feet. You cannot feed from the top of a very big one; it will spoil too much, but you can uncover part of it and go down in sections that way. It won't spoil in a week or two weeks.

Mr. Goodrich—There have been quite a number of stave silos made in the country, and a few men praise them very highly. But the trouble is, you fix the hoops tight, the ensilage swells the staves and then when it comes dry the next summer, it leaves open joints. Now, there is a way to make a stave silo and make it all right, and it is about the only way you can make a round silo and make it small. Take staves 2x4 or 2x6, have them joined well, and the staves doweled together, once in four or five feet. That will prevent its racking over if it gets dry. Now, it is necessary to have an air space or it will freeze too much. You can put some strips horizontally on the inside, two thicknesses of inch-board, an inch and a half wide, tack them inside the staves, then put some matched lumber, four inches wide, up and down on the inside. Now, the ensilage does not come against the staves to make them swell, and therefore they do not have so much shrinkage, and there is your air space too, to keep out the frost. That is the only way that I know of for building a good stave silo.

A Member—Can silage be successfully kept from one year to another?

Mr. Hays—I think it can if you have the right kind of a silo.

Mr. Convey—I know in a great many parts of this state it is quite difficult to get your brick or stone, and I do not want people who read the coming Bulletin to be discouraged from building a frame silo. I have used one eight years and it is in good condition today. I would advise the building of a round silo, it is really cheaper to build than the square. I would discourage the system of taking from the bottom, or cutting down a

portion of the silage, and letting the rest remain until later on. It is a good deal better to feed from the top; there will be much less waste and more satisfaction.

Mr. Hays—That depends on the size of the silo. If you have a big silo you cannot do that way. Would prefer two small silos, rather than one large one.

Mr. Thorp—In regard to keeping ensilage for two years, I will say that a silo on Mr. A. F. Noyes' farm, filled in 1895, is being fed out this winter, and they inform me that the silage is just as good as any they ever had.

Mr. Arnold—How many pounds of ensilage is the proper amount to feed?

Mr. Hays—I think that no animal ought to eat over forty pounds a day, if they have a little dry feed besides.

Mr. Arnold—Suppose you give a steer thirty pounds of ensilage, what else would you feed with that ensilage for the best results?

Mr. Hays—I would feed corn meal and bran and oilmeal. Of course there is a good deal of corn in the ensilage. We always grind our meal.

Question—Would you feed a steer of two years the same as a one year old?

Mr. Hays—I would feed him all he would eat, if I wanted to fatten him.

Mr. Thorp—We have lots of farmers giving steers all the straw they will eat, and they don't grow well, they think. Now, in the experiment made at the Experiment Station at Minneapolis they fed nine steers, three they fed ten pounds of meal a day; three others twelve pounds, and three others fourteen, and those that got the ten pounds did as well as those getting the fourteen, showing that we waste feed.

The Chairman—Were not these steers selected on account of their individuality? Isn't it true that one certain steer with ten pounds will do as well as another with fourteen, and won't dairy cattle do the same?

Mr. Arnold—They were all of one breed.

The Chairman—It is the individuality; I don't care for the breed.

Question—Don't it appear from that experiment that when those steers were getting fourteen pounds, four pounds were being wasted?

Mr. Arnold—It won't hurt a steer.

A Member—But it will hurt hogs.

The Chairman—This is one of the experiments that does not prove anything.

Mr. Arnold—It has been proved that ten pounds of meal will make as many pounds of weight on a year and a half steer as will sixteen on a four-year-old steer.

The Institute adjourned till 7:30 P. M.

EVENING SESSION.

The Institute met at 7:30 P. M. H. C. TAYLOR in the Chair.
Music, First Congregational Church Choir.

RURAL MAIL DELIVERY.

Hon. JOHN M. STAHL, Editor Farmers Call and Sec'y Farmers' National Congress, Chicago, Ill.

JOHN M. STAHL.

Mr. Chairman, Ladies and Gentlemen:—I want it distinctly understood at the beginning of what I have to say tonight, that we, who labor for better mail facilities for towns and villages, and for the farm, are not animated by any spirit of enmity to city people. We recognize the inter-dependence of industries. We know that other industries cannot be solidly prosperous unless the farm is prosperous, and we deem it as equally true that the farm cannot be solidly prosperous when other industries languish. If we made war on city people we would be making war on our own, because statistics show that more than 85 per cent. of those who are successful in commercial and professional pursuits in the city come from the farm. We would not by one iota reduce the profit of city industries or take from the pleasures of city life.

City People Favor It.

I am glad that I can say tonight that the city people are heartily in favor of rural free mail delivery. When my little article in support of it appeared in the North American Review, clippings were sent me from more than four hundred city papers commending my article and favoring rural free mail delivery, and I have found only one city paper that opposed it.

The necessity of such rural free delivery service was touched upon in the house of representatives the 6th of March, 1896, by Mr. Pickler, who referred to the fact that no effort is made to improve the service for country people, while immense amounts of and there was not a single word spoken money are spent every year in the cities improving the postal service. Mr. Hepburn, also speaking in the house, gave figures along the same line

in opposition to these gentlemen, because every member of congress knew that what they said was true.

As a resident of the city of Chicago, mail is brought to my residence, which is more than five miles from the postoffice, three times every day, but as a farmer of central Illinois, mail is not delivered to me once a year; when I want mail I must go four miles and a half to get it.

What Congress Has Done for Us.

Even when congress has endeavored to improve the mail service to country people the postoffice department has taken the money and used it in the city, so that notwithstanding the efforts of our friends in congress, who secured an increase of $500,000 in the appropriation for country service, there was actually expended $170,000 less than was expended the year before.

During the past four years the postoffice department has been hostile to any improvement in the country mail service, and so they have maintained that in order to deliver mail in every town and village, and on every farm in the ccuntry it would make a net cost of somewhere between eight and twelve million dollars. I have demonstrated to my own satisfaction that it would not increase the net cost of the postoffice department a cent. For five years free delivery in villages was tested and it was found that it not only paid for itself but made net profit, and the hostile postoffice department has had to acknowledge that. It made a profit of 161½ per cent. in the town where longest tested, and that is better than any other business that I know of. The Loud bill to correct abuses in the application of the second class rate of postage, which passed the House in the last session of Congress, but which was killed in the Senate, would have made a saving of about eleven million dollars a year, and that would have paid the expense of delivering mail to every person in this country except a few in isolated localities. That bill will come up at the next session, and I hope every person who lives on a farm will write to his senator in favor of the bill. It is supported by every agricultural paper in the country. Bills have been passed appropriating many million dollars for the inland transportation of mail by railroads, and that appropriation was increased practically ten per cent. at the last session. Mr. Wanamaker declared that carrying the mails costs this country three or four times what the service was actually worth, and he was postmaster-general and ought to know. In a debate in the senate on the 2nd of this month Senator Butler showed that we were paying a little more now to carry a ton of mail than we paid for the same service twenty years ago, while in that time charges on freight have been reduced more than forty per cent. Yet twenty years ago we paid more than anybody else, so that according to the Senator we pay now about twice as much as private parties pay for carrying similar freight.

Big Money for Postal Service.

To show again how nicely the railroads get money out of Congress, I will mention another thing. According to the bill enacted the 2nd of this month, we shall pay for the year beginning July 1st $3,600,000 a year for the use of certain railroad cars in which to carry mail. Now, it has been repeatedly shown in congress that those cars can be built and equipped for $1,800,000, just one-half of what we pay every year for their use, and it has been shown that on an average they last twenty years, so that at the present rate we are paying $72,000,000 for what costs the railroads less than $2,000,000, and if I had time I could show you even a more shameful misappropriation of funds by the postoffice appropriation bill. Senator Vilas has tried for years to get the compensation to railroads reduced, or to have the government build its own cars. I

want to be fair to the railroad men. I have rather a wide acquaintance among them, and I know of no class more progressive or honest, or patriotic; but I must say that according to all the evidence the $29,000,000 that they get for carrying the mails is about $15,000,000 too much. I do not blame the railroad men for getting all they can, but I do blame the people who elect the senators who pass such bills. I haven't a particle of pity for the farmers who have to plod through the dust and mud to get their mail as long as we elect senators of this kind, as, long, for instance, as the great agricultural states of Illinois and Iowa have not a single genuine farmer in either branch of congress. The trouble with the farmer is, he is too modest, he won't demand his rights; farmers will never get their rights until they send their own friends to congress. Why shouldn't the mail be delivered to the farmer just as much as to anybody else?

What Can the Farmer Do?

Now, what can you do, what can every farmer do to help along rural free mail delivery? You can do just one thing; write letters to your congressmen and senators in favor of it. They probably will not pay any attention to the letter in the way of a reply—they will be too busy for that—but you need not worry that they will not read those letters and consider them. The congressman or the senator knows that the man who has the intelligence to write him to support this bill or to oppose that, has the intelligence and the independence to vote against him if he does not do as he should. When I began this agitation six years ago I met only ridicule. My best friends told me I was a fool, but now only one agricultural paper opposes this rural free mail delivery, and it would seem that the majority of the farmers are in favor of it, and in the discussion in the session of 1895-6 on this Post Office Appropriation Bill many congressmen spoke on this subject, and nearly half of the senators, and not one word in opposition to rural free mail delivery was said; they all acknowledged it ought to come, that it was a question of only a short time when it should come. So I hope you will write to your congressmen and senators and let them know that you are in favor of rural free mail delivery. I know of nothing that will do so much toward making the people happy and prosperous as rural free mail delivery—happy and prosperous because their prosperity and happiness are founded, as they must be, on a progressive and contented husbandry.

Music, choir of men and boys, 105 voices.

OUR PUBLIC SCHOOLS.

CARRIE E. MORGAN, Supt. City Schools, Appleton, Wis.

CARRIE E. MORGAN.

So much has been said about the influence of the public school, that there can be no longer any doubt as to the relation of this institution to our nation's welfare. The question that is occupying the minds of educators today is: How can we secure better schools? It is for conference on this question that our teachers' conventions are held. While our schools are good and a credit to the nation, all educators know that there is much to be done, if we would take first rank among nations. Germany has long been noted for the excellency of her schools. At the time of the exhibit at the world's fair our public school system received some severe criticism by European authorities. If it is true that our system has serious defects, it remains for those interested to devise means of bettering our condition. This is not a question that interests teachers alone, the responsibility rests with the people as well.

A step was taken in the right direction when it became the custom to hold school-board conventions as well as teachers' conventions, and to publish school-board journals as well as teachers' journals. The last step was taken when meetings of parents and teachers were held to discuss topics of vital interest to both. This last movement is still in its infancy, but its possibilities are vast. I believe that more can be done by this means than any other, for there are conditions existing in our school-rooms to-day that parents only can remedy.

The Good Teacher—Her Qualifications.

Undoubtedly the first requisite for good schools is good teachers. With these, good results can be obtained even in the face of difficulties, and without them the most modern school-houses and the best of apparatus count for little. The necessary qualities of a truly good teacher are many. We cannot expect perfection in school-teachers any more than we can expect it in other human beings, but there are certain qualities that we do expect every teacher to possess.

First, she must be well-prepared for her work. She must have a good education and know how to impart the knowledge she has. She must be systematic, thorough and progressive. She must possess a character that will exert a good influence over her pupils. She must understand child-nature. She must be kind, but firm, consider-

ate and patient. Surely the teacher's cardinal virtue is patience.

School Officers.

If there are essential qualities in the good school-teacher, there are also essential qualities in the good school officer. We need our best citizens in these positions. We want not only good clerks and good financiers, but men who know something of school-work, and above all who are interested in it. It is a source of sincere regret to many schooi officers that their business requires so much time, that they cannot give to school affairs the attention they would gladly give.

Correct knowledge of the state of affairs in our schools is absolutely necessary to the proper action of a school-board, and by correct knowledge is not meant the exaggerated reports of offended school-children, nor the complaints of angry parents. There are always two sides to a story. When personal investigation on the part of school-boards is impossible, the teacher's story and the reports of supervising officers should be weighed in the balance with current rumors.

In the selection of teachers lies the most important and the most difficult duty of the school board. The care of finances is an important one, but the proper disposal of public money affects merely the pocket-books of the people, while the selection of fit teachers affects the minds and morals of the rising generation.

The Best Are the Cheapest.

It is a well-known fact that there are to-day more teachers ready for positions than there are positions to fill. With this the case there is no excuse for hiring an unfit teacher. This is sometimes done through a false sense of economy on the part of school-boards. Of two applicants the cheaper one is often taken and as a result cheaper work is obtained.

It is true of course with so much competition, that our best teachers are often forced to work at low salaries, but this should not be so. Good teachers deserve good salaries. There is no class of workers in any field more conscientious, more industrious, more unselfish than good school-teachers. The progressive teacher recognizes the fact that she must work to keep up with the times. With our Normal schools and colleges crowded with would-be teachers, those who are already in the field or desire to enter it must redouble their efforts if they wish to keep well to the front. The lazy or indifferent teacher deserves to be crowded to the wall.

Politics in School Affairs.

In some places school management is happily free from political corruption, in others it is a slave to it. In some cities in our own state, we are told, the schools are entirely in the clutches of politicians and a political change in administration means a decided change in the schools. No principal or superintendent not conforming to the required political code is allowed to remain. Surely such a state of affairs is disgraceful. The evil effects of such a system upon the public schools can be appreciated only by cities suffering from such slavery. Other cities are more fortunate. School officers are chosen not for political reasons, but because they are believed to be fit persons for the place. Any person voting for school officers for other reasons is guilty of doing great injury to the schools.

Grounds for Dismissal.

There are but four legitimate reasons for the dismissal of a teacher,—failure in teaching, failure in discipline, lack of health that seriously interferes with school work, or proof of a character that has a bad influence over the school. When dismissals are made for personal or political reasons,

surely a school board is abusing its high privilege.

Prof. Waetzoldt, a noted German educator, says that the greatest evil of the whole public school system in the United States is the influence of politics upon schools.

It is true that in many respects the life of a school officer is a burdensome one. From the moment of his election, he is besieged on all sides by would-be school-teachers. His position is exactly similar to that of a state official who is expected to furnish employment to every applicant presenting himself. It is for this reason that we need our most firm and conscientious citizens in these positions. The question which should confront every school-officer is this: What is the primary object of our public schools? Is it to furnish employment to needy teachers, or is it to educate our children in the best possible manner? This question decided by a conscientious school officer would oft-times make a vast difference in our schools.

It is a common opinion in many places that a resident applicant should take precedence of an outside applicant. This is undoubtedly true, providing the resident's qualifications are equal or superior to those of the outside applicant. If they are not, she has no more right to expect precedence in her own town than she has to expect it elsewhere. The merchant, the banker, the manufacturer seek the best help. School officers should do the same.

But let us look at the matter from the teacher's standpoint. Many a bright young teacher with apparently all the necessary qualifications has failed to make a success in her own town, where she has afterwards succeeded elsewhere. The disadvantages that the young teacher encounters on beginning work where she is well-known are too obvious to need mentioning. It is often for her very best interests that she should begin elsewhere.

Co-operation Between Parents and Teachers.

As I said in opening this paper, it is not only teachers and school officers who control affairs in a school-room, but parents play a larger part in school management than they are perhaps aware of. For nine or ten months in the year, the care of the average child is divided about equally between parent and teacher. How absolutely essential it is then that the parent and teacher should co-operate! But in how many cases is this actually done? Think of the homes in our land in which the teacher is looked upon as the natural enemy of the child! Think of the children who enter school with this false idea and are constantly on their guard lest some injustice be done them! Whose fault is it that this antagonistic spirit exists in the minds of so many children? In how many homes is the teacher upheld by the parent instead of being criticised? If parents could only realize the infinite amount of harm they do in allowing one word of criticism to pass their lips in the presence of the children, I am sure the error would never occur again. Suppose the teacher to be wrong, the place to settle the difficulty is with the teacher but not in the presence of the child. No good was ever known to come from an interview between parent and teacher in which the child was present as witness. If the child knows that his parent opposes the teacher, he will return to school with a ten-fold more impertinent manner than he had before, and the teacher's influence over him is forever destroyed. Nor is this the end of the trouble. The moment that the other children see that an unruly child has come off victorious, it is a signal for trouble from all parts of the school-room. Children who were hitherto

most obedient begin to show signs of uprising. Many a good teacher's influence has been destroyed by one case of trouble in which she was not upheld.

Home Discipline.

As a rule it is the children who are under the most strict discipline at home that give the least trouble in the school-room. Children who have no respect for parental authority are apt to have little respect for the teacher's authority. The independent American spirit is an excellent thing in its place, but like all other good things it may be carried too far, and when our young people assert their independence so far as to defy all rules of order in the school-room and are upheld in it by their parents, it is easy to see the ruinous effects of such proceedings upon all discipline in the school. The majority of parents do not uphold their children in wrong-doing, but nearly every teacher has one or more cases of that kind to contend with.

Successful work in the school-room is the result of a long chain of co-operation,—between parent and teacher, teacher and supervisor, supervisor and school-board. One break in this chain will destroy effective work, it matters not which link is broken.

In many school-rooms there are children who are a direct detriment to the school. When parents have no influence over these children, or having it fail to use it, it is time for other authorities to interfere. The best teacher in the world will fail in discipline when she has no support. Back of the teacher should stand the supervisor, and back of the supervisor should stand the school-board. If such unruly children be found that none of these authorities have any control over them, their place is not in the school-room, but we have state institutions provided for children of that kind. With our school-rooms freed of these children, and with a strong co-operation on the part of the authorities named, I believe the question of discipline in our schools would be forever settled. It is on account of some break in this co-operative chain that we have the trouble that we do today.

It is true that discipline is not the only thing to be considered in a school-room, but it is the foundation of good work. The course of study to be pursued and the methods of teaching each study are important factors in the success of a school, but these are topics beyond the province of this paper, and I wish to speak of one more matter that directly concerns the people.

Our School Buildings.

A fine school-building is not merely an ornamentation to a town, but a necessity for the best of school work. Only those who have been obliged to stay for years in a cold and poorly ventilated building can appreciate what this means. Pure air is a necessity for clear-headed work. The same is true of proper temperature. A room that is either too warm or too cold will cause physical discomfort, which will in turn detract from mental energy. Crowd into a room twice as many pupils as it was meant to accommodate and you have as bad a state of affairs in a modern schoolhouse as existed in the old one. The fault is not in the size of the rooms, but in the fact that there are not enough of them. The rooms are large enough to hold all the pupils one room ought to contain.

Large Classes a Mistake.

Educators who have spent much thought on the subject have decided that thirty pupils are as many as one teacher should have charge of in order to do the best work. Forty may be put into a grammar grade, but the number in a primary should be less

than thirty instead of more. Teachers who have been fortunate enough to have a small school will verify these statements. I know that teachers of a few years back will say that they did splendid work with seventy, and no doubt they did, but how much better work they might have done with forty!

With seventy pupils in a room no teacher can have much time for individual work, which is acknowledged to be the ideal method. A great cry is often raised at the time of erecting a building that it is too large and a useless expense, but people find to their chagrin in a few years that the building is over-full and a new one must be built. It is a wise and most economical thing to build for the future.

Value of School Libraries and Accessories.

I wish to say just a few words in regard to school libraries and apparatus. We cannot expect teachers of science to do effective work without apparatus, nor can we expect pupils to get a fair knowledge of history and literature without books to read. Of course these things cost money, but it is money well invested. They serve not only to instruct but to amuse our young people. If more money were put into libraries and reading-rooms and less into doubtful, if not harmful, amusements, it would be better for the moral tone of a community. Our young people must have amusement, and if they cannot find it in books or pleasing occupation they will find it elsewhere. Educate the child to enjoy proper amusements and he will care less for doubtful amusements when he grows up.

The home and the school are both places for this education, but neither can do it without the proper attractions. One of the greatest difficulties with which our teachers have to contend is the number of outside amusements which are taking the attention of pupils from their work. Just at the age when our boys and girls should be giving the best of attention to school work, we find them devotees to society. Many spend more time talking about the latest ball and other amusements than they do studying their history and geometry, and surely parents are to blame for this. A little wholesome amusement is a necessity for students, but when it becomes a business instead of a recreation, it is going a step too far. Parents who have allowed their children to become absorbed in amusements must blame themselves if the children are a failure in school. It is impossible for the teacher to counteract home influence in this respect. Eighteen years used to be considered the proper age for young people to enter society, now it is fourteen or even younger. If we are advancing in many ideas, we are surely going backward in this, and never until a reform is instituted can we expect the best of work from our high schools and colleges.

"Union is Strength."

The home life and the school life are inseparable. The influence of the one must act upon the other, but the home influence is the stronger and has the greater effect in moulding character. For the best of results it is absolutely necessary that the parent and teacher should work hand in hand.

There are two ways in which this can be done. First, by forming cooperative associations which all parents and teachers in one ward should be urged to join. These local meetings could occasionally give place to a general meeting. Although no regular organization exists in our city, such meetings have occasionally been held and I believe they are productive of much good.

In the second place parents should visit schools, not in a critical spirit,

but to learn what the teacher is doing and to aid her in her work.

The possible future of our public schools is great, but there is work for us all to do. Never until hostility, jealousy and strife are eliminated from them can the ideal state be reached. These things are a hindrance not a help to progress. The school that is rent with dissensions cannot give its attention to study. But it is not enough that one school should be in harmony itself. All schools are aiming for the same results and should be in harmony with each other.

"All our strength is in our union,
All our danger is in discord."

RUSSIA.

Prof. F. W. TAYLOR, Lincoln, Neb.

Mr. Chairman, Ladies and Gentlemen:—I take it for granted that on the average this audience does not know much more about Russi tnan I did before I went there. I know of no country upon the face of the earth about which so little is known, and about which the little that is known is so incorrect, and I hope that in the short time that I shall speak to you I may give you some truer ideas of Russia than you now have.

About the Convict System.

I wish to say at the start, for I am always asked regarding that point, that I know nothing about the convict system in Russia, except what I have read in the books and writings of others. During many miles of travel there I have never seen a convict; during several hundred miles of travel on the river Volga I never saw a convict boat, and I wish to say emphatically that the convict system seems to occupy no higher position as something that needs investigation and care in Russia today, than does the system in our own country. From my own observation and questioning I am inclined to think that at least ninety-five per cent. of all the people who go to Siberia would be behind the bars in our own penitentiaries in this country. I am assured by those who know that there are not to exceed five per cent. of political prisoners sent to Siberia, the ninety-five per cent. being common criminals and sent for offenses that would be punished by imprisonment in America.

Size of Russian Empire.

The Russia of which I shall speak is European Russia, which is about one-third of the great Russian Empire, and comprises half of Europe. European Russia is five times as large as both Germany and France, and the population of European Russia is greater in numbers than that in both Germany and France put together.

Formalities to Enter Russia.

In going into Russia you have to go through some formalities such as you do not have to follow in going into any other European country, save in the present year in Turkey. You have heard about the dangers attending the getting into Russia, but I found no more danger than there is in going to Berlin. You are obliged to conform to the laws of the country and provide yourself with a passport. You send to the Secretary of State at Washington, enclosing a dollar, and receive a document containing your

description, and stating that your are a citizen of the United States. "All to Whom These Presents Come," are requested to grant free entry to the bearer, and to extend any proper aid. This is not necessary in most of the countries of Europe, but it is required in Russia and it must be properly viséed beside. You must go to the Russian Consul at Washington or at Berlin and have them put something on the back for which you pay two dollars and twenty-five cents. These are the words: "The bearer, Mr. So-and-So, has been recommended to me as a person proper to travel in Russia."

Thus fortified, you start out. After having crossed Germany you come to the place of entry, and alight in a large room; a sentry or a gen d'arme, stands there and says, "Passport," and you hand him your passport. He looks over it to see that your visé is all right, and it is handed back with a few words in Russian to which you say "Yes." Your baggage is then examined, and that is all there is to getting into Russia.

St. Petersburg.

I will pass over the experiences of the first few days, because at St. Petersburg begins the real traveling in Russia. This is a modern city, only about 250 years old, founded by Peter the Great. I drove to the hotel. I didn't know how much to pay the driver, but walked into the hotel and said, "Is there anybody here that speaks English?" The porter answered that he did, and I told him to pay the man and charge it on my bill. He paid about a quarter what I would have been asked. I could tell you much more about St. Petersburg, but we must not linger there because it is not a characteristic Russian city, although it is a wonderful city in the amount of magnificent building that has been done there in the last hundred years. It is four or five hundred miles from there to Moscow, and then you are in another country, and you know it. Things are more oriental; you see women in all kinds of bright colors, and many things entirely different from anything that you have ever seen before. The Byzantine style of architecture prevails, and you see dozens of magnificent churches. The Russians have a way of saying that in Moscow there are forty times forty churches, but though there are really not so many there are really a vast number of them.

The Capital City.

Moscow is perhaps the most interesting single city in Russia, although there are other places which are older, but taking the great Kremlin, with all it contains, and the old palaces and towers, there are more things of interest than in any one city in the great empire. The word "Kremlin" means, in its strictest sense, a fortress, but it is really a part of the city enclosed within walls which were fortified in order that there might be protection against the Tartars, who were continually coming in upon Russia from the east. There are several Kremlins, one in Moscow, one in Keif, one in Nijni Novgorod, and various others. The old Kremlin in Moscow contains about forty acres and within its walls are a number of churches and palaces, some of the churches a thousand years old; here is the church where the Tsar goes to be crowned. You remember the great coronation scene last June where three thousand people were trampled to death. Within this Kremlin also stand other churches and a great tower, the Ivan tower, which is about two hundred feet high. Another object of great interest is an immense cannon which has a diameter of almost three feet. There are hundreds of guns there which were gathered up after Napoleon had started on his re-

turn from the awful campaign he made into that country.

From Moscow we went to Nijni Novgorod, which in one respect is the most interesting city in Russia, because here is to be seen the old yahrmart or fair, where every year several million dollars worth of goods exchange hands.

A Visit to Tolstoy.

Passing along through the country I went down the great Volga river, the greatest river system in Europe, draining a large part of European Russia. We stopped at the various ports along the river, but can not speak of this trip at this time. I will speak only of one little visit I made, before I stop, and I speak of this because it was to a man who is interesting, not only to myself, but to many people, a great man, Count Tolstoy. I was very desirous of calling upon Tolstoy, but I had no special excuse for doing so until I happened to run across a couple of American gentlemen who had been studying in Berlin. I arranged to accompany these gentlemen on a visit to Tolstoy. We went a hundred and eighty versts or about a hundred and twenty miles south of Moscow to the ancestral home of the Tolstoys. As we drove through the beautiful gateway we heard words that sounded very familiar and very pleasant, because they were English. A gentleman came to meet us and said, "How do you do, sir?" My friend answered him, introduced himself, and after some little conversation he volunteered to go in and see if we could see Tolstoy. In a little while he came back saying to my friends, "You may come in since you have books for Tolstoy, but I am very sorry the other gentleman will not be able to see him, he is quite ill." This made me feel very badly, but I put in the next few minutes in taking some pictures of the house and surroundings, and just as I sat down to rest under a tree a very bright young lady came along, and as she came by she said, "How do you do, sir. I am Miss Tolstoy," speaking English very perfectly. After a little while she asked if I had had any refreshments and when I said "No," she called to a serving man who went and brought some refreshments for us. While he was gone I heard quite a commotion in the back yard. I looked out that way and saw a horse tied to a post, which seemed to be having a good deal of trouble. On starting up to see what was the difficulty I saw that in fighting the flies, he had gotten his right hind foot into the stirrup, and he didn't seem to enjoy his condition very much. I went toward him and released him. Miss Tolstoy said, "Oh, don't go near him," but I did go near him and removed the stirrup from his foot and let it down. Miss Tolstoy said, "I don't like to have you do that." I said, "I have always been used to horses; there were plenty of them where I was born and bred, and I am not afraid of them." I saw there an opportunity to increase my acquaintance with her, and I told her a little story of an Irishman whose horse caught his foot in the stirrup, and Pat immediately began to dismount, saying, "Bedad, if you are going to get on I will get off." Miss Tolstoy very kindly smiled, and very evidently thought it was a joke. She began to ask some questions, and I happened to have in my pocket some pictures which I had taken down in old Mexico, which I showed to her and she seemed to be much interested. Pretty soon she said, "Would you like to see my father?" I said, "Certainly I would, but if he is ill I would not like to intrude." She went in and came back in a minute and said, "You may come in and see him." I immediately acepted the invitation and was led into the presence of this man whom we all know perhaps better than any other Russian. I spent perhaps an hour in talking with him, and I was

impressed all the way through with what appeared to be honesty of purpose, and the reaching after higher things for the Russian people; I found it most extremely interesting.

Some Ideas of Tolstoy.

When I went in I had said to myself that I would ask Tolstoy a lot of questions, and I had a list all ready in my mind. When I went in he said, "How do you do? What is your profession. I told him what I did. Then he asked how we did this work over here and I proceeded to tell him; while I was catching my breath to ask him something, he had another question ready, and in the course of about fifteen minutes I began to see that my only earthly hope of getting anything from him was to follow up my answers with a question, and in that way we evened up the conversation. He asked me a good many questions about out farmers, and as you can believe I told him that America was a great place. He said, "What do you think about railroads?" "Oh," I said, "they have been an infinite blessing to our country, because they have opened up sections that would have been inaccessible otherwise. For instance, the territory in which I live would perhaps be occupied by Indians if it had not been for them." "Oh," he said, "you look at it that way. I don't. I think they have been a curse to Russia. They distract the people's attention. They divide the people into classes more than was true before." Tolstoy believes, you know, that every man, as well as every woman should do as much as possible of the personal service which is required for himself. He thinks that people should wear clothes simple enough in form so that every man could make his own, and he thinks that every man ought to go out and at least wash the potatoes that he is going to eat, even if he does not see that the water does not burn while they are cooking. He has a great many notions of that kind. I was more and more impressed with the depth as well as the honesty of purpose in his heart, and with the fact that he appreciates, as few Russians do, their condition. He appreciates the advances they have made, and the difficulties under which they labor. In many ways he is a wonderful man, and made a very deep impression upon me.

I never tired of studying the Russian people, and I found very much to interest me and to overcome the impressions received in reading stories and magazine articles. I think you will find, as I have, that it will pay you to study about this country, which is a remarkable one, and one of the present and coming nations of the world.

THIRD DAY.

The Institute met at 9 o'clock, March 11. H. A. BRIGGS in the Chair.

THE HORSE AND ITS MARKET.

Prof. J. A. CRAIG, Experiment Station, Madison.

To understand the requirements of the market, it will be necessary to consider the horse as a mechanism in which the bones are levers, the muscles the source of power, and the nervous system the stimulator of the muscles. The horse is valuable in the market, because of his ability to perform certain kinds of work, and for that reason it is very necessary to know how these features adjust themselves in the performance of work.

The Bones as Levers.

There are three classes of levers, and these are all represented in the skeleton of the horse. The first class may be said to be represented by a pair of scissors, as the power is applied in the hole for the fingers, and the fulcrum is in the center where the blades are united, and the application of the power is at the point. This is the most advantageous form of leverage, and it is employed in the skeleton of the horse by the parts that are used in the extension of the limbs.

The lever of the second class may be said to be represented in every day life by the wheelbarrow. The power is applied at the handles, the weight is in the center, and the application is at the wheel. This leverage in the horse enables it to sleep standing, or to stand without feeling the strain. It is the leverage which prevents the joints closing on each other.

The leverage of the third class is represented by a pair of sheep shears. The power is applied at the center, the fulcrum is at one end, and the application of the power is at the other. This leverage is not common, but it is shown in the action of the lower jaw of the horse.

Action of the Muscles.

In further consideration of the leverage, the attachment of the muscles and their nature are important. As muscles consist of bundles of fibers, it is easy to understand that when these fibers are long, there is more elasticity than when they are short. The long muscle with long leverage of the bone is more favorable for quick action of speed, while the heavier muscle is more favorable for draft or power. The attachment of the muscles to the skeleton is also of some importance. When the muscles by means of the tendons are attached to prominences which enable them to work free from the bone that furnish leverage, it is easy to see that the action of the muscles would be freer and more effective, hence in most joints there are prominencies to give the muscles the best attachment.

In this connection, it is interesting to study the proportions of the bones of the skeleton to find reasons for the advantages which certain relative proportions produce. In general we look for short bones in those parts where the function is simply the transmission of power, while we desire greater

length in those parts where the muscles, the sources of power or speed, are to be found. In the front leg for instance, we expect length from the elbow, or where the leg joins the body to the knee and a much shorter distance from the knee to the fetlock joint for the reasons that have been given.

Function of the Nervous System.

In studying the horse as a mechanism something more than bone and muscle must be included. The stimulation for action comes from the nerve power or force. The nerve power is represented centrally by the brain, and from there it is carried to all parts of the body, from the spinal cord through the main channel of the vertebra, and from this it branches out to stimulate the muscles. The stimulation for action must come from the nerve centers, and these have a great deal to do with the quickness and the strength with which the horse may act.

General Market Qualities of Light Horses.

Before considering the market qualities of light horses in detail, it will be best to take a general view of the requirements of the market in respect to the form, quality and action of the horses that sell for the highest prices.

Form.—To analyze the form of any market type of horse, it is necessary to understand the extent to which the form is due to the skeleton, and how much of it should be credited to the muscular development. A comparison of the skeleton of the horse with the living and well developed animal will show clearly that some parts owe their form entirely to the bony frame work, while other regions are shaped wholly by the muscles. Beginning at the head it will be noticed that its form is determined by the bones that comprise it. The outlines of the neck are made altogether by muscles. The shoulder and the chest are outlined and formed by the skeleton, while the shape of the leg from the knee upwards is determined by the muscles of that region, and from the knee to the fetlock chiefly by the tendons that makes the leg at this point appear flat from the side. The form of the body is covered largely by the rotundity of the ribs and the width of the loins. In the hind quarter, the upper part is moulded almost altogether by the muscular development, and the same may be said of the thighs and the quarters, while the tendons of the leg give the lower part of the latter its shape.

A study of the degree to which the skeleton and the muscular development contribute to the form of the horse, brings forward the idea that the most of the power resides in the hinder parts. The fact that the greatest muscular development is in this region, would indicate this. It will be noticed that the form of the loin, the shape of the crupper and the fullness of the thigh are due in the greatest degree to the extra development of muscles in these parts. The front quarter is bare of muscle in comparison with the hind quarter.

Another reason for accepting this theory is the difference in the attachment of the fore legs to the body in comparison with that of the hind legs. The shoulder blade is loosely attached to the trunk, while the hind leg next to the body through the agency of a strong ball and socket joint. The shoulder blade plays loosely seemingly for the purpose of lessening a concussion that the leg receives from contact with the ground, while the hind legs connect with the pelvis at a joint, which is the most powerful in the body. The market for light horses recognizes three leading types, the carriage horse, or coach horse, the trotter, or roadster, and the saddle horse.

Coach or Carriage Horse.

The distinguishing features of the coach or carriage horse, are its symmetry and action. The height should be about 16 hands to make a good appearance. In contrast with the roadster, the carriage horse is very smooth and symmetrical. The smoothness should be due to plumpness of the muscles over all parts. In the carriage type, the head should be comparatively small and lean; the ear neat, the neck long and carried gracefully; the body round and plump, and the limbs clean cut, with well formed and durable feet. Graceful carriage and stylish action are leading qualifications.

Style, when in any posture, is a very desirable attribute in the carriage horse. A critical examination of this type would indicate how far the position of style depends on the adjustment of the parts of the frame work. When a carriage or coach horse possesses characteristic style there seems to be an appropriate blending of all proportions of form. In analyzing this it will be found that most of the lines have a smaller direction in addition to the fullness of outlines already discussed. The line running from the poll to the nose seems to be parallel to that of the shoulder. Then the line running through the center of the pastern also has a similar direction, while the line of the thigh in the hind quarter corresponds with the slope of the hind pastern. Considering the lines that run different from these, it will be noticed that the one made by the arm from the point of the shoulder to the elbow is very similar in direction to that made by the ischium of the pelvis, and this again is similar to that of the lower thigh. Each part seems to bear a fixed relation to every other part, both in size, length and slope, giving the horse that symmetry which contributes so much to his style and beauty while standing or in action.

Trotter or Roadster.

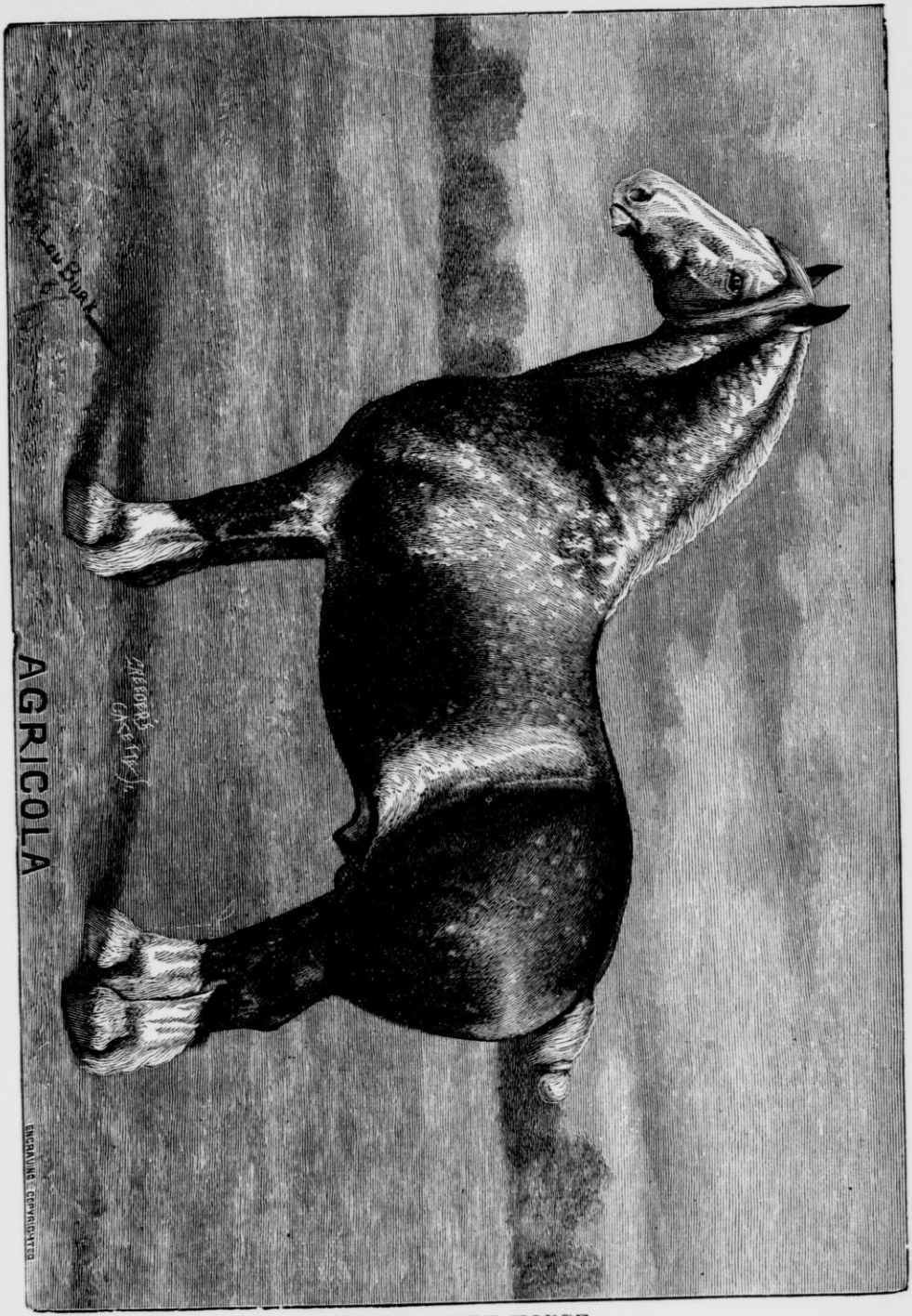
The chief characteristics of the roadster are speed and stamina. The ability to trot fast is a leading characteristic of the roadster, and the ability to maintain a rapid gait is clearly essential in a horse of this kind. In addition to being able to stand steady road work, such a horse should sell well on the market, and must be well mannered, so as to be safe and pleasurable to drive.

The typical roadster may be said to be about 15 1-2 hands high and about 1,000 pounds in weight; the formation is, narrow in front, deep chested, wide at the loin, and very muscular in the quarters. Every feature about the horse appears clear cut, giving a hard finish which indicates durability. The lineaments of the face and the outlines of the neck, and especially the distinctness with which the tendons stand away from the leg are very characteristic features.

The type lacks the fullness and symmetry that are characteristic in the carriage or coach horse. To do effective and hard work on the road is the sphere of the roadster, and a type that has been evolved is an illustration of the evolution of a form for a specific purpose. The type of the best campaigners that have marks of 2:10 or better will show a similarity that indicates the type towards which the trotter is tending, though it should be noted here that the roadster in show form will display quite different outlines after being subjected to the hard training the campaigner receives.

Saddle Horse.

The type of the saddle horse that is desirable on the market is somewhat similar to that of the light carriage horse, but the typical saddle horse will show more quality and better manners than any other class of light horses. Aside from these features, the chief qualifications of the saddle horse is the ability to show the follow-



MODEL SHIRE HORSE.

Winner of several first prizes at the Royal Manchester and Liverpool and other leading shows in England, and first at the Great Chicago Horse show.

ing gaits in a satisfactory manner: Walk, trot, rack, canter and running-walk.

Quality.

In a general way all these types of light horses to sell to advantage in the market must be possessed of high quality. This term applied to horses refers to their bone, skin, hair and to other features of their organization. Evidences of quality are clean cut features, glove like skin, silky hair and firm bone. In the instance of the horse possessed of quality, the lines of the face are clearly defined, and in every region there is a complete absence of coarseness. It is possible in such a horse to distinguish easily the muscles, tendons and bones, and when the animal is slightly exerted, so that the coat lies smooth, the veins in the skin show clearly in an intricate net work, so delicate and fine grained is the skin. This freedom from coarseness in the joints and tendons, and in the other parts, shows a soundness in these features that guarantee much endurance. Coarse hair is associated with coarse skin, and that is a true indication of soft spongy bone that quickly becomes diseased when subjected to a strain of hard usage or neglect.

Requirements of Good Action.

Still considering the market for light horses in a general way it will be found that a necessary characteristic of all the types is good action. Action is desirable chiefly for its utility, but also for the many other qualities which it indicates. It goes without saying that the light horse with good action is very durable and more enjoyable, as the work is done easier and more profitably, as more of it is accomplished; but looking still further, it will be found surprising to notice the other attributes that are attendant on it. The action of a horse reflects his temperament, proves the balance of his conformation, and indicates the degree of soundness.

Qualities of the Walking Gait.

Excellence at this gait is a very desirable quality in all varieties of horses, and unlike the trot its meritorious features are the same in all, as it has no connection with type. In the enjoyment of a road horse there is much to admire in the manner in which he conducts himself when walking. It is questionable as to which is the most pleasurable to observe—the walking of the horse whose step is evenly timed and nervy, or the trotting of one that has all the grace, style and snap that characterizes the coacher.

In moving away from you the feet of the good walker leave the ground with a quick snap, showing in its passage the glint and reflection of the whole shoe. After leaving the ground with this peculiar snap the foot swings upward and forward, then the knee unfolds, the pastern carries the foot gracefully forward and it again comes to the ground lightly but firmly with the characteristic spring and snap that identified the first movement. The feet move straight away, swerving neither to the left nor the right, nor should the folding of the knees or the flexing of the hocks result in an outward pitching or spreading. A horse that will lift and plant his feet in the way described almost invariably has the up-headed and commanding appearance in movement which is so admirable in the harness horse.

The crucial test of the balance of a horse's walk is the side view. Any variation from proper structural proportions results in wobbling, hobbling or an otherwise uneven walk, and all these are readily seen from the side. The levelness with which a horse walks is one of the best evidences that the legs work in harmony. The most common deflection from this is attributable to a long, slim coupling which gives the onlooker the impression that the horse might break away into two parts near the region of the

loin. In defective conformations of this kind the stride of the hind limbs is short and he usually has an uneven, choppy gait that is unsightly as well as being ineffectual in covering distances. On the other hand, an opposite relation of the parts, close coupling and short back, with long legs, is likely to give use to a slovenly swinging gait, producing clicking, stumbling or other deficiencies. If there is a flaw in the mechanism of the front legs it is usually made evident by the movement of the front feet, especially as they are about to touch the ground. If the limb proportions are ungainly the feet do not seem to reach the ground at the proper stage, either turning too much on the heel or not turning enough, and precipitating the toe.

The Action of the High Stepper.

The highest priced action in the general horse market is that of the high stepper. The peculiarity of this action consists in lifting the knees inordinately high and flexing the hocks so that they come close to the body and keep the legs well under it. From the standpoint of action alone, the higher the knees and the hocks are lifted the more valuable is the horse, provided that the type and other features more common are equally satisfactory. The feet must be thrown forward without any dishing on either side and the hocks must pass each other close and in line with the forward movement. It is easy to understand that while this method of movement is the most showy and stylish, it is not serviceable action for a road horse. The front legs soon succumb to the heavy concussion they would be called upon to stand under hard driving. But this action is sought only in the horse that is used for short drives about the city where style is paramount to speed and stamina. While it is recognized that the high stepper should have as many as possible of the other qualities of excellence in addition to high action, yet all others are considered of minor value among horses of this class. "All-around action only to be considered" is the current phrase in the prize lists that provide classes for competition among the high steppers, which means a combination of shoulder, knee and hock action.

The Carriage Horse in Motion.

A connoisseur of horses will see much more than the legs of a carriage horse when he is moving. As he moves along before an appropriate vehicle with the latitude of a light hand assisting him there are flashes of gracefulness from every motion. With this there is a quality of mind that gives buoyancy to step and accounts in no small degree for the uplifted carriage of the head. It is expressive of a happy temperament that gives gracefulness to every poise and a smooth flow to every movement. Such a minor organ as the ear plays its part in carriage and quick action. The eye shows the fire within and challenges the critic for its mead of praise in measuring the step and alertness in giving it security. Scan the lines of the neck, notice their tenseness, and yet the unusual elasticity it shows when occasion offers for a movement of greater gracefulness. The shoulder plays with freedom, and the smooth turned loin and quarter seem the only regions that are not taking part in this unusual display, though in this immobility they show their real strength.

As to the action of the fore legs, it is straight away with a continued folding and unfolding. In the action of the carriage horse there must be some style and dash and high lifting of the feet, but never enough of it to make the action unserviceable. At no time is the fore leg held in poise, nor does it dwell either in flexion or extension. The leg folds and the foot snaps from the ground and is

then carried forward, and the limb unfolds as if following the rim of a wheel. It seems to reach the ground at the right stage of the unfolding, so that it is not held in suspense at any point along the line of descent. The feet pass close and in a straight line, so that there is no swaying or dropping down of the forehead with each step. The hind foot leaves the ground with the same quick movement, and at no time is it allowed to hang back so as to give the horse the appearance of not gathering himself well together.

After all is written that it is possible to write about the action of the carriage horse, there is something else that must go with it which cannot be described with sufficient vividness to make the novice appreciate it. It has something to do with power and it passes along the lines between the animal and its master. As you sit behind the horse of true carriage action and conduct, you feel your proximity to a powerful mechanism that is undergoing a test of its minutest parts. If anything fails everything would be demolished, but it is the feeling of strength and power in the animal that allays unnecessary fears.

Without leaving this feature connected with the carriage horse let us consider it in its relation to the trotter. Weight and strength in the carriage horse gives momentum to the occupants of the somewhat cumbersome carriage, while the trotter sacrifices those for speed and stamina. Between the trotter and its driver the feeling is that of flight instead of power in motion. The difference in the feeling resulting from watching the movement of these two classes of horses might be better expressed by reference to the difference in the feeling that one has when standing beside a swift turning wind-mill as compared with the effects of observing the turning of a ponderous water wheel. The former takes advantage of every breath of wind and speeds a merry clip without apparent exertion of strength; the other impresses one at once with its power and in a slower degree with its combination of strength and speed.

Action of the Trotter.

The leading feature of the action of the trotter is speed at the trotting gait. But there are many others that must be comparisons of this to result in the greatest development. Stamina or the ability to maintain that gait is necessary. It is generally thought that if a horse has speed he has the one essential necessary to make him a trotter or a good road horse. Any one familiar with horses acting in such a capacity knows that much more than this is required. Not only is speed desirable, but there must be the true balance of parts that ensures their protection, together with trueness of stride. Being true and level-gaited guarantees the greatest durability, and that with an ambitious turn of mind gives us that very desirable quality in the trotter termed gameness or stamina. Of all classes of action that of the trotter must not be wasteful of energy. While that of the carriage or high stepper must display effort, the trotter should move so as to leave the least impression of it. Less roll to the knee, more propulsion from the stifle and less motion in the hocks, carries the trotter forward closer to the ground and with less expenditure of force than the higher lifting of knee and hock which is characteristic of the high stepper. There is much more extension of the limbs, the fore legs are extended more and the hind legs are swung back farther and reach farther forward than in the action of the high stepper or carriage horse that must keep his legs well under him to gather himself together in a proper degree. A wider spread in the movement of the hind legs in the instance of the trotter is not as

bad a fault as it is in the instance of the carriage horse.

The Market Qualities of Light Horses in Detail.

Thus far we have considered the general market qualities of light horses in our large markets clearly separating all the horses that come to it into several distinct general classes. In addition to these qualities there are numberless details of structure and soundness which more or less influence the value of the animals that are marketed. The most influential factor is undoubtedly that of soundness, and the conformation that predisposes the animal to various diseases. To find ready sale for the horse of any of the types that have been described, it must not only be sound, but also show such strength of structure as to ward off the possibility of unsoundness. A badly constructed hock without the spavin may actually depreciate the value of the horse as much as a spavin on the well formed hock. The first does not have a spavin simply because it has never been put under a strain, while the spavin in the latter instance must have been due to a test of more than common severity. To discuss this feature of our subject in detail, it will be necessary to arrange the material that follows, so we may be able to go over the horse completely.

Head—Straight, Lean.—The shape of the head and the countenance of a horse adds greatly to its appearance. The line from the ears to the point of the nose, as seen from the side, should be almost straight. In scanning the photographs of a great number of trotters, it will be noticeable that nearly all stallions have slight Roman noses, while most of the mares have slightly dished faces. As a rule it will be found, that horses with very prominent Roman noses are strong-minded or self-willed. Small nostrils are generally associated with this form of nose, and as a consequence we find in such instances the respiratory or breathing organs lack development. The features of the face should be distinct without the least appearance of coarseness or meatiness. A lean face is suggestive of good quality in a horse. The muzzle should be fine to make the head appear at its best. Between the eyes there should be breadth enough to give a pleasing frankness to the countenance. It is a point of practical value as it is index of the brain development, which is of much importance in a light horse, as intelligence is a merit that has a high valuation. While it is granted that the intelligence of a horse depends mostly upon the training received, yet, there is a marked difference in which horses will derive benefit from training, and that difference can be accounted for only by variations in the brain development.

Nostrils—Large, Open.—The nostrils of a horse should be large, then, dilatable and of a pink color. There should be no discharge from them but they should have the appearance of being moist.

Eyes—Full, Clear.—A bright eye indicates vigor of constitution, that is, stamina, staying power or bottom, as it is sometimes called. It is also associated with a happy disposition, and it is that, which accounts for the fact that some horses do an enormous amount of work with little worry and strain upon themselves. A large, full, clear eye is indicative of a kind, generous disposition.

Ears — Erect, Active.—The ears should be carried in an erect position. They should be active and somewhat pointed. Lop ears denote lassitude, or in plainer words, laziness. When it is noticed that a horse does not shift or move either of his ears to any extent to catch sounds, it is safe to presume that deafness is present. On the other hand, if they are continually moving, it is advisable

to look well to the eyesight, as the chances are that the extra labor imposed on the ears has its origin in a defect in one or both of the eyes.

Jaw Bones—Wide, Sharp.—Between the jaw bones there should be sufficient width for the wind pipe and also enough to allow the head to play freely on the neck. When the space between the jaw bones is very narrow, it will often be noticed that the horse carries his head stiffly and in an awkward position, but when there is sufficient width in this region the head is carried freely and gracefully on the neck. The throttle and throat latch should be light, without any unnatural fullness between the jaw bones or heaviness at the juncture of the head and the neck.

Neck—Arched, Muscled.—A nicely moulded and distinctly chiselled neck carrying the head gracefully, is one of the most beautiful features of the ideal light horse. Running towards the shoulder, the neck should swell gradually, so as to join the body smoothly. The windpipe should be large and appear distinct from the rest of the neck, and the upper outline of the latter should be sharp. While the ewe neck is possessed by many excellent road horses, it is a defect, as it detracts from the appearance and should be noted as such.

Chest—Deep, Projecting.—In the light horse that is called upon for fast work, the chest should be deep rather than broad. It should give room or capacity more by depth than by breadth. The reason for this, is that the deep chest permits of freer play of the shoulder blades on the body. It is easy to see that swift, smooth action of the fore legs is hardly possible in the broad-chested horse, mainly because it throws them too far apart and out of line with those behind. A deep chest is an evidence of staying power. The conformation of such campaigners as Mary Marshall (2.12), Nancy Hanks (2.09), offer convincing proof of this.

Shoulders — Long, Oblique. — The formation of the shoulder is one of the parts of all light horses that requires critical scanning. To give elasticity to the movement of saddle horses and to permit of quick and clean action in the roadster, the shoulder blade should be long and oblique. An upright shoulder gives a short, stilted action frequently accompanied by stumbling, and is a more or less fertile cause of such bone diseases as sidebones and ringbones.

The high action which is desired in the coach or cob horse and the long reaching clean action so desirable in the roadster depend as much on the obliquity and freedom of movement of the shoulder as on any other feature. In addition, a sloping and long shoulder strengthens the back and extends the length of the underline. The muscular development of the shoulder should also be carefully noted, if there is an unusual bareness or lack of muscular covering it would denote the presence of sweeny.

Fore Legs—Broad, Cordy.—The appearance of the fore leg from the side show it to be flat and cordy. The flatness, due to the tendons being properly attached, and the clean cut appearance denote the absence of any coarseness about the legs. In this region the leg should be long from the elbow to the knee, for the reason that free and clean action follows such a conformation. In these parts it will be noted that most of the muscle that extends and flexes the leg is located between the knee and the elbow. If this part is long, the muscle must necessarily be long and that produces quick and easy action. The muscle of the fore arm flexes and extends the rest of the leg, and in order that these motions may place with the least expenditure of power, the course over which it must travel should be as short as possible; that is, the cannon running from the knee to the fetlock should be much shorter

than the distance from the knee to the elbow.

Mr. H. T. Helm has made a careful study of the effect that the proportions of these parts to each other has upon the horse's action. He has measured a great many horses and finds that their action in the fore legs seems to be governed by the proportionate length of the arm and the cannon. He found that Administrator had superior action in front, and that his cannon was 11 3-4 inches long, and the forearm 21 inches. About the same proportions were found to exist in the fore legs of George Wilkes, and there was no lack of knee action in his movement. The actual proportions were 10 1-2 to 20 inches. In Governor Sprague the cannon was 11 inches and the forearm 21 inches, and here the front action was not quite so rounding as that of George Wilkes. In the instance of St. Lawrence, the proportions were 11 1-4 to 21 inches, and the action was noted to be far-reaching and gently curving. It can be easily understood that the strain upon the knees would be greater in those horses that were long in the cannons in comparison with the length of the forearm, and it will usually be found that such a conformation predisposes a horse to weak knees. On the other hand when the arm is inordinately long, the tendency is for the front legs to bend back at the knee and give rise to what is commonly termed calf-knees.

Arms—Short, Thrown Forward.—The humerus which forms the arm should be short and appear comparatively straight. When it is so, it gives a horse an upright appearance and adds to his style.

Elbows—Free.—The space between the leg and the body should permit of easy insertion of the hand. If the elbow is closer than this or tied in, as it is termed, the toes are, as a rule, thrown out, or if the opposite is the case the toes are likely to be thrown in, which makes the progress of the horse awkward and dangerous.

Forearms — Wide, Muscled.—Perhaps the most important matter to notice in examining the fore leg is the size of the forearm, or the bunch of muscle observable just below the juncture of the leg and the body. As fat accumulates but very little there it is a safe criterion of the muscular development of the animal.

Knees — Wide, Deep, Straight.—The knees should be broad in front, much broader than the rest of the leg, either above or below, and the pisiform bone, which is the bone forming the projection at the back of the knee, should be sharp and prominent, for to this some of the most important muscles of the fore leg are attached. Breadth is desirable in such joints, because of the fact that the concussion is more evenly distributed and better spent by the many bones forming the joint, when their surfaces are large. The most common defects of the knee are calf-knees, knockknees, knee sprung, speedy cut, and scars.

Cannons — Wide, Short, Large Sinews.—There should be very little shrinkage below the knee as the joints require as much support as possible. This defect of being tied in below the knee is one of the most common weaknesses to be seen in the fore legs of light horses. A light horse of common size should measure at least 8 inches at this point. The cannon should be short, wide and clean and the sinews should be back from the bone. It is sometimes noticeable that the cannon is thicker than usual which is generally caused by hard road work.

Pastern — Sloping, Strong. — The pastern should stand at an angle of 45 degrees with the ground, and with the cannon, it should form an angle of about 135 degrees. When more upright than this, they will cause bone troubles, such as side-bones

and ring-bones, as the concussion is very severe in such instances. Moreover, it detracts greatly from the utility of the light horse, especially those intended for the saddle, as the step is short and stilted, and this is very disagreeable to the rider. On the other hand, sometimes the pasterns of light horses, and of thoroughbred horses especially, are too slanting, which weakens them and ultimately ends in the breaking of the suspensory ligament resulting in the horse "breaking down" or the part being strained.

Feet—Dense, Waxy, Large.—The foot should receive careful attention as it has an important part to play in the work of the horse, and is subject to many defects and various kinds of unsoundness. It should be of firm texture, good size, moderately upright and thoroughly sound. It should have a healthy appearance which is indicated by an oily coat of natural wax. The frog should bear the marks of natural usage as a buffer, being spongy and touching the ground at each step. The roof or sole of the hoof should be distinctly concave. Flatness, brittleness, and contraction, are the three most common defects in horses' feet. It will be noticed in many instances that the bar of the foot has been cut away, so that the hoof splits from the heel towards the coronet. This is due to the blacksmith's practice of cutting away the bars that bind the foot together behind. When this is done the foot begins to spread and the crack ultimately extends as far as it is possible for it to do so.

Ribs—Well Sprung, Deep, Close.—The ribs should be well sprung from the spine and they should be close to each other. It will generally be found that those horses that have well-sprung ribs always make a better appearance than those that are flat ribbed; and, in addition, they will be found to be easier keepers. It should be noted that the round ribbed horse always has the appearance of being inordinately long in the legs. This deception is due to the roundness of his body. It can easily be seen that from a side view the flat ribbed horse presents a body of deeper appearance and seemingly has shorter legs than the horse that is rounder ribbed.

Back—Strong, Short, Muscled.—In its proportions the body should be short above and long underneath. This not only adds to its strength, but it gives the legs free play and insures a balanced stride. The horse of this conformation under the saddle will unite himself more quickly and better, while the same horse on the line, or in harness will have a long, sweeping, yet balanced stride. It is the opinion of many that the roach back is an evidence of strength. It is the most undesirable feature in a horse intended for the saddle, and it is to say the least an eyesore in road or in carriage horses.

Loin—Short, Broad, Muscled.—It is a defect of many horses to be light and narrow at the juncture of the body and the hind quarter. If the loin is long or slack, that is, if the distance is great between the last rib and the hip bone the horse is likely to be weak in the coupling and deficient in action, and when viewed from the side it will be noticed that the reach forward of the hind feet seems to step short before arriving at the place the other feet have left the ground. This probably is due more to the lack of muscle over the loin than to any other defect.

Hind Quarters — Croup Long, Thighs and Quarters Muscled.—These parts should be critically examined, for, as it has been previously explained, it is in this region that the propelling power resides. The haunch or croup should be long and for appearance sake should be comparatively straight. When the croup is long, it allows of a greater play of the main muscles that are located in this

region. It will be noticed in nearly all fast trotters that the croup seems to have this characteristic. Length of muscle here as elsewhere contributes to speed.

The thigh should be plump with muscle and the quarters should be very strong. The muscle should not only be heavy in the quarters, but it should also extend as far down to the hocks as possible. The thigh should be long, making the hocks low, as this contributes to a long stride.

Hocks—Wide, Straight, Clean.—The hocks should be clean and broad, and the point should be prominent as the leverage of some of the powerful muscles attached here depend to a great extent upon this. There should be no gumminess about the hocks or fetlocks. The support below should be strong, and in every feature the outline of the hock should be distinct. In running the hand over the hock, all the depressions that are characteristic of the sound hock should be easily felt and the bone should feel firm without the least indication of unsoundness in any part. The web of the hock should be especially clean and free from all fleshiness or puffs of any kind. Too much attention can hardly be shown to this joint—it being one of the most important in the whole frame.

It is necessary here to make a distinction between what are known as blemishes and unsoundness. A blemish is something that depreciates the value of the horse without actually interfering with his usefulness, such injuries as wire cuts, sprains, and other features are blemishes, while unsoundness consists of spavins, curbs, ringbones and all the other disorders that lessen the usefulness of a horse in his work.

In examining a horse for unsoundness, it is well to follow a regular order, beginning with the teeth. The best indication of decayed teeth, or any unsoundness in the mouth is the odor which comes from it. If the outer edges of the incisors are broken and worn away, it is an indication that the horse is given to "cribbing" in the stable. The condition of the nostrils will indicate whether glanders or distemper is present. The nostrils should have a nice pink color, and no discharge should come from them. In regard to the eye, there are many defects of vision which cannot be easily classified as unsoundness, yet, they should be looked for as such. A horse, by his action, will usually indicate if his eye-sight is good. He will step inordinately high and be inclined to shy readily, if there is any defect in his vision. By moving the hand gently in front of the eye, blindness can usually be detected. The hand should be moved slowly, for, if the motion is quick, the influence of the air on the eye will induce the horse to shut his eye, though he may not have seen the motion of the hand. Defects of hearing are also common, and they can be foretold easily by the action of the ears. Rigid ears indicate that the hearing is defective. Passing to the shoulder, sometimes sweeny may be noticed. There is a shrinkage of the muscles which leaves the shoulder flat and bare. On the elbow, shoeboils, or capped elbow will be seen frequently. The point of the elbow seems to be unduly enlarged by the accumulation of matter. Passing down the fore leg, splints should be looked for on the cannon. They may be found on all parts, but more care is necessary not to mistake the ends of the two small bones that are associated with the cannon for splint. In some horses the ends of these bones are surmounted with noticeable knobs. If these lumps are found on both of the legs in exactly the same place, it may be assumed that they are natural. When the splint is located on the back part of the leg or close to the knee joint, so as to interfere with the action, it is in the worst possible place to have it. A small splint in a position of the leg where

it is not likely to cause lameness, is not considered by most judges to be more than a blemish. The fact that splints on young horses very frequently disappear in a year or two should be sufficient reason for overlooking this defect, when it is present in young animals. On the pastern ringbone is sometimes to be found. This is easily discovered because of the lameness which it produces and the size to which it grows. Sidebones are sometimes found on light horses. By pressing the thumb and the forefinger around the hind quarter of the front foot this disease may be detected easily. Little hard prominences may be found on the side of the pastern just above the foot. They are formed of cartilage, and afterwards become ossified, causing pain and frequently lameness. Sidebones or the formation of foot producing them are considered hereditary. The foot itself is subject to many forms of unsoundness. Looking at it from above, the presence of quarter-crack and sand-crack are sometimes seen and these are bad defects. On the underside of the foot there should be no splints in the hoof, running from the bars to the top of the foot. This is a very common form of unsoundness in the feet. Corns, which are located in the corners of the heels are also quite common, and may be more or less indicated by the way a horse will shrink when the hoof is hit with the handle of a knife in that part. Thrush and scratches are not common, and when they are present it is very easy to detect them. Lameness in the fore limbs is easily foretold by the action. In locating lameness in the leg, it should be borne in mind that it is the sound limb which the horse puts down with the most confidence, and when the ailing leg comes to the ground, he makes an effort to ease it by throwing his head up. In locating lameness it should be remembered that when a horse shows lameness in front, if the trouble is in his shoulder he will usually flex the leg at the knee when he is standing at ease. When the sprain or lameness is below the knee he will extend the defective limb from the body. When he is sore on both front feet he will extend them as far as possible.

Defects of the Hind Legs.

In the hind limbs the hocks should be carefully inspected. In detecting diseases in this region, it is absolutely necessary to know first the outlines of a perfect hock. With that in mind, it is a very easy matter to detect any of the many unsoundnesses that occur in this region. Thoroughpin is located between the tendon of the hind leg and the bone, and it fills the depression, which naturally occurs just above the hock. It consists of a soft swelling which may be pushed from side to side. Curb, which occurs just below the hock, and to the rear, is a thickening of the ligaments in that region. By looking at the leg from the side it may be noticed easily, as it is a deviation from the straight line which should follow from the point of the hock down towards the end of the cannon. The most common trouble of the hocks, and the worst one of all is bone spavin. To detect this, it is best to stand in front of the horse and look back between his fore legs, if necessary, so that the inner outline of the hind leg may be seen very clearly. This is a bony deposit which nature has thrown out to strengthen the weak joints, and when it has developed, it ties up the joint so that it interferes with the proper action of the horse. The hind leg instead of coming down on the heel as it should in a sound limb, is thrown forward so that the toe reaches the ground first, and the stride is unnaturally shortened, and lameness frequently results. Bog spavin is usually associated with thoroughpin, though it differs in location. In the natural depression which occurs on the inner and front of the hock, the oil from the joints

seems to accumulate and form a soft swelling which is commonly known as bog spavin. Splints sometimes occur on the hind legs but they are exceptional; sidebones only in front, and ring bones both front and behind.

Further Caution.

After giving all the parts careful inspection for soundness the horse should be driven rapidly a quarter of a mile or so to try his wind. He should be stopped short and as he stops, advance close to his neck and notice if the breathing is free from any sound similar to whistling. If the breathing is accompanied by a wheezing or whistling sound then whistling, roaring, or some disorder of the air passages is present. If there is any doubt as to the origin of the sound—it might possibly be due to a very tight collar. Have the horse taken out of harness and ridden rapidly. When the breathing is not regular, it is likely that the horse is troubled with the heaves. In the instance of horses so afflicted the breathing is more or less spasmodic, the air from the lungs seeming to be half expelled when the respiration stops for a brief period, and then the expulsion of the air is continued. In this way the depression at the flanks is not gradual and continuous as it is in the instance of a horse with sound lungs, but it is stayed for a short period when the breath is about half expelled from the lungs.

Horses may have many stable vices that detract greatly from their utility, but these cannot be discovered, as a rule, in the show ring. To make a satisfactory examination of a horse, it is necessary to see him in the stable, then have him hitched, driven and subjected to a critical examination, and after these things have been attended to, there are generally many discoveries in after usage.

DISCUSSION.

Supt. McKerrow—In speaking of the draft horse and his powers, his weight, etc., do you place any stress upon the nervous energy of the horse?

Prof. Craig—Yes, I do. There is something, we don't know exactly what it is, but we know this much, that every movement of the muscles and the power of the muscle to a certain extent—the stimulation of the muscle—must come from the nervous system; the stronger that stimulation the quicker the muscle will act, and the stronger it will act to a certain extent.

The Chairman—Is is not often true that a small horse that has a nervous temperament will outdo the larger horse?

Prof. Craig—Yes, that is true.

Supt. McKerrow—Is it possible that the nervous energy of a horse may sometimes make up for a hundred or two hundred pounds of weight?

Prof. Craig—It may do so for starting a load, or taking a load a short distance, but for an all day's job, with a heavy load, the horse has to have weight to work steadily. In a place like the city of Chicago where big loads are drawn and the horses are kept steadily at work all day, I think perhaps the weight would over-balance the temperament. I think that the nervous energy counts more in time than it does in power. It counts more on the race track than any other place, perhaps.

Mr. Goodrich—You said that the frog on a horse's foot struck the ground and took that concussion. Now, when the horse comes to be shod that leaves the frog off the ground, doesn't it?

Prof. Craig—When the horse is shod and stands in the stable, he is standing on the iron, but when he is on the road that lets the foot down, and if the blacksmith goes to work and cuts out the heels of the frog, you will find the frog split, and you will find that it will dry up, and that is no good to a horse.

A Lady—Would you consider it a defect in a horse to rest one front foot when standing?

Prof. Craig—Usually we consider that an indication;—for instance, if a horse stands with his front foot out he is generally sore somewhere below the shoulder, if he stands with the foot rested back, resting on the toe, it is generally some sprain of the shoulder or something like that; it is an indication generally of soreness about the shoulder.

The Chairman—Isn't it always considered an objection in buying a horse?

Prof. Craig—I think it is, but the way a horse stands is largely a matter of handling in the breaking.

Question—You would not consider a horse sound that would set his foot forward, would you?

Prof. Craig—I would not consider that an unsoundness. He is likely to have some unsoundness, but I have known horses to do that that were perfectly sound. That may be a blemish, but I would not consider it an unsoundness.

Mr. Convey—Wouldn't it produce shrinkage of the muscle where he followed that habit very much?

Prof. Craig—He is resting that foot for some cause. It is not the natural way for him to stand. It depends a good deal on what the cause is. If it is in his shoulder, I think it will shrink up the shoulder.

Supt. McKerrow—How much trim ought to be allowed on a frog?

Prof. Craig—The only part of a horse's foot that grows unnaturally is the horn. The horn will grow too long if it is not cut back, I mean the outer edge of the foot. Inside the foot is the sole between the outer horn and the frog, and that part will naturally peel off, nature will regulate that largely; the frog is the same, it grows and peels off. It is not necessary for the blacksmith to cut off the heel of the frog, nor to cut down the frog and the sole, except to just take off the loose particles and get a better fit to the shoe.

Supt. McKerrow—How will you remedy that effect in the frog if it has been spoiled by the blacksmith cutting it down?

Prof. Craig—I do not know of anything that will stimulate the growth of the frog. Perhaps the best plan would be to take off the shoes for a while.

A Member—Will thoroughpin do much damage to a horse?

Prof. Craig—At first it will make him lame. It spoils the market value completely; it is unsoundness. That is on the hind legs always, never the front legs, but we get something very nearly the same thing, kind of wind bags. A horse that has been ridden hard and allowed to stand in a hard stable, the oil will accumulate and it is very much like thoroughpin in the front leg.

A Member—If a horse is hurt in the pastern joint, will it ever get over it?

Prof. Craig—I hardly think so; it will probably throw out what we call a high ringbone. They are not as dangerous as a lower ringbone.

Question—What is the cause of splint?

Prof. Craig—The same trouble. If inflammation spreads in any point there is a thin skin starts on the top of the bone and a bony deposit is thrown out and gathers there.

Question—A young horse that skips, is it ever saved?

Prof. Craig—I don't think he is of any use unless it was a mare that you wanted to breed from.

MARKETING THE HORSE.

ALEX. GALBRAITH, Janesville, Wis.

This is a very important subject and there never was a time when it was so important as right now; but before we can have the horse ready for market we must produce him. I will therefore go back to the young colt and follow the subject along until he gets old enough to be ready for market.

The breeder ought to have a certain and distinct type of horse in mind before starting to breed, and his constant aim should be to produce only the very best of its kind. Unless his aim and ambition be high the probability is that he will never produce anything valuable. He should select the breed or breeds that he thinks are best adapted to his conditions and circumstances, and that when raised and marketed will net him the most money. Assuming that he decides to raise draft horses—and they are much the safest for the average farmer—he ought to aim at producing horses that will weigh at maturity not less than 1600 to 1700 pounds. At present the market value between a draft horse of 1500 pounds and one of 1700 pounds, other things equal, is something like 50 per cent., and the farmer is surely entitled to the maximum price. But size, of course, is not everything. The horse must be proportionately made; he must be of the best quality and stamina, sound, have good legs and feet, good disposition and good walking and trotting action.

Necessity of Good Parentage.

The history of our country and of all countries shows that our greatest men have been the sons of good mothers, and I have never known an animal of outstanding merit, either in this country or Europe, but what had a good mother. For this reason I would impress upon the farmers of this state the great necessity of having good mares to breed from, as you might just as reasonably expect to raise grapes from Canada thistles as to raise good stock from inferior parents. A great deal of the depression and stagnation in the horse market the last few years was directly caused by a system of breeding that did not sufficiently recognize the law of nature that "like produces like." Indiscriminate breeding from inferior, unsound, or unsuitable parents has done great injury in the past and will continue to do so wherever and whenever practiced. And chief among those evils is the production of that nondescript animal frequently got by violent crossing. Very light mares ought not to be crossed with very heavy stallions, nor vice versa. It is unnatural and unprofitable. Select the best types of brood mares available, then mate them according to your judgment with the best and only the best pure bred stallions you can find of the breed you like best or is best suited to the purpose. If you raise draft horses see that they are so, not in name only, but in reality, and give this department of the farming operations your most intelligent and unwearying attention. No other department will, over a period of years, yield more pleasure or a better profit if judiciously managed.

The Brood Mare and Colt.

It is generally admitted that the young colts in this state, as in other states, do not receive anything like the care they ought to get during the first year of their existence. The cus-

tom of working our brood mares while the colts are suckling is not calculated to do full justice to the colt, although it is all but universally practiced on American farms. In Europe the mares are worked up to the day of foaling, but are not generally put to work again until the foal is old enough to wean, unless in some exceptional case. Mares become heated when working during the summer, and unless great care is exercised the foal is apt to suffer. For this reason I would recommend that the mare should, if at all possible, be allowed a complete rest for at least two months after foaling. The young colt should be taught to eat grain, preferably oats, either whole or bruised, just as early as possible, so that when weaned he will be in good condition and not so likely to feel the want of his mother's milk. From four to six months old is about the best age to wean the colt, and from that time on he should be fed regularly and liberally. The first winter of the colt's life is the most important and the so-called economy that allows a colt to run around the straw pile and rustle for a living is certainly the poorest kind of economy. Any man who practices that stands in his own light because he is losing the growth of the colt at that early stage which will never be made up in the future. Feed generously and regularly the first winter and allow the colt to run out every day so he may have abundance of exercise. A little extra attention paid to the colt's feeding and trimming of his feet during the first year will well repay any breeder. If he has a tendency to turn his toes outwards or inwards you can generally correct that defect by trimming the feet, which at that early period are in a soft cartilaginous state. If, for instance, he is inclined to turn his toes out, trim down the outside and that will rectify the tendency. If he "toes in" just trim the inside in like manner. If you allow these habits to go on for a few years you cannot afterwards change them and it is highly important that the horse goes straight when you come to sell him.

The Colt—Feed, Care and Handling.

As regards rations I would of course recommend good sound oats and bran, a little flaxseed meal, carrots, and good bright hay, preferably clover, if free from dust. A little corn ensilage once daily is also recommended, although I have had no experience using it. If you have any skim milk to spare it can be fed with great benefit to young colts, and if fed judiciously nothing will give better results. Continue giving the colt a grain ration when going on pasture the following summer and if at all convenient have him gently handled and halter broken. As he grows up he will require to be carefully broken to harness—the first operation being to teach him that he has a mouth. Use great kindness and patience in bitting him, and on no account lose your temper or you will almost certainly spoil him. In England what is termed a "dumb jockey" or bitting harness is frequently used before the colt is harnessed. A belt or surcingle fastened around the girth and checked from the bridle serves a similar purpose. With this rigging the colt may be turned into a yard for an hour or two daily and he will afterwards be much more tractable, in fact partially broken. Our horses are not well broken, according to European standard, and many foreign buyers find it necessary to break them again after importation with the view of teaching them better horse manners. This, of course, refers only to carriage horses, however, so if any of you are raising that class it will certainly pay you to be very particular in the breaking and handling of your colts, as many a promising, highly bred young horse is absolutely spoiled through imperfect or careless breaking.

In addition to breaking, the colt

must be taught obedience under all circumstances, and accustomed to all city sights and sounds. With the draft horse there is usually little trouble in this respect and buyers will rarely enquire whether or not the horse is accustomed to steam or trolley cars. But in carriage horses it is different. No horse is safe or fit for a carriage until he can be relied on to stand under a volley of artillery.

Preparation for Market.

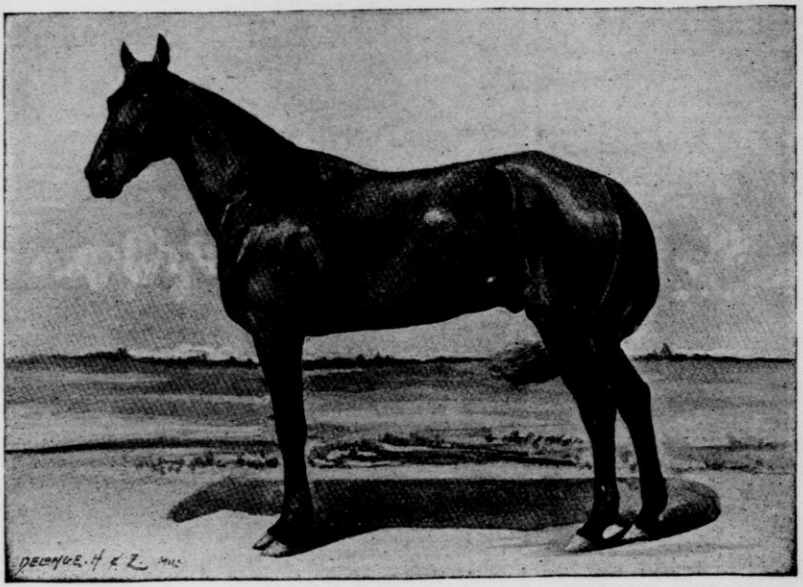
Now about preparation for market. Suppose you are raising carriage horses, don't make the mistake now of assuming that your horses are necessarily carriage horses because they are yours, or because they are bred right, as that is a delusion frequently indulged in, but supposing you have such a horse showing style, quality, and action, and you wish to prepare him for market. You must, as I say, have him thoroughly broken both single and double, and accustomed to all kinds of noises and crowded streets. Engage a good blacksmith to shoe him just as well as it can be done, not with the view of making a speed horse, but with shoes suitable for carriage purposes. The men who buy such horses are always willing to pay well for getting their horses in the best possible condition and neatly shod. Feed him rather more liberally so that he may be steadily on the gain without being hog fat, and drive him a short distance daily, to keep his muscles in good form, but not far enough to tire him or take off the keen edge.

Not in Good Flesh.

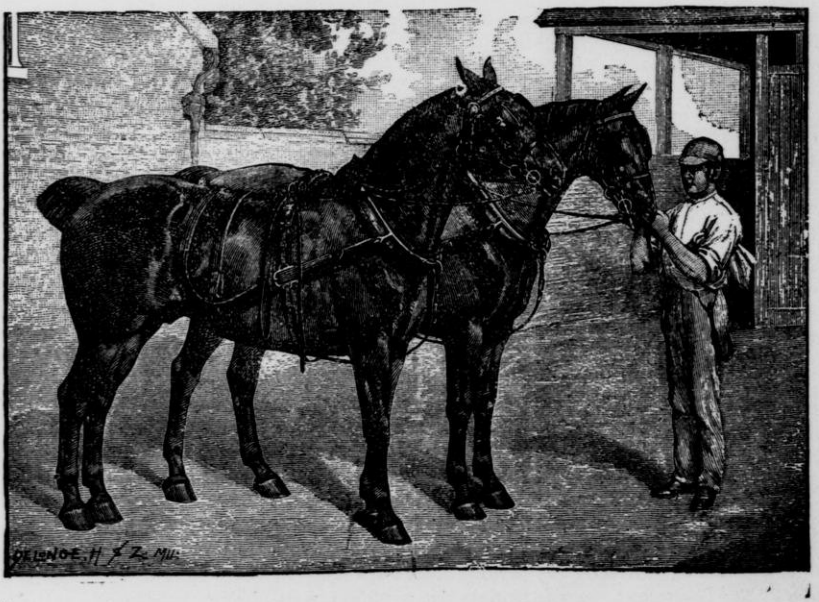
It has been a general complaint among the dealers in Chicago and other horse markets that a very large proportion of the horses sent in for sale are in an unfit condition, being mostly too thin in flesh. They maintain that this is one of the main causes why horses have sold so cheaply in recent years, and it is a well known fact that many of those dealers buy half fed horses from the farmers, fatten them, and then sell at good prices for the eastern and foreign trade. It seems remarkable that with the abundance of low priced grain which our farmers have had in recent years they should persist in sending their horses to market in a half fed condition. It may be, of course, that they are fat enough for work, but they look better when fat and the buyer wants them fat, and is willing to pay extra in order to get them. In such a case it is folly for us to argue that medium condition is more desirable. If they want fat horses, as they certainly do, let us offer them that kind.

Ventilation of the Barn.

The ventilation of our barns is a matter which I think deserves more attention than it receives, but I will not take time to go into details. There are frequently cracks and open spaces which serve the purpose of ventilation but which often cause drafts, resulting in colds, rheumatism, and other ailments. In like manner the drainage around the barns should be examined, as bad results often come from imperfect drainage. Then there is the watering arrangements. All horses ought to be watered before and not after feeding. The horse's stomach is comparatively small, it only contains from 7 to 9 gallons, so if you feed him heavily and then water him, the result will be that a certain amount of the food will be washed down into the intestines in an undigested condition. This is a frequent cause of colic and other troubles, and can easily be obviated by watering the horse when his stomach is comparatively empty. If the horse comes from the field or the road in a heated condition it is not advisable to give him all the water he wants. Give him a pailful or so, and then allow him to cool off, by which time his thirst will have partially subsided. On no account water him within an



A half fed horse not in market condition.



A well fitted team of the hackney type of horse that is in good demand.

hour or two after feeding. Running water is best suited for stock, and well water should only be used after being exposed some time to the air, and so become oxydized.

A Glimpse at the Horse Business.

In marketing our horses it is highly essential that we should know exactly for what purpose they are suited, and in this connection I wish to read an extract from last week's paper.

"A buyer at the Chicago stock yards purchased, at a combination sale, a five-year-old stallion for fifty-five dollars. The horse was rather plainly bred, a good individual with some action, not by any means well broken and therefore unable to show himself to the best advantage offered at a time when even the very best bred stallions were a drug on the market unless of world wide reputation, and the result was that his breeder did not get back the cost of a year's keep. The buyer promptly had the horse added to the list, had his tail docked, improved his manners, dispatched him to New York and there sold him at auction for thirteen hundred dollars. Another case may be cited: Newgass & Company heard of a trotting bred stallion that looked like making a good coach horse. Mr. Newgass offered the owner three hundred dollars cash if the owner would pay the freight from the point of shipment to Chicago. This the owner refused to do and the deal fell through. Two of Newgass' buyers came across the horse and telegraphed the house in the city that they could buy him for such and such a price. They were wired to leave the horse, that the house did not want him at any price whatever. Time went on, and no purchaser appearing for the stallion, he was put in a combination sale and first disposed of for sixty-five dollars, but as there was some dispute as to the final bidder he was put up again and bid in by Mr. Newgass for eighty-five dollars. This horse was also added to the list of geldings, docked, trimmed up, given a due amount of training in the way he should go, and when he was sent to New York and there exposed at public auction he provoked the keenest competition, and was finally struck off at sixteen hundred dollars. In both of these cases the breeders had succeeded in breeding good horses; all that they lacked was the ability to dispose profitably of what they had."

Now, the moral to be taken from this is two fold, I think. In the first place it is evident that those men did not know where to dispose of those horses or the work they were best suited for. In the second place, it shows that even in the horse business there are some men that are somewhat sharp when opportunity arises.

A Look Ahead.

Now I will pass on to speak of the prospective future of the horse market. As you all know we have been suffering from low prices of late years. The prices today are gaining, going slowly up, and going slowly for the reason that the market is very full, the receipts lately being very heavy, and they may perhaps continue to be large for some months to come. Another circumstance that militates against an advance, is the fact that the quality of the horses in our market is gradually and surely deteriorating. And why? For the simple reason that buyers when they go into a district to buy horses, take the best and reject the balance; then when they come back they are obliged to take a lower grade of horses, those they had previously rejected, and of course the general average is deteriorating. I think that wide-awake, intelligent breeders throughout the country are waking up to the situation. I understand that in Canada they bred very largely last season, and will breed this season still more largely. We find lately there is far more inquiry for breeding stock than

for years. Only a few will get in this year, but those few will get the benefit, because they will have colts on the market early, and before other people. Some of you may say that horses will not be wanted in the future, if electricity and bicycles, and motorcycles are going to take their place. The other day I read an interview with an electrical engineer in Liverpool, who had been putting in electrical motors into the streets of Liverpool to take the place of draft horses, and after giving that motor a full and fair trial they have abandoned it, and this man gives it as his opinion that they have made virtually no advance during the last sixty years in moving heavy tonnage in the streets of our cities, and he does not think that inside the lifetime of those now living, will draft horses be supplanted in our large cities by electricity or any other motive power, but light drawing will be done largely by electricity and other motive power.

Then we have the bicycle, of course, on all hands, but even the bicycle is a fad, entirely dependent on weather and roads and I find it is going out of style. The wealthy people are giving it up since it has gotten within the reach of the common people. When I was in St. Louis last fall I was told by a gentleman there that the St Louis people were giving the cold shoulder to the bicycle because the negroes are all riding them.

A Word of Advice.

I certainly advise you to breed horses, and I say that there never was a time when there was a better prospect for breeders, but you must breed the very best animals you can produce; have a distinct object in view and when once you start in do not change around with every wind that blows, but stay by whatever you start in with. There are probably higher prices going for carriage horses than any other kind, there always will be, and if you think you have the ability and experience and material to produce that horse and fit him for market, and give what the market demands, you will get a better return than for any other horse.

For the average farmer I would rather recommend the draft horse as a safer animal to produce for several reasons, one of which is that he is easier raised, and if he gets slightly blemished there is less to come off his price on that account; he is more salable than a blemished roadster or carriage horse. We must remember that although we still have a large supply of horses in the market that supply is not going to last forever. As Prof. Craig said, the average life of a horse in the city is only five years, and the horses in the cities now will all need replacing inside of five years and many of them in far less. We are using up our horses just as rapidly as we ever did. Out in the west they are kiling them by thousands and sending them to glue factories and canning factories, I suppose. We have an export trade of something like 50,000 per annum, and that trade is growing and ought to be cultivated. We must, therefore, strive to strengthen our weak points and give our horses more style, strength, quality and action; action more than anything else, because that sells the horse of the carriage type, and the prices depend more on that than anything else.

DISCUSSION.

The Chairman—Isn't there danger of over-feeding colts; suppose you feed them on what Mr. Goodrich would term a balanced ration and they had plenty of exercise?

Mr. Galbraith—No, I think there is very little danger of that. Of course, you will meet an occasional colt that is gluttonous and will eat more than is good for him, and then a man must use his judgment. I find that colts suffer more from too little food than from too much.

The Chairman—What is the principal difference between the breeding and raising of horses in this country and those in the old country?

Mr. Galbraith—I think they give them more care over there. They value them more from the start than we do here and they always breed for a special purpose, having something more definite in view.

Mr. Cressy—Is there any means of giving horses this action that you speak of by care and feed?

Mr. Galbraith—No, sir; good action must be born in a colt. There is a kind of artificial action that is produced by shoeing heavily in front, but this is not desirable. We don't get this natural high action from our general breeding once in a dozen times. Here is the picture of a Hackney mare that a gentleman in New York state imported last year. She is a very valuable mare, and what makes her so valuable is the high knee and hock action which she always displays. Something can be done in the shoeing to make them lift their knees higher, but good action depends on the movement of the shoulders, the knees and the hocks all in unison.

Question—Do you feed your colts mostly to produce muscle rather than flesh?

Mr. Galbraith—Yes, I omitted to say that we do not believe in feeding corn hardly at all to colts; we want such foods as will produce muscle and bone rather than fat. I don't like them too fat, of course there is a medium in that; but you want a certain amount of flesh.

Question—What is the best food to feed the first year?

Mr. Galbraith—I think oats, bran, and flaxseed meal, with good, bright hay, but not too much hay.

A Lady—Would you advocate putting a bitting harness on a high-spirited colt and turning it out?

Mr. Galbraith—I think so. If he has too much spirit you would take some of it out of him. I would not bit it up too short to make him fret.

Supt. McKerrow—Wouldn't you handle him some previous to this?

Mr. Galbraith—Oh, yes, he ought to be halter broke and handled a good deal previously. You can put a harness on at two years old; that is early enough, or three years old, if you don't want to break him until he is three.

A Member—Don't you think that farmers who are obliged to work their mares during the summer would do well to breed fall colts?

Mr. Galbraith—It would seem so, and yet my experience is the other way. I have not seen many successfully raised fall colts.

Mr. Hays—How would it do to let a colt run till he is five years old before he is halter broke?

Mr. Galbraith—I don't think you can do so in these days. You can teach a colt very much easier and quicker when it is quite young. On no account should a young colt be driven very fast. Their bones are soft.

A Member—Do you think an idle mare will raise a better colt than one that is kept in the harness?

Mr. Galbraith—No; I think that a mare that is worked moderately will give the best results. Of course I mean before foaling.

Question—In driving a horse a distance say of fifteen or twenty miles, would you advocate the heaviest driving at the farther end of the ride or at the beginning?

Mr. Galbraith—It would depend a good deal on the horse. You would naturally prefer to bring your horse in the barn not in a very heated condition, and consequently the last few miles should be driven quite slowly.

The Chairman—Wouldn't it be a good plan to start out slowly, then drive up, and then slow up again before you got back?

Mr. Galbraith—Yes, I think so.

Question—At what age would you wean colts?

Mr. Galbraith—About five or six

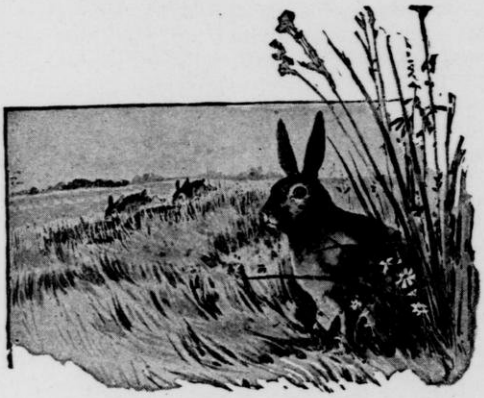
months. You must be careful that the mare does not become overheated, while nursing a foal.

Question—If the mare should be worked real hard, and the colt is a couple of months old, or even less, wouldn't it be well to take the colt off and raise it on cow's milk, rather than to leave it with the mother if she is out of condition?

Mr. Galbraith—Well, I think the foal ought to be allowed to suckle the mare three or four months at any rate, and five or six are preferable. If the mare is unhealthy the colt is better weaned, however.

Mr. Convey—About what per cent. of mares are being kept?

Mr. Galbraith—A great many of our mares have been sold off. Some years ago we had lots of good mares, but the proportion is much smaller than it was. Breeding stock is at a very low point at the present time. In my opinion the time will never come again when it can be as easily and cheaply bought as right now. If a man is contemplating going into breeding, now is the time to do it, because he can get the benefit of the advance in the market that is bound to come very soon.



ECONOMICAL FEEDING.

Supt. GEO. McKERROW, Madison, Wis.

For a few minutes I will talk to you along this line of economical feeding, and I believe there is no subject of more importance to the Wisconsin farmer. We have different and various ideas about what economical feeding means. We work all through the long summer season to grow crops to put upon the market when they are grown, and we look around us to see where we can sell them to the best advantage; we study the market reports and come to a conclusion in regard to the best time and place for selling them. If we live an equal distance between two selling points we are very apt to try both as to market conditions. If we have a crop of oats to sell and at one of the elevators they are giving a cent per bushel more than at the other, the roads and other things being equal, we sell in the market that will give us the highest price, be it only one cent a bushel.

The Best Feed Market.

We feed stock through the winter season and that stock presents to us a market for our product, a better market than the market at the elevator, because when we feed stock we sell economically, we get the market price for the product and then have left with us upon the farm, from seventy-five to ninety-two per cent. of the value of this product in the form of fertilizers to put upon our fields, and to maintain the fertility of our farms. But when we feed stock I am ready to say that we get a greater difference in the price than we get between seling to two different buyers. To illustrate: The Minnesota Experiment Station some two years ago, when wheat and prairie hay, two of the principal commodities of the state, were very low in the market, started out to experiment with a view of determining what would be the returns by the use of the dairy cow as a market for wheat and prairie hay. No consideration was given to the labor involved. It was simply a question of the farmer marketing his crops to his cows, the labor involved probably being greater than that of hauling to the station in some cases, and in some cases less, because stations are far apart in some places in Minnesota; but labor not being considered, they found that a certain cow in the herd returned 83 cents a bushel for wheat and $8.26 a ton for prairie hay. This certainly was a very good market for any Minnesota farmer when wheat was worth 45 cents a bushel and prairie hay only worth $2.50. Other cows returned more than this cow, 90 cents a bushel for wheat, $1, $1.10, and so on, but the best cow in the herd returned $1.57 for wheat and $15.76 a ton for prairie hay. Now, while these were both good cows, you see that one of them nearly doubled the market price of wheat and prairie hay over the other. This is one point that I wish to call your attention to, the particular animals that you feed.

Food for Maintenance and Gain.

To illustrate again: In my boyhood days I remember one particular winter when we had a number of shoats that weighed in the neighborhood of 200 pounds in the fall of the year and ought to have gone to market, but in those days we thought that a hog was not fit for market until he weighed 500 pounds; therefore we would winter them and summer them again and feed them another

crop of corn and sell them at 500 pounds weights. This particular winter we had a certain amount of corn and oats, and some other food, and we concluded we would winter those shoats. We saw that we would have to feed in limited quantities to make the food and the hogs come out even in the spring. We started in to feed those hogs so as to carry them through, as it was termed, and in the spring of the year the feed bins were empty, the hogs were no heavier, if as heavy, and where had the feed gone to? The 75 to 90 per cent. of it was returned in fertility, but the product part of the food was wasted, because the hogs had made no weight. Now, supposing that instead of 200 pound hogs at the beginning of the winter we had started with 100 pound hogs; it has been demonstrated by experiments and by the records of the fat stock shows that it takes about twice as much food to support 200 pounds of animal live weight as it does to support 100 pounds. Had we started with 100 pound pigs, it would have taken half the food of support only to have taken care of those 100 pound pigs, and the other half of that daily ration would have gone into gain, and in the spring of the year, instead of having only 100 pounds of pork, the same amount that we started with in the fall, we would have had about 170 pounds of pork. In the one case the food was wasted, and in the other about 70 pounds of gain could be figured; in one case it was very extravagant feeding, in the other case it would have been by comparison economical feeding. So you see that the kind of animal that we feed makes a great difference, especially in regard to its age and weight. As Mr. Galbraith told you, the feed and care of all our animals has a great deal to do with their development.

Proper Feeding Increases Value.

Prof. Craig showed you the difference between a 1400 pound horse and an 1800 pound horse in the Chicago market, showing you that the extra amount was worth about 25 cents a pound. Many a colt has been born to become a 1600 pound horse and then has been starved down to a 1300 or 1400 pound horse.

This feeding problem is considered very important by our best feeders, by our scientific experimenters, and by the agricultural press. When you read in the live-stock journals you find many articles upon feeding, and you also find in these articles certain terms that you may not well understand; the lack of knowledge upon these points causes you to lose the force of the arguments. Therefore today we will spend a little time in endeavoring to better understand the scientific terms used in feeding discussions, and also in so far as we can make the experiments and investigations of the scientific feeder compare favorably with the experiences of the practical feeder.

Description of Feeding Terms.

I will first call your attention to a chart illustrating terms and kinds of coarse food products. In the upper line you see the names of the food elements and just below each term, what each element produces in the animal economy.

First, we will look at some of these terms; there is the word "Protein," or, instead of "Protein" it might be "Albuminoids," or it might be "Nitrogenous elements in food"—these three terms are nearly synonymous. Protein is the most common term in use at the present day. Its object in the animal economy is to form muscle. In human foods we find protein best illustrated in such foods as the white of egg, nearly pure albumen. "Fats" produce fat and are found in the oils of our grains and grasses. "Carbohydrates" is another term probably not so easily understood. Carbohydrates

CHART I.

FEEDS.

Terms:—Protein, Ash, Fats, Carbo-hydrates { Sugar. Starch.
Object:—Muscle, Bone, Fat, Heat and Energy.

Cost in Wisconsin:—Protein, 1.5 cts.: Fats, 3.5 cts.; Carb., .5 ct. per lb.

	Protein.		Carb.
Balanced Ration	1	to	6
Oats	1	to	6.2

Narrow.

	Protein.		Carb.
Cotton-seed meal	1	to	1.3
Linseed meal	1	to	1.7
Skim milk	1	to	2.8
Peas	1	to	3.2
Wheat bran	1	to	4.6
Clover	1	to	5.2

Wide.

	Protein.		Carb.
Barley	1	to	7.2
Wheat	1	to	7.4
Rye	1	to	8.2
Corn	1	to	9.7
Timothy hay	1	to	15.0
Corn fodder	1	to	15.8
Oat straw	1	to	27.4
Turnips	1	to	11.5

Age of Animals, Individuality, Climate, Exercise,
Digestibility of food, Variety, Succulence.

in the animal economy are transformed into fats; all these three are transformed and used as fuel and yield energy. The word "energy" is used here instead of product. We also speak of the mineral matters in food, or we sometimes use the shorter term "ash," which means what is left after we burn up a certain amount of food.

We sometimes find the word "Calories," which is a term used to represent a measure of heat in the matter of feeding. As we understand it, it means the amount of heat that will raise a pound of water four degrees Fahrenheit. Scientific investigators deal a great deal with this term "calories."

A Balanced Ration.

Now we read a great deal about a balanced ration. What is it? The Germans began the investigation of this problem years ago, and they looked upon milk as a perfect ration. They knew then as we know now that whole milk grew and developed the whole system of the young animal in perfect order and kept it in health. They analyzed that whole milk and found that it made a ration of about one part of protein to 4.5 of the carbohydrates. Now, in this ration which we speak of as a balanced ration today, we use the terms one of protein to six of carbohydrates. The Germans looked upon milk as a perfect ration for the young and growing animal, but they found that as the animal grew older he needed something different from whole milk. There was a time when he could be fed oats and bran, and other grains and would even do better with it than with whole milk alone, and it made the ration cheaper, because butter-fat in whole milk in this country today is worth 15 to 20 cents a pound. When you

supplant that butter fat with fat that costs only 3 1-2 cents a pound, after the animal stomach gets so that it can digest it, you see it makes a cheaper food. The Germans finally determined that the average ration for a young and growing animal along through the first months or years of their life, and for a dairy cow that was producing, was a ration of about one of protein to 5.4 of carbohydrates. This was the ration bringing the best results, both as to economy and production.

When we attempt to figure out a balanced ration we multiply the amount of fat in a food by 2 1-4, because fat produces 2 1-4 times as much heat or fat as the carbohydrates proper do, and then add the amount obtained to the amount of carbohydrates, and then make the comparison between protein and this combination of fats and carbohydrates.

The Best Single Ration.

Now, let us as practical feeders stop for a moment and consider what our experience teaches us. Of all grains that you have fed in your experience, in feeding young and growing animals to keep them healthy and to have them develop bone and muscle perfectly, if you were confined to any one grain, what grain in your experience would you use? I hear several voices say "oats." I have put this question, I might say, at scores of Farmers' Institutes, and that has invariably been the reply, "oats." I hear one gentleman over here say "peas." If you were feeding to get the most rapid growth on your young animal, the best growth, would you depend upon peas alone? No, I think not. They are too narrow and too hard to digest. You could do it with oats alone. Oats in themselves are practically a balanced ration. Oats are a little different from other grain because they contain one element in a small amount that other grains do not seem to contain, an element that we do not know a great deal about, that seems to influence nervous energy mainly, but nevertheless the fact remains that they are balanced. The balanced ration, as you see by the chart, is one to six; this is the average ration today as we use it.

A Narrow Ration.

In our reading and studying we come across the term "narrow ration," which means simply rations that are narrow compared with one to six. The narrowest ration we know of in stock food is dried blood. It is used by some of our fancy hog breeders for growing young pigs rapidly, to show at Fairs, to get growth and develop bone and muscle at an early age, but it would be too expensive to use for pork production. There are other foods in the same category but they would be too expensive upon which to raise three-cent pork on the market.

Of all coarse foods that you raise to grow young and thrifty animals upon, if you were confined to one coarse food, let me ask you farmers who have had experience with clover and timothy and corn fodder, which one coarse food would you take? "Clover" comes from all over the house, and clover comes very near a balanced ration, one to six, it being 1 to 5.2.

Effects of Food on the Animal System.

Now, as to the effects of food on the animal system. Many of those who discuss dietaries for the human family will hold up to you as an illustration, different nationalities that have been raised upon different classes of foods; they will say that oats are a good bone builder and ask you to look at the Scotchmen as a people who are raised upon

oats, and you will find a people that are bony and muscular. On the other hand, you look at the Chinaman who is raised upon carbohydrates, starches, mostly, as they are found in rice and such foods, and you will find a man who is dwarfed in bone and muscle, when some sharp Irishman, like my friend Convey, jumps up and says, "What about the Irishman? He is bony and muscular, and he lives mainly on 'praties.'" But you see the Irishman, in his shrewdness, balances his "praties" up with skim milk and butter milk.

Economical Feeding.

Now, as to the economy of feeding some of these things. These feeds are best fed in combination, brought together. Corn is one of the cheapest foods we can raise in the state of Wisconsin, but all corn fed to the young and growing colt or calf, lamb or pig, practically destroys their profitableness, because it does not grow frame enough to build upon later, and it is apt to disease the animal. You never knew an animal diseased by having too much muscle and bone, but you all have heard of animals being diseased by having too much fat and heat in their system. If we feed too much heat-producing food, the danger is that we overheat this young animal, put it in a feverish condition, dry up its whole system as indicated by the dry condition of the hair and skin, which means simply a dried up condition of the inside menbranes of the animal, and that means that that animal cannot take out of the food that you are giving it, what it otherwise would if it had not been overheated, the whole system is constipated. I know this from experience. A few years ago we had upon our farm corn fodder, timothy hay, and oat straw with corn, all in good shape, enough to winter the stock, and we began to feed. After about six weeks in the winter we noticed here a lamb and there a calf were not thrifty; they began to dry up and some of them began to get a little over fat—they didn't grow right. So I began to reason to myself that this could not be economical feeding; in fact I weighed some of the animals and found they were practically gaining nothing, and I said to myself, "Next spring I will find quite a percentage of these young animals that have done no good; they are not keeping up to the standard." So I looked at these narrow foods, and I said, "What can I get for a little money that will correct this dried up condition?" I figured on bran and oil meal, and concluded that oil meal was best for me for balancing up, and I bought the oil meal and fed it with the other foods, and the result was that these young lambs that were dried up began to relax, and to improve, and to pay me in that case many times over what the oil meal cost, yet when I summed up in the spring of the year it had been economical feeding, more so than it would have been to have saved that money and confined them to the carbonaceous foods.

The young growing animal needs muscle forming food, a ration of one to five or six. After its frame is grown and you begin feeding for the market, like a steer or hog, they can be fed upon such foods as corn, and make weight a great deal cheaper than to keep on feeding foods of the protein class as you can see by the food values on the chart.

CHART II.

Ration for 1,000 lb. cow.

	Organic matter.	Digestible Nutrients.			Prot., Carb.
		Protein.	Carb.	Fat.	
Maintenance	17.5 lbs.	0.7 lbs.	8.0 lbs.	0.15 lbs.	1 to 11.91
Ave. for production	25.0 lbs.	2.5 lbs.	12.5 lbs.	0.6 lbs.	1 to 5.5
(Prof. Woll), production	24.5 lbs.	2.2 lbs.	13.3 lbs.	0.7 lbs.	1 to 6.8

CHART III.

Sample ration as figured out.

	Lbs. of fodders and grains.	Digestible Nutrients.						
		Protein.		*Carb.*		*Fat.*		
		Per ct.	Lbs.	Per ct.	Lbs.	Per ct.	Lbs.	
Corn silage	30	× .8	= .24	× 10.9	= 3.27	× .7	= .21	
Clover hay	8	× 8.1	= .65	× 39.1	= 3.13	× 2.1	= .17	
Corn meal	4	× 7.	= .28	× 66.2	= 2.65	× 3.3	= .13	
Wheat bran	6	× 11.2	= .67	× 54.3	= 3.26	× 3.5	= .21	
Oil meal	2	× 28.2	= .56	× 32.9	= .66	× 7.1	= .14	
			2.40		12.97		.86	1 to 6.

DISCUSSION.

Mr. Arnold—What would you raise as a substitute for clover hay?

Supt. McKerrow—Pea and oat hay is the next best thing to take the place of clover hay; if your clover is killed out put in peas and oats. I have clover every year, but not as much as I want. I sow it alone on a piece of land that has been well cleaned from weeds by previous crops. I sow very early in the spring.

Mr. Goodrich—What is the best corn to raise for corn fodder and is it better to feed the stalks than the corn?

Supt. McKerrow—I believe that the cheapest way, now that corn is so cheap and labor comparatively high, is to feed stalks, corn and all. I am farming on pretty heavy clay land and I plant Flint corn, Michigan Smut nose as we term it, mainly. I would aim to grow a corn that will ripen in your latitude, some of the early ripening Flints or Dents, whichever your land is best suited for.

Mr. Hyatt—How do you protect your clover after you get it to grow, from killing out in the winter?

Supt. McKerrow—I never have been troubled with young clover killing out the first year.

*Average Composition and Manurial Value of Stock Foods.**

	In one Hundred Pounds of Material.									
	Water.	*Protein.*		*Carbohydrates.*				*Fat.*		Manurial value per ton.
		Total.	Digestible.	Fiber.	Starch sugar, etc.	Total.	Digestible.	Total.	Digestible.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Alfalfa, green	71.8	4.8	3.9	7.4	12.3	19.7	11.9	1.0	0.5	$2.85
" hay	8.4	14.3	10.8	25.0	42.7	67.7	39.7	2.2	1.2	8.76
Apple, pomace	76.7	1.4	.....	3.9	16.2	20.1	.....	1.3	.....	0.84
Asparagus stems	94.0	1.8	.....	0.7	2.5	3.2	.....	0.3	.....	1.30
Barley, grain	10.9	12.4	8.7	2.7	69.8	72.5	64.6	1.8	1.6	7.35
" meal	11.9	10.5	7.4	6.5	66.3	72.8	62.4	2.2	2.0	5.65
Brewer's grains, dry	8.2	19.9	13.7	11.0	51.7	62.7	37.0	5.6	4.5	11.96
" " wet	75.7	5.4	3.9	3.8	12.5	16.3	9.5	1.6	1.3	3.03
Buckwheat flour	14.6	6.9	.....	0.3	75.8	76.1	.....	1.4	.....	.....
" grain	12.6	10.0	7.4	8.7	64.5	73.2	48.9	2.2	1.8	4.97
" middlings	13.2	28.9	.....	4.1	41.9	46.0	.....	7.1	.....	5.16
" straw	9.9	5.2	.....	43.0	35.1	78.1	.....	1.3	.....	7.10
Cabbage	90.5	2.4	.....	1.5	3.9	5.4	.....	0.4	.....	1.68
Carrots	88.6	1.1	0.7	1.3	7.6	8.9	8.8	0.4	0.4	1.08
Clover, (alsike), green	74.8	3.9	2.4	7.4	11.0	18.4	11.3	0.9	0.4	1.63
" " hay	9.7	12.8	7.9	25.6	40.7	66.3	41.1	2.9	1.3	9.70
" (Red), green	70 8	4.4	3.2	8.1	13.5	21.6	14.3	1.1	0.6	2.18
" " hay	15.3	12.3	8.1	24.8	38.1	62.9	39.1	3.3	2.1	8.75
" " silage	72.0	4.2	.....	8.4	11.6	20.0	.....	1.2	.....	.....
Corn cob	10.7	2.4	.....	30.1	54.9	85.0	.....	0.5	.....	2.16
" and cob meal	15.1	8.5	.....	6.6	64.8	71.4	.....	3.5	.....	5.27
" fodder, green	79.3	1.8	1.5	5.0	12.2	17.2	11.8	0.5	0.4	1.71
" field-cured	42 2	4.5	2.2	14.3	34.7	49.0	32.0	1.6	1.1	5.00
" kernel	10.9	10.5	7.9	2.1	69.6	71.7	66.5	5.4	4.3	6.55
" meal	15.0	9.2	7.0	1.9	68.7	70.6	66.2	3.8	3.3	6.35
" silage	79.1	1.7	0.8	6.0	11.1	17.1	10.9	0.8	0.7	1 32
Cotton-seed hulls	10.4	0.4	.....	44.4	36.6	81.0	.....	2.0	.....	3.51
" meal	8.2	42.3	36.7	5.6	23.6	29.2	18.8	13.1	12.5	24.50
Gluten meal	9.6	29.4	25.0	1.6	52.4	54.0	49.8	6.3	4.8	15.47
" " (Buffalo)	10.0	21.6	.....	5.7	51.9	57.6	.....	10.8	.....	.....
Kentucky blue grass, green	65.1	4.1	.....	9.1	17.6	26.7	.....	1.3	.....	1.75
Linseed meal, O. P	9.2	32.9	28.2	8.9	35.4	44.3	32.9	7.9	7.1	19.50
" " N. P	10.1	33.2	27.1	9.5	38.4	47.9	32.8	3.0	2.7	20.56
Malt sprouts	10.2	23.2	18.7	10.7	48.5	59.2	43.5	1.7	1.2	13.71
Mangel-wurzels	90.9	1.4	0.9	0.9	5.5	6.4	6.1	0.2	0.2	1.10
Milk	87.3	3.2	3.2	.....	.....	50.0	5.0	3.8	3.8	2.00
Oat fodder, green	62.2	3.4	2.7	11.2	19.3	30.5	22.4	1.4	1.0	1.98
" grain	11.0	11.8	9.3	9.5	59.7	69.2	48.3	5.0	4.2	7.40
" meal	7.9	14.7	11.5	0.9	67.4	68.3	52.0	7.1	5.9	6.90
" straw	9.2	4.0	1.6	37 0	42.4	79.4	41.6	2.3	0.7	3.30
Orchard grass, green	73.0	2.6	1.5	8.2	13.3	21.5	11.4	0.9	0.5	2.21
" " hay	9.9	8.1	4.7	32.4	41.0	73.4	38.9	2.6	1.3	6.22
Pea meal	10.5	20.2	18.0	14.4	51.1	65.5	57.1	1.2	0.9	10.80
Potatoes	78.9	2.1	1.3	0.6	17.3	17.9	15.6	0.1	.....	1.20
Rye fodder, green	76.6	2.6	2.1	11.6	6.8	18 4	14.0	0.6	0.5	1.87
" flour	13.1	6.7	.....	0.4	78.3	78.7	.....	0.8	.....	6.54
" grain	11.6	10.6	.....	1.7	72.5	74.2	.....	1.7	.....	6.64
" straw	7.1	3.0	0.7	38.9	46.6	85.5	42.7	1.2	0.4	2.45
Sorghum, green	79.4	1.3	.....	6.1	11.6	17.7	.....	0.5	.....	1.00
" silage	76.1	0.8	.....	6.4	15.3	21.7	.....	0.3	.....	.....
Timothy, green	61.6	3.1	1.5	11.8	20.2	32.0	18.6	1.2	0.6	2.46
" hay	13.2	5.9	2.9	29.0	45.0	74.0	42.0	2.5	1.5	5.75
Turnips	90.5	1.1	0.6	1.2	6 2	7.4	6.7	0.2	0.2	1.10
Wheat bran	11.9	15.4	11.2	9.0	53.9	62.9	54.3	4.0	3.5	12.75
" flour	12.4	10.8	.....	0.2	75.0	75.2	.....	1 1	.....	7.74
" " (graham)	13.1	11.7	.....	1.9	69.8	71.7	.....	1.7	.....	.....
" grain	10.5	11.9	.....	1.8	71.9	73.7	.....	2.1	.....	8.25
" middlings	12.1	15.6	11.3	4.6	60.4	65.0	57.6	4.0	3.5	9.47
" straw	9.6	3.4	0.8	38.1	43.4	81.5	38.0	1.3	0.5	2.40

Blank spaces indicate that the facts are not known.

* Taken from New York Farmers' Institute Bulletin.

Question—How is millet?

Supt. McKerrow—That is not of the same nature as clover. Now, do not go away from here to say that oat straw, according to this table, is the best food to produce heat in an animal. It is not. It has more heat producing elements than protein, but they are both pretty thin. You can starve an animal to death by feeding it rye straw, and you can do little better by feeding oat straw alone on account of their dry indigestible condition. Oat straw has some value when fed with succulent foods such as turnips or beets. Mr. Hyatt would put in turnips to help the animal along.

Mr. Hyatt—I am feeding peas, oats and corn fodder with nubbins and turnips.

Mr. Bradley—We, as feeders of dairy cows, think we get more out of corn fodder than we do from timothy hay. Cannot a cow take more out of corn fodder, because it is in a different condition,—get it out in better shape?

Supt. McKerrow—There the question of succulence comes in. Timothy hay has only about 15 per cent. of water, while corn fodder usually has from 35 to 45 per cent. of water. There is a succulence that makes it more palatable to the cow. Well cured corn fodder is better food than timothy hay for that ration. It does not compare with clover, because it is heat-producing, almost altogether. Clover is a higher priced food because it has a great deal more protein in it.

Mr. Bradley—I have fed my cattle on corn stalks all winter and they never looked better.

Supt. McKerrow—That is all right; if you balance up, you can carry your cattle through if they do not need new muscle formers.

Question—Where you haven't a silo how is the best way to save your corn fodder?

Supt. McKerrow—Cure it dry. You want nearly mature corn for the best results anywhere, in the silo or out of the silo.

Question—Why does not skim milk seem to be a good food for all pigs? I have fed it when it seemed to fatten them too much.

Supt. McKerrow—From my observation and experience in feeding it doesn't fatten quite enough. I have had to mix corn meal with it, that is, when the pig is not too young.

Question—If you lived in this country what would you do with whey?

Supt. McKerrow—If it was sweet or but slightly sour I would feed it. You see the casein and albuminoids are largely taken out of it. I would feed middlings with it. Some people feed it in such bad condition that they make their pigs crosseyed.

A Member—Don't you think that the difficulty this gentleman spoke of, the pigs getting fat, is from lack of exercise?

Supt. McKerrow—Yes, that might have something to do with it. Then again, it is possible that he is feeding them skim milk from deep or home setting, and we find that it sometimes runs up to 2 1-2 per cent. fat. A lady at Eau Claire brought to the Institute skim milk from settings from her cow and the full milk tested 5 per cent., and the skim milk 2 1-2 per cent. She said it didn't make any difference, the children drank it anyway.

Mr. Hyatt—How do the peas run in proportion to the oats?

Supt. McKerrow—About one-third peas. As we are in a section of Wisconsin where peas do not thrive well we do not grow many. Let me repeat that when clover fails you cannot get any better crop to balance up your food ration than by growing peas. I would grind them with the oats for

dairy cows. I would not feed them whole as Prof. Curtiss seems to think is all right. My sheep do remarkably well when they have a few peas among the oats, and do their own grinding.

At this point in the proceedings a number of children from the Children's Home at Appleton, were brought upon the stage and Mrs. Geo. M. Miller, the manager of this Institution, spoke as follows:

THE CHILDREN'S HOME OF APPLETON.

Mrs. GEO. M. MILLER, Appleton, Wis.

The Children's Home is a charitable institution, incorporated in January, 1888, and sustained entirely by voluntary contributions, the only exception to this rule having been made the present year, when the Board of Supervisors of Outagamie county appropriated $500 to its support, in return for which the managers engage to care for as many dependent children of the county, as the capacity of the Home will permit.

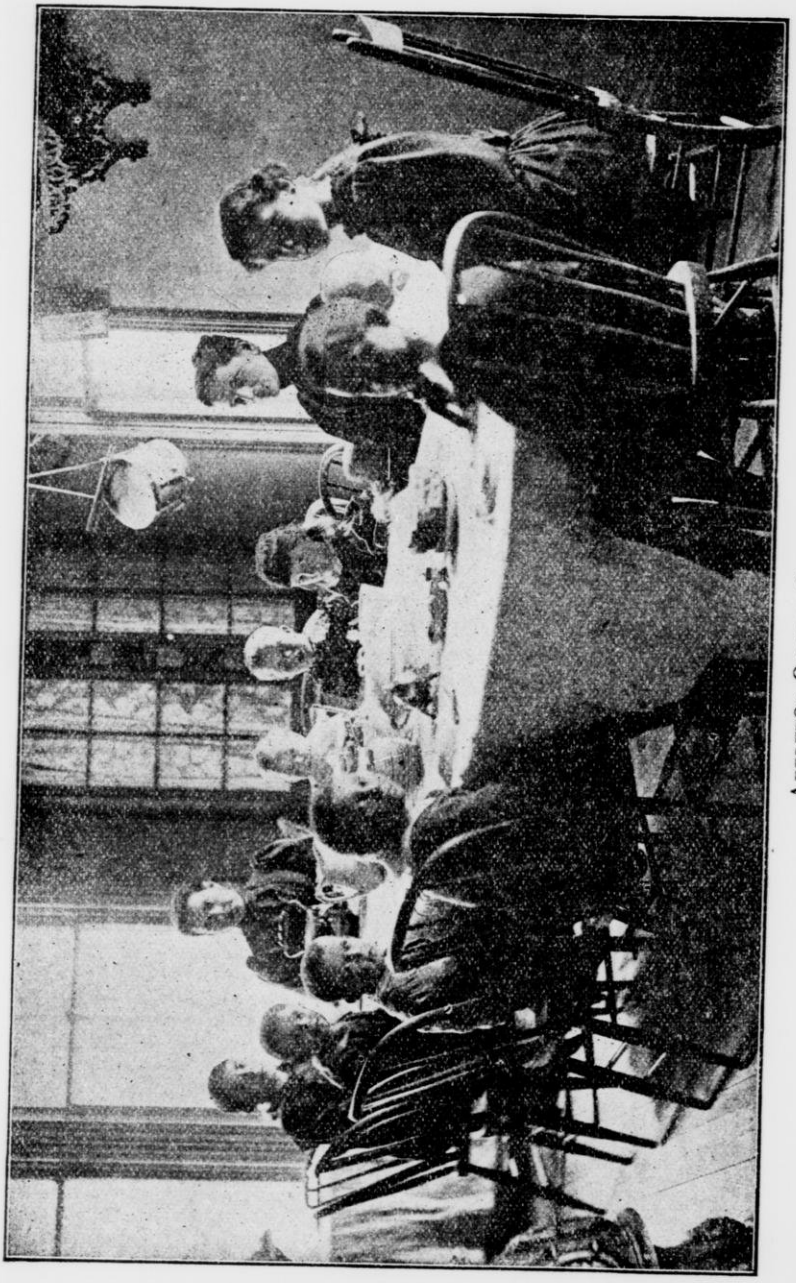
The date of organization was emphatically a "day of small things" in all but that faith and courage whose drafts upon the stores of philanthropic benevolence are never dishonored. The institution, now occupying a handsome and commodious building, has sheltered during the nine years of its existence, more than one hundred children, of varying ages and nationalities, who have been received from all parts of the state, and in many cases, from the most pitiful conditions of neglect or destitution.

Pitiful Cases.

Lack of space forbids the multiplication of illustrative cases, but mention may be made, in passing, of one family of five children, whose father had been a habitual drunkard, and whose mother was killed by a locomotive on a railway crossing; of a little sister and brother who coming with scarcely any knowledge of the name of God, except as used in blasphemy, were afterwards numbered among the most lovable and obedient inmates of the Home; of one babe cared for, while the widowed mother made brave struggle for the support of her remaining children; and another, whose mother had died in an insane hospital, temporarily nurtured until the crippled father should be able to reclaim it.

These instances, selected almost at random, suggest the two lines of work attempted by the organization; —first to secure suitable adopted homes for children who have been legally relinquished to its care, and second, to provide shelter in worthy cases of temporary distress, for such as can be later returned under improved circumstances, to their parents or guardians.

The greatest possible care is exercised in the selection of homes by adoption. The applicant for a child must be proved, by proper reference or by personal investigation, to be not only financially capable of its support, but morally suitable for its guardianship. No papers of legal adoption are given, until the child



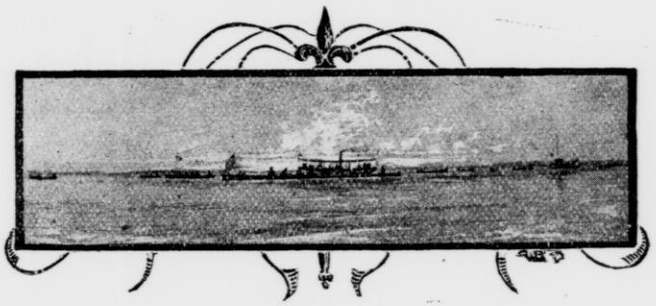
APPLETON ORPHAN SCHOOL.

has been for a longer or shorter time on trial, or in Home parlance, "On a visit," in the proposed home. If the mutual relation prove in any manner inharmonious, the child is accordingly taken back without difficulty or misunderstanding.

An Appeal to Our Farmers.

Other things being equal, a country home is considered by the managers as by far the more desirable and conducive both to the moral health and development of the children. In the endeavor to secure such homes, they venture to ask the assistance and co-operation of every farmer in Wisconsin. If there is no more room at your own fireside, have you not some childless friends to whom the coming of one of these little ones might be a source of new and perennial comfort and joy? The appeal in behalf of helpless childhood is confidently made to that noble army of men and women, under whose hands the broad fields of our great commonwealth "Blossom as the rose," and whose generous and hospitable homes are at once the foundation of our free institutions, and the assurance of their prosperity. "And whoso shall receive one such little child in My name receiveth Me."

The Institute adjourned until 1:30 P. M.



AFTERNOON SESSION.

The Institute met at 1:30 P. M. A. A. ARNOLD in the Chair.

HOW TO GET GOOD COWS.

H. C. TAYLOR, Orfordville, Wis.

My subject is the cow for profit, and she is the prime factor in successful dairying.

The first and most essential thing is the dairy tendency of the cow employed, the next is the ability of the farm to produce sufficient and cheap food for the dairy cow, and the next is the dairyman and his willingness and ability to apply to a cow and to the farm improved and modern dairy methods. If he is not that kind of a dairyman, he is going to make a failure of it.

Must Know the Best and Keep Them.

In selecting a cow, which is my part of the subject, I will say that to succeed as a dairyman every man must have as high an appreciation as is possible for him to obtain by study and close observation of the essential qualifications of a dairy cow; he must know a dairy cow himself, and of course it is impossible for him to know this until he has had lots of experience with the cow, until he has bred her and raised her, and staid by her through her milking period until she reaches the highest state of her physical development. A man should have a high ideal; if he is willing to take up with any sort of a scrub cow or beef cow, in fact anything that is a cow, that man will very likely make a failure in the dairy business.

Now, if you want to get a perfect type in your mind, look at such a cow as this picture shows. If a man undertakes to go into the dairy business with a cow that is inclined toward beef he will make a failure. So he will make a failure if he picks out a cow that lacks vigor, quality and constitution, and the ability to transmit to her progeny such good qualities as she possesses.

Now, where are we going to find these good cows that we are after? Are we going to some adjoining state, county or town, or right in our own herds? Charity begins at home, and dairying should begin at home. Let us look into our own herds and see how many of that herd correspond or come up to our standard of what a dairy cow should be. That standard should never be the same one year with another; it should get one notch higher in the scale one year after another, indicating progress on our part in every line of operation.

The Babcock Milk Test.

Now I am going to speak of a very common thing of which we have talked all over the state at every Institute, and I think this is the one hundred and seventh in Wisconsin. I think that I have talked it at some twenty-five. That subject is the method of improving your herd and getting good cows, ascertaining which are your own good cows, and

which are unprofitable ones, by the Babcock Test.

The greatest improvement that has even been given to the dairy interest in the world is the Babcock milk test. I am sorry to say that not more than two per cent. of the cow owners in this state, which is looked upon by Nebraska, Iowa, and other states as one of the great dairy states of the country, not more than two per cent. of Wisconsin dairymen or Wisconsin cow owners, have the Babcock test in their herds. I have asked the question in every audience this winter, how many there were in the audience that had the Babcock test, and it has turned out that not more than two per cent. of those who have two or more cows own the Babcock milk test. If you have this test you can take it into your herd and carefully test each cow at least twice a month, and oftener is better. At the end of six months you can tell whether that cow is profitable or not, and if she is not, do not keep her any longer, but discard her. Of course the scales always go along with the milk test, and they should be good ones. Be honest with yourself, honest with your cow, honest with the creamery man, and you will see that the Babcock test is a wonderful truth teller. This is something that is within easy reach and is absolutely correct. If I had a Babcock milk test that cost me $100 and it cost $5 to test a cow each time my neighbors would come and look with longing eyes upon that test and they would say, "How I wish I was able to buy a test, wouldn't I test my cows!" But the test being very cheap and costing nothing practically to make the test, and any man being able to do the work, somehow the farmers don't seem to want it.

Brown Flora 2nd. Record 20 lbs. 2 oz. per week. Bred and owned by H. C. Taylor.

After you have weeded out the cows in your herd that have been

found with the Babcock test to be unprofitable, where are you going to get cows enough to do business with? Let me tell you of one of the most careful dairyman we have in Wisconsin who bought a Babcock milk test and he tested his cows for a year, some twenty-eight of them. He found that two of these cows made more profit during the year than sixteen of the others, so he discarded all but the profitable ones.

A Poor Way to Fill Your Herd.

Now, how are you going to get these cows that you want? You are going out to buy them; if you think you can pick out a profitable cow by her looks, you may find out that you cannot. You go to a herd of twenty cows, and the man says, "I have just one to sell." You look at that cow a little crosseyed, but don't fail to look straight into the owner's eyes. He knows what he is doing. He probably uses the Babcock milk test, and people who do that are not selling their good cows. There is a large per cent. of the product of the dairy farm that is going to our cities in the shape of milk, and it is going to our cheese factories. These milk routes are reaching out further and further from the cities every year. This year they run trains far up into Wisconsin to get milk for Chicago. The cheese factory men and men supplying milk to the cities are not raising calves; they have to buy their cows, and the supply of good cows is growing less and less all the time. There are a lot of farmers owning broad acres of land that are raising a kind of scrub cow way back from the milk route. They make no money in dairying in any other way than to raise these cows for the market. The cow dealer goes out and finds these cows and he judges by their looks an animal that will sell to these milk dealers; the milk man milks them and gets completely disgusted. He discards them at the end of one season and goes back to buy more. Now, the kind of cow that is put on that kind of market is constantly, year by year, growing inferior, just as sure as you live. These scrub cows are raising scrubbier calves every year, and they are turned out upon the market. That is one source from which we can get our dairy cows.

The Good Dairy Cow.

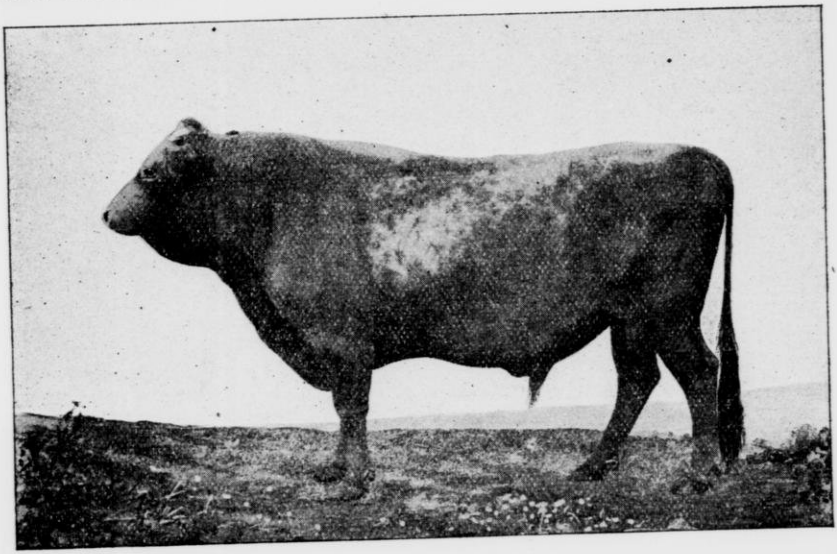
There is another source, and that is, from the man who is maintaining a herd of thoroughbred dairy cows, and there are many of the breeds and many of the men capable and competent to bring about an essential improvement in the dairy business. If it was not for them our supply of good cows would be much less than it is today. They are breeding from the best type of dairy cows, and they are developing the best dairy interests of this country. I do not know that I care to speak on this subject from the breeder's standpoint, but I will tell you what I would do if I wanted to start a herd of dairy cows. I would select a cow that looks as near like this one as I could get, with a perfect dairy figure and constitution, but not thick meat. I would want her deep through the middle, with a large udder and a rather lean body. I would breed that cow to the very best sire that I could find. I would have a proper animal to put at the head of my herd. If I could find some more females of the same family I would purchase them, if possible, and bring them into my herd; from this first cow or cows I would build up a herd of dairy cows. I would not go into any herd for a cow of different characteristics, even if she was a good producer; neither would I use one animal at the head of my herd one year, and the next year discard him because I could make a little money in selling him

and buying another. I would have my plans more perfect and they should not be disturbed by any foolish notions. I would get into the center of some main channel and I would keep there and be sure that I never run ashore.

cember, I would have her fresh the October or November before.

Question—Would you consider a cow a good one that would give between eight and nine thousand pounds of milk a year?

Mr. Taylor—Yes, ordinarily speaking, that is a pretty good yield. It depends a good deal upon the quality of it.



Recorder, 29239—Son of Brown Bessie. Bred and owned by H. C. Taylor.

DISCUSSION.

Question—Then you recommend a dairyman to raise his own cows?

Mr. Taylor—I recommend every dairyman to be a breeder to a very large extent.

Question—Can you make as good a cow out of a heifer that has gone till her third year before her first calf?

Mr. Taylor—If she is of the early maturing breed of cows I would have her fresh at about two years of age, but be sure she gives you her first calf when the weather is warm and you can feed her upon nature's best ration, which is grass, and stimulate the milk production in early life. Start her out upon the business of life. If she was two years old in De-

Mr. Arnold—What is the thing of prime importance to secure in a good dairy cow?

Mr. Taylor—Dairy tendencies; a cow that has a tendency to produce milk and butter at a profit. Vitality should always come in second. I do not care how good a breed she is, she must have plenty of nerve power, plenty of vigor, a sprightly, active cow, with a sharp twinkle in her eye, which should be large and prominent.

Mr. Hyatt—The man that owns her wouldn't want too much twinkle in her eye.

Mr. Taylor—If he has that kind of a cow his eyes will generally twinkle.

Mr. Hyatt—Could not a cow even

like Brown Bessie be spoiled in one year by a scrub owner?

Mr. Taylor—Yes; if you expect a breed of domestic animals to long continue showing the peculiar characteristics of that breed, you must throw around them those climatic influences, those foods, those environments, that have made them the peculiar animal that they are.

Question—At how low a per cent. would you keep a cow?

Mr. Taylor—It does not depend entirely upon the per cent. of fat in the milk, the quantity and the quality should both be taken into consideration. Sometimes a four per cent. cow is profitable while a six per cent. cow is unprofitable. She must be a persistent milker through the year. The question as to the quantity comes under the same head, but I will say a cow that will not produce 200 pounds of butter in a year would be below my standard of profitableness; if she won't do that, I think you had better discard her and get one that will do better than that, because there are plenty of herds in this state that are producing even one third more than that with good feed.

Question—Which is the most profitable, a cow that will give twenty pounds, testing 5 or 5.5, or a cow that will give forty pounds, testing 3 per cent.?

Mr. Taylor—Well, usually speaking the six per cent. is the most profitable cow, because your chances are good of getting an increase along the line of increased production, while in the other case you will not succeed in getting the richness increased. We like to have a large flow of rich milk.

Question—Can you increase the per cent. of fat in a cow's milk after keeping her six months?

Mr. Taylor—The per cent. of butter fat cannot be increased by feed; that is generally conceded. There seems to be a slight temporary increase sometimes. If you want to increase the per cent. of butter fat just take off her feed.

Question—Why, then, is it that when the flow of milk becomes small that milk seems to be richer?

Mr. Taylor—Because she has been long in milk and the per cent. of butter fat increases as the milking period advances. Every cow as she advances in period of lactation, increases the butter fat slightly.

Mr. Goodrich—You mean it increases the per cent. but not the amount of butter fat?

Mr. Taylor—Yes, the per cent. of butter fat will go up and down—fluctuate—and you cannot always tell why.

Mr. Everett—You and Mr. George C. Hill do not agree. He said this morning that the milk was influenced by the feeding.

Mr. Taylor—Well, it is when you feed only sawdust. That is the only feed known to the materia medica of cowology that will increase the per cent. of butter fat.

Mr. Everett—How do you increase the per cent. of fat in a cow?

Mr. Taylor—By good breeding; it is an individual characteristic; I might say a breed characteristic. The per cent. of butter fat and the quality of butter fat are two different things. Let us not strive to increase the per cent. of butter fat by feeding, but let us try to increase the quantity of milk. We can do that. When a cow is in a normal condition, giving a normal quantity of milk, it is always a normal quality; quality is an item that is born with her and you cannot change that, whether she is giving thirty, forty, or fifty pounds of milk.

Mr. Reed—If you are going to raise your calves to increase your own herd, must you wait until each calf is a cow before you can know what she is going to be?

Mr. Taylor—You almost always have to.

Mr. Reed—Are there no indications in the calf that will help you?

Mr. Taylor—Not to be safe to rely upon. I like to have them in nice form, a nice shaped udder, squarely placed, and if they have a disposition not to get fat, but to grow rapidly and to grow away from a fat form, then it is very likely that they will make good dairy cows.

Question—If you had a herd of high grade Holsteins, would you recommend crossing with Jerseys to get better milch cows?

Mr. Taylor—I would not. There is too much dissimilarity of characteristics in the two breeds, each very strong in its own line. One has been bred and developed for the production of a large quantity of milk, regardless of quality; the other has been bred for the purpose of producing a persistent flow of rich milk. There is no occasion for it either. If you breed nearer and nearer to the pure butter type of the Holsteins you are on the right track. If you breed towards a higher, better and purer type of the Jerseys, you are still on the right track, providing your love and your affections and your tastes and prejudices go towards that breed of cattle. Select those breeds that you like best, and if you breed them well and treat them well, they will give you a response.

Question—Do you feed a dairy calf?

Mr. Taylor—Yes, I would feed all those foods that would make a strong physical development—oats, bran, oil meal, clover hay. I would avoid corn stalks to a large extent, both corn and timothy hay to young and growing heifers that I wanted to take the place of their mothers in the dairy herd.

Mr. Convey—I don't quite like the manner in which that per cent. of butter fat question has been left. I have been stating for a number of years that you cannot feed a cow so as to increase the per cent. of butter fat, but it is due to the falling off of the feeding, rather than the raising of it. You can feed a cow a heat-producing ration and dry the milk, and thus make the milk show a large per cent. of butter fat.

Mr. Taylor—Yes, but I would consider it like sliding down hill on a sled with a river at the foot of the hill.

Mr. Convey—The dairymen of Wisconsin, as a rule, depend very largely on feeding fat producing food and they dry the cows up in that way, getting a high per cent. of butter fat in the milk, but they do not have persistent milking.

Mr. Taylor—The fact is, that by giving large quantities of heat producing food, the animal is unable to make sufficient casein in her milk to balance the butter fat—she hasn't enough to balance up the ingredients, so she gives increased butter fat for a few days; then she will go back to the normal quantity of milk, but it will be much less in quality, and nature will shrink the flow down to such a point that she can produce the skim milk from the food she is fed, and then she will put into that the balanced portion of butter fat. Just try feeding your cows slough hay and wheat straw and keep at it; you will dry her up nicely. The combination is changed in the milk when such a change in food is made, but it only lasts for two or three days; they soon go back to the normal quantity. Your profit for the whole year depends on getting up a good flow soon after she freshens, and keeping it up.

Question—Would you advise the test for the cheese factory?

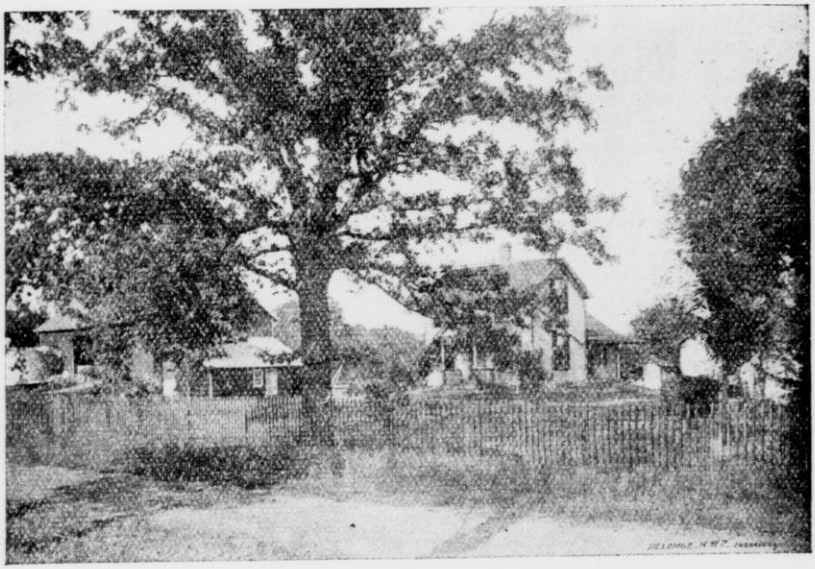
Mr. Taylor—If you are sending your milk to the cheese factory, your business interests demand that you know how much fat you are taking there.

The Member—They don't buy by the test; they buy by the one hundred pounds.

Mr. Taylor—I would want to move out of that neighborhood. You ought to have an Institute there every week.

HANDY THINGS ON A DAIRY FARM.

CHAS. THORP, Burnett, Wis.



FARM HOME OF CHAS. THORP.

In my opinion the reason dairying is so much disliked, and considered by many to be an undesirable occupation, is because the arrangements are so unhandy that it requires a great deal of unnecessary labor to carry on the business. The object of this paper is to show how we have overcome some of the most disagreeable parts of the business by having things handy about the place, and some of the things I shall mention are as handy for others as they are for dairy farmers.

The Dairy Building.

This, I think, is an absolute necessity for the dairyman who expects to make his product up at home, and should be located as near the well or spring as possible to save carrying or piping water any great distance.

My dairy house is 30 ft. long by

14 ft. wide. The first 12 feet are used for the dairy room proper in which is the separator, churn, cream vat and butter worker; and right here I wish to say that the cream vat is one of the best labor saving devices we have on the farm, as with it and ice we can practically control the temperature of the cream, and thus save the labor of churning more than twice a week either in winter or summer. In cold weather we use a small oil stove to warm the cream for churning.

The next six feet of the building is where we keep the packages, scales, refrigerator. The balance, of the building is used for an ice house, a thing that every farmer ought to have if he expects to enjoy good religion while entertaining his city friends during the hot months of summer, although he may feel like using language that is more forcible than elegant, while filling it in winter.

Ice Boxes.

These are a device that we find very handy for us, and would be handy for anyone else who has to draw ice a long distance. Our boxes are made of two inch plank and are 14 ft. long by 2 ft. wide, and one ft. deep, and are put together with clamps. The boxes should be waxed with paraffine wax, and the waxing should be done on a warm day in the fall, before the boxes are set up, and the wax used boiling hot. When cold weather comes, set them up on skids four or five inches high and level; then wash the corners, put in a little water and let it freeze, after which they can be filled. When frozen solid take the boxes off, saw the ice in cakes, and pack it in the ice house. We have frozen ice this way for the past two seasons, but like all other things, to make it successful requires a fair share of attention.

The Milk Pipe.

This is another labor saver with us, as the skim milk and butter milk all runs through it from the dairy house to the hog house, a distance of 140 ft., and I find by a little figuring that to carry the amount of milk that passes through that pipe each year by hand, we would have to walk a distance of 50 to 60 miles to accomplish the task.

Power.

The tread power is the cheapest and handiest power that I know anything about, for churning, separating milk, or pumping water. If located in a convenient place and well housed, it is always ready for use, and seldom needs repairing.

The Water System.

On every farm the water system should be such that it will require as little time as possible to water stock. Some farmers do not seem to realize the amount of valuable time lost in watering stock, work horses in particular, where they have to lead them through gates or bars, or long distances to drink. They seem to think that the drinking tank has to be lower than the pump, and the result is that the tank is placed in some low place where the rains or the leakage from the tank keeps a continuous mud hole for the stock to stand in while drinking. But in these days of windmills and force pumps the water can be forced to almost any desired elevation so that it is unnecessary to have the drinking tank in the lowest place in the yard.

With us the water is pumped by horse power into a large cemented reservoir, and is piped 160 ft. from there to the drinking tank. The drinking tank is small, holding only about enough for one drink for

the stock the farm carries. The supply is regulated by a float in the drinking tank. When the stock drink, the float lowers and opens the valve; as the tank fills up again the float rises, the valve closes, and stops the supply. By this system our stock always have pure water, as water in a well covered cemented reservoir will not get foul, and the small tank is easily kept clean.

the device which consists of a 5-8 iron rod the desired length, the manure box, and a post set in the yard. The rod has a thread cut on each end, and is drawn tight with a large nut or burr. One end of the rod passes through the post in the yard, the other through the sill on the opposite side of the barn. A small notch cut in the sill over the door for the end to fit in will allow

Manure Carriers and Tracks.

Feed Bins.

These should be situated so as to save all unnecessary steps in feeding stock. Ours are on the floor above and the feed runs through a spout to a small covered box below where it is very handy to get.

Cleaning Stables.

This is perhaps the hardest and most disliked of any part of the dairy business. I have constructed a very simple device for the purpose, which comes the nearest to being an easy way to handle manure that I have seen.

The illustration on this page shows the door to shut, and the weight of the box will cause the rod to sag enough to let the carrier pass in and out. The cut shows one box right side up and held so by a spring at the end. The box is run in the barn loaded a little heavier on one side, then pushed out, and can be dumped on a low wagon or sled by pulling the spring out of the slot, as shown by the other box in the illustration.

This is a very handy device for the farmer, who like me has not room enough to drive a team through his barn, and since I have had this method, I have more than once been glad that my barn was built as it is.

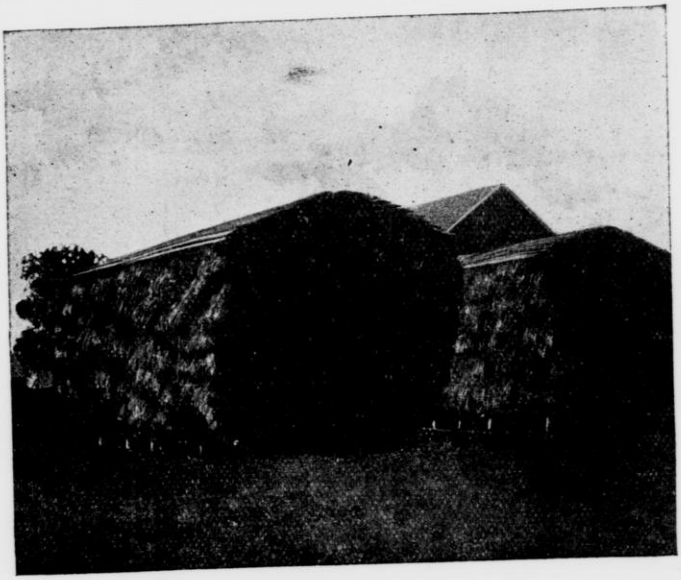
Feed Cutters.

Although not absolutely necessary these are handy things to have, if we have suitable powers to run them. But they should be in some convenient place, and always ready for use. The men who own them and lay them aside, are generally those who have to set them up every time they use them. The extension table should be attached to the side of the hopper, instead of at the end as most people have it. If attached to the side, the feeder does not have to reach so far for the fodder and can feed the machine more evenly and with less labor.

Stack Yards.

Every farmer should have a stack yard in which to stack his grain. A few posts and a little barbed wire will make a yard that will last for years, and can be used for other purposes, and when the stacking is done he does not have to spend valuable time putting up temporary fences to protect them.

The illustration on this page shows our stacks set up on posts 20 inches high, to keep out the rats and mice. They are covered with boards held in place with stack chains. These chains are very handy things to have as it requires no nails to hold a roof on a stack when they are used. The stacks shown in the illustration contain 30 acres of oats and ten acres of barley, and are to be fed out unthreshed. Any one will readily see how much better it is to put grain up in this manner than to put it in the barn for rats and mice to destroy.



Covered Grain Stacks.

Handy Wagons.

They are advertised in nearly every farm paper, and they are what we all need. As there are a great many farmers like myself, too poor to buy everything, I will tell them

how I made two handy wagons at a cost of $6 apiece.

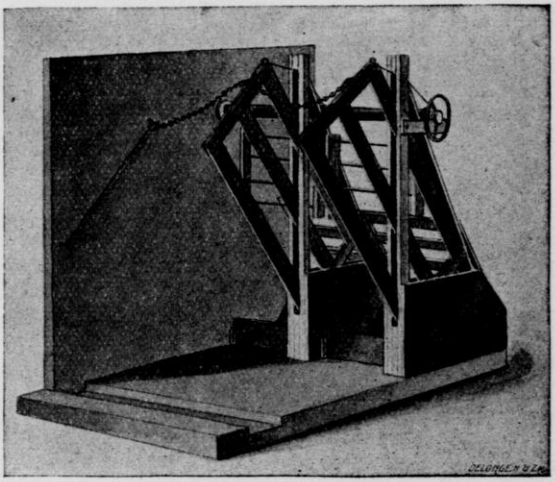
The front wheels are old mower wheels, and the hind wheels are old self binding harvester wheels. The axles are 1 1-2 steel rods clamped to a 4 x 5 inch stick hewn from a white oak log; the bolsters are also white oak. The tongue is an old harvester tongue and cost 50 cents. The steel axles cost $2.25 per set, and the harvester wheels from 50 cents to a dollar apiece. The mower wheels cost from 25 to 30 cents apiece, and are so cheap that if we break one another will not cost any more than to have a tire set on a wooden wheel. For all kinds of farm work these wagons of mine are as good as a $50 wagon.

Tenant Houses.

They are handy things that are not as numerous as they ought to be among farmers. Since building ours eight years ago, and hiring married men, we have had steadier and better help than ever before. When the man's day's work is done he has a home to go to, and he goes to it, which makes a great deal less work for our folks. I am satisfied that the money invested in our tenant house pays the biggest interest of any money we ever invested.

Cow Stalls.

The key to success in the dairy business lies in keeping the cows comfortable, and to this end I have constructed what Supt. McKerrow calls the "drop stall." The illustration on this page shows the stalls raised up, and as they are not to be patented, I hope, with the aid of the illustrations to explain them so fully that anyone wishing to put them in can do so without any trouble.



Thorp's Cow Stall.

The slotted posts are made of 2 x 4's, by nailing the ends together with a short piece of 2 x 4 between, and should be at least 7 1-2 ft. long, or from floor to joist above. The slanting piece in front is 2 x 6 and joins the post 7 ft. from the floor. The partitions are

made of common boards and are 5 ft. 8 inches long, 30 inches high, and project nine inches over the drop. The floor space from post to drop is 4 ft. 4 inches, and from manger to drop is 4 ft. 4 inches to 5 ft., according to the length of the cow.

The manger is made by nailing on four cleats, two on each side, and dropping in a piece of 2 x 10 inch plank next to the cow's feet, and as the other side of the manger should be higher, we used three pieces of 10 inch boards cleated together and dropped in between the cleats the same as the other. This makes a manger that is easily washed out, as both parts can be lifted out in a moment. The partitions are raised by means of the long windlass or roller above the cows' heads. We have eight in a row and could easily raise as many more. We use sash cord to raise ours, and run it over sash cord pulleys. We first bore a hole through the slanting 2 x 6, and nail the pulley over the hole so that the cord will not wear out. We have snaps on the end of the cord so that we can unsnap them and leave a cow in, if necessary, or if we wish to turn out one cow we unhook the chain behind and back her out; otherwise they are all let out at once.

The partitions being made of one inch stuff and the slot in the post being two inches wide gives plenty of room for the partition to swing without breaking anything. When milking, we unhook the chain behind and have plenty of room.

This illustration represents two stalls next to the side of the barn, and the iron rod on the side of the barn shows how the chain will pass up and down and not have to be unhooked.

The distance from the bottom of the slotted post to the bottom of the slanting 2 x 6 is 4 1-2 ft., and side of manger, 2 1-2 ft. high. The partitions are from 12 to 14 inches from the floor, and there is a loft through the lower front corner to keep them in place.

DISCUSSION.

Question—Are you going to get a patent on that stall?

Mr. Thorp—No, sir, there will never be a patent on it.

Question—What does it cost to put in those stalls?

Mr. Thorp—Each stall will cost about $1.25 providing you are man enough to put it in yourself.

Question—Does it prevent somebody else putting a patent on it?

Mr. Thorp—No, not if they are mean enough.

Question—Do you think they are handier than the Bidwell stall?

Mr. Thorp—The Bidwell stall is a good one, but of course I think mine is a better one as it takes less material, and does away with the post at the rear end of the partition, which I think is a decided improvement.

Question—Suppose you want to keep one or two cows in?

Mr. Thorp—The ropes we use to raise the partitions are sash cord, and we have a snap at one end, so if we wish to leave a cow in we unsnap them and leave her stall down.

Question—Cannot a cow rack those back and forth and break them?

Mr. Thorp—Ours never have, and we have used them since September, 1896. We have a chain across the alleyway and hook it to the side of the barn when we leave at night.

Mr. Everett—We know there have been very great improvements made in the machinery used in the cotton mills at Lowell, Mass., and the improvements in every case have been suggested by the workmen. I ap-

prehend that the improvements that Friend Thorp has advanced here have been suggested to him by men who have worked for him while he was absent at the Institutes.

Mr. Thorp—Well, you needn't tell everybody.

Question—Does the milk stay in the pipe that you run to the hog house?

Mr. Thorp—Yes, it does.

Mr. Goodrich—What sized pipe do you use?

Mr. Thorp—We have one and 1-2 inch pipe.

Mr. Goodrich—Isn't there danger of its getting clogged up, and the milk getting sour?

Mr. Thorp—No, I have a small pump that screws on the top of the pipe and when it begins to clog, we pump out the milk and pour in a boiler full of boiling hot water; we pump that through and it cleans it.

Question—Do you clean out behind two rows of cows with that same car?

Mr. Thorp—Yes, the two rows stand tails together.

Mr. Goodrich—There are a great many, I find lately, who advise the use of the gasoline engine for power, and they claim that they like it better than the tread power. Do you know anything about it, Mr. Thorp?

Mr. Thorp—I never have used one. I have seen several men who use them, but I never could afford to buy one while I had a horse in the barn that could do the work. They cost about $150 to $200, such as I would want. The horse power cost me $35, and I have used it six or seven years. We always have a horse, and we find it very convenient—never have to fire up. I think it is the cheapest power for a farmer to have.

Mr. Taylor—I have had a gasoline engine and also horses on the farm. I like the gasoline engine far better than anything I have ever tried, and it is very economical. It is always ready to start. You simply start a wheel and the machine goes right off, and does its work. It does not back or kick, and requires no hollooing or whistling. It costs about two cents an hour to feed it.

Question—Where do you keep it?

Mr. Taylor—We have it in the engine house close by the creamery. That does the power work on the farm. I can get along now with one team less on the farm than I could before I bought this engine because it does all my grinding, runs the ensilage cutter summer and winter, does the churning, and does the pumping when the wind doesn't blow; it is a very convenient machine. Mine is a five horse power and it can be purchased at different prices from different manufacturers, at from $200 to $300. There is close competition and if you want to place an engine on your farm, the agents will be around to see you. The engine house didn't cost me anything because it was already there, and had been used for a stripping room on a tobacco farm, but that need not be an expensive building.

Mr. Thorp—You have to build a building for a horse power if you want it right.

The Chairman—Is that a strong enough engine to cut ensilage?

Mr. Taylor—Yes, I have a twelve-inch Smalley ensilage cutter and it runs that as fast as we can feed it.

Question—Is a gasoline engine safe in the barn?

Mr. Taylor—Yes, there is no fire about it. The gasoline is outside in the ground and it is pumped up; what is not used runs back into the tank.

Mr. Root—Wouldn't it require more whistling to buy a gasoline

engine than a horse at the present time?

Mr. Taylor—That is a question that I have studied very, very carefully; I have taken a multitude of counsel upon it and in a multitude of counsel there is safety. I concluded it was economy for me to buy the gasoline engine.

Mr. Thorp—I am satisfied by what I have heard that the gasoline engine is all right if we can afford to have it.

Mr. Convey—How do you build your ice house?

Mr. Thorp—An ice house is very easily built. If I were going to build again, I should build with 2 x 4 studs and board them inside and out, then put on paper and board again inside and out. Then on the inside I would paper it again. I would take parchment building paper and put it on the same as I would put it on a dwelling, with the exception of the paste. I would tack a lath on top of every sheet and then put lath up and down the seams. That paper will protect the wood from decay. When I filled it I would do the same as I do now. I take out the sawdust and let the ground freeze hard. When I got the first tier in I would put water on that and make it one solid cake of ice in the bottom; that prevents air from coming up to the ice above. Then I would have my ice cut in even sized cakes and put them in not too close together. I found that it is a mistake to pack them close together. I leave a little space between each cake that I pack full of dry snow; then put on another tier of ice and again fill the crevices with dry snow, and my ice keeps all right. I set it about four to six inches from the outside wall and pack sawdust around the outside, and then put six or eight inches of sawdust on top.

Mr. Goodrich—Do you have to paraffine your ice boxes every time they are filled?

Mr. Thorp—Just in the corners. When I first paraffine them I do it on a warm day, and the wax should be used boiling hot, so that it will last a number of years. It will penetrate the wood if it is put on hot. Then when we set the boxes up we have to paraffine the corners every time.

Question—Do you pack your ice flat or edgewise?

Mr. Thorp—Flat. I break joints as a general thing. Sometimes if there is a space continued from the top to the bottom, it will widen out and melt very fast.

Mr. Monrad—Some farmers would not like your water plant on account of its being underground.

Mr. Thorp—If I had not elevation enough I would build a reservoir above ground and cover it with earth.

Question—Why isn't a large water tank just as good?

Mr. Thorp—The water gets foul very quickly in a tank open to the air. In a large reservoir that is covered up, it never gets foul.

Question—Did you ever put lime in it to keep it from getting green?

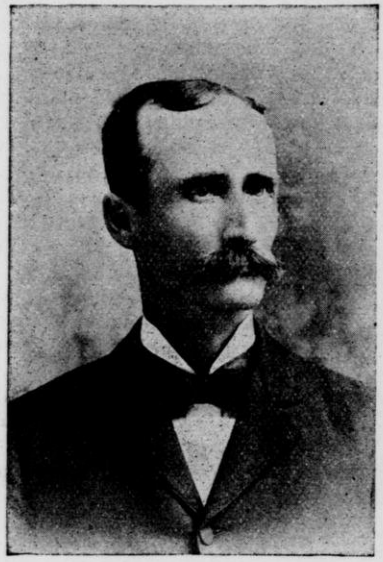
Mr. Thorp—No, I never have, because I have a very small tank and if I want to clean it out it is no trouble to do it.

Mr. Taylor—What kept me from buying a stationary engine for a number of years I might say, was that I wanted the power at several different places. I sent down to various business houses and told them to send one of their men up to look over the plant. They said it was a very easy matter, they would put a rope pulley upon the main shaft in the engine room, that is, just simply a grooved wheel, and they could transmit this power 100 feet or 200 feet away with a three-

quarter inch rope, and it run very nicely. I think we got 200 feet of three-quarter inch rope, only costing $3. In that way you can transmit from one building to another. You have new rope for the different lengths.

THE CO-OPERATIVE CREAMERY.

JOHN IMRIE, Misha Mokwa, Wis.



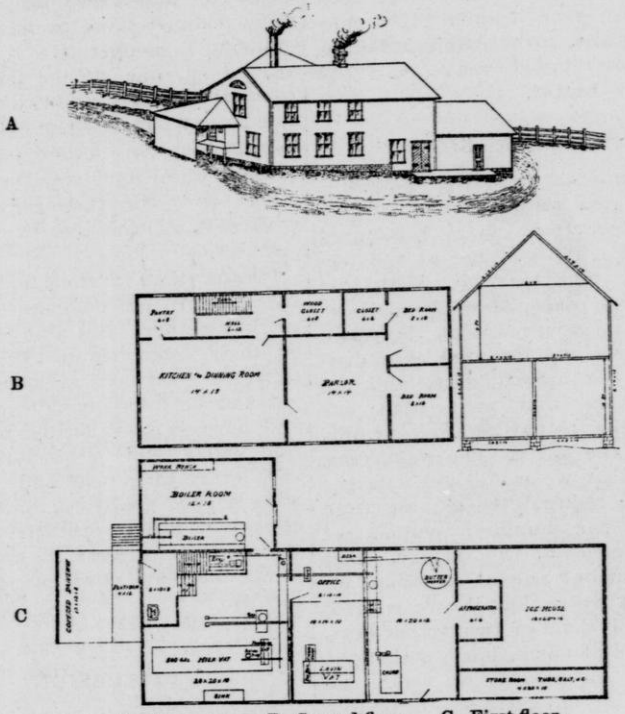
JOHN IMRIE.

Mr. Chairman, Ladies and Gentlemen:—Since dairying has become such an important industry to the farmers of Wisconsin, it seems to me that the most important thing to be considered, after we have, by careful selection and breeding, obtained the best machines that we possibly can under our circumstances, for changing the food growth upon the farm into milk, is some method by which we can reduce the cost of making a pound of butter to the minimum. Now, along this line comes in the co-operative creamery. Instead of each farmer who keeps cows investing a certain amount of money in buildings and machinery necessary to produce good butter, we propose by this co-operative plan, to make one plant, one building, one set of machinery, and one butter maker do the work of from fifty to one hundred of those dairy farmers, thereby thinking that we can economize in time, labor, and in dollars and cents. We find nearly all of those engaged in other branches of business combining, forming corporations and trusts, for their own mutual benefit and self interest. Then why should not we farmers wake up along this line and try to co-operate together so that we can produce butter at a cheaper cost per pound than it generally costs the average dairyman to produce it.

Organizing—Officers—Building.

I am going to speak of the manner of co-operating and of organizing. We called a meeting representing the number of cows tributary to the creamery and estimated about what it would cost to build a creamery. We voted to build one, and voted to

sell what we considered a sufficient number of shares of stock to put it up, according to the plans that we exhibited, large enough to accommodate all the milk that we could naturally expect would be delivered at the creamery. We elected a board of seven directors, one of whom should be president of the company, and one for a general manager and secretary; we also elected a treasurer, who, according to our by-laws, may or may not be one of the board of directors. We drew up a set of by-laws to govern the organization, and we made it a point in our manner of building the creamery, that we should endeavor to do all the business that we possibly could in the way of putting up the building and in putting in the machinery ourselves, thinking that we could save money by so doing. We bought the machinery and the material for putting up the building instead of letting the job to a creamery supply house, or jobber, contracting to put up the whole plant for a certain amount of money, as some others in our locality did. I have in my mind one plant within a few miles of us that was built in this way at a cost of $3,800.



A Creamery. B Second floor. C First floor.

Our Creamery.

I have with me here a small plan and a cut of the creamery, which will give you some idea of the plant. The main building is 42 x 20 feet, 18 foot posts, with an ice house addition twenty feet square and ten feet high; the boiler room is 12 x 18 x 10. The upstairs is finished for living rooms for the butter maker,

with kitchen and dining room 14 x 19; pantry, 6 x 8; hall about 12 feet; parlor, 14 x 14, woodroom, 6 x 8; two bedrooms, 8 x 10. The cost of that building was $2,200, furnished complete with everything in it, and we got the best machinery that we could obtain; that is $1,600 less than this creamery that was built by the supply house, and we have a far better building, and far better machinery than they have, and they have been obliged this year to add $1,200 more to their plant, to have things handy, so that they could make a good quality of butter.

Our Financial Status.

Our manner of operating is this:—The first year we deducted five cents a hundred from every hundred pounds of milk delivered at the factory as a sinking fund. With this we paid insurance, taxes, general repairs and improvements on the plant. The balance was declared as a dividend to the stockholders, and we were able the first year with our small intake, to pay 10 per cent. dividend on the stock. The next year, realizing that we would get a larger intake, we reduced the sinking fund to 4 cents per hundred pounds of milk delivered at the factory. Last Saturday at our annual meeting, we found that we could, if we wished, declare a dividend of twenty per cent. on the capital stock, but we thought that in all probability we would be obliged to buy an extra separator this summer, so we left a little over $200 in the treasury towards buying a separator if it was deemed necessary, consequently we decided to declare a dividend of twelve per cent. on the capital stock, thinking that that was doing very well during these hard times. I think that next year in all probability we will reduce the sinking fund to three cents per hundred, because we are increasing all the time.

Delivering the Milk.

We have formed what we call "Milk routes," but we allow every patron who wishes to haul his own milk, to do so. Those who send their milk by the milk wagon we charge ten cents per hundred for drawing the milk both ways. We have been very well satisfied with the operation of the creamery, so well so that those who are living some distance from us have been organizing co-operative creameries around us; one started last summer when they saw that we did well and could pay more per pound each month than any other factory that I know of in our country, and another one is starting this spring, with still another one a little farther off.

I know that in some localities the farmers will not co-operate—will not work together, but this we take to be their own fault. If they will put in a good man as general manager and have full confidence in him, and have a good butter maker, one who will attend to his business and keep everything neat and clean, and make a good quality of butter, I cannot see why a co-operative creamery cannot be a success in any locality where there are cows enough to support it.

DISCUSSION.

Question—What do you charge for making butter?

Mr. Imrie—We don't make it that way. We simply take the expenditures from the gross receipts and divide the balance among the patrons, according to the butter fat.

Mr. Goodrich—What does it cost you a pound to make it?

Mr. Imrie—I have an average of the work for a year, the first year, It cost 1 3-4 cents per pound to manufacture that butter, that is, ex-

penses and delivering it at our station, Durand.

Question—What do you charge those who have not stock in your company?

Mr. Imrie—Just the same as the stockholders.

Question—Then they have an advantage over those that are in the company.

Mr. Imrie—They get nothing back from the sinking fund, remember, if they haven't any stock.

The Chairman—The stockholder has no advantage except the interest on the investment.

Question—Where does the 12 per cent. come from?

Mr. Imrie—From this sinking fund.

Question—What do you pay per hundred for milk?

Mr. Imrie—If we are getting 20 cents a pound on a test of four per cent. that will bring 80 cents a hundred.

Question—What did the patrons get per hundred last year?

Mr. Imrie—Somewhere about 58 or 60 cents the year around. You see part of the time we got 21 1-2 cents a pound for this butter fat, and as a general thing it tested about 4 per cent. right through. We had a little less than that price in the summer time, but we got so much more of an intake that it cost us less to the pound.

Question—How much skim milk did the patrons get back out of a hundred pounds?

Mr. Imrie—We have a rule to measure that by; I couldn't say exactly. They get a certain amount and it comes out almost exactly correct; they get it all back.

Question—What do you pay your manager?

Mr. Imrie—This year we voted to pay him $75 a year, and I tell you he earns it.

Question—What do you pay your butter maker?

Mr. Imrie—Fifty dollars when we are not getting a larger intake than 5,500 pounds a day. As soon as it reaches above that we allow him $12 a month more, and that will pay for a boy to help in the creamery.

Mr. Thorp—How many dissatisfied patrons have you?

Mr. Imrie—We have not one. The first year we sometimes heard a word of fault-finding, here and there, but our general manager had lots of patience, and he would invite them right to his place to examine the books that were open to everybody. He took a great deal of pains in explaining to the patrons the workings of this factory, and now the fault-finding has stopped.

Question—What would your advice be in regard to running a creamery; would it be to run it on the co-operative plan, or the individual?

Mr. Imrie—Well, of course I may be a little partial. We have tried both ways, but we found this out, that no matter what private creamery we sent our milk to, we farmers had to pay for the hauling, and for the making to the butter maker, for the transportation of the butter to market, and for the use of some man's brain for doing our own business for us. We made up our mind that if there was anything in it, any profit, we would try to get it, and if there was any loss we would try to be men enough to stand it.

Question—What is the average price for making butter in your part of the state, Mr. Chairman?

The Chairman—About four cents; that pays for the transportation and shrinkage.

THE CHEESE FACTORY.

JOHN W. DECKER, Cheese Instructor, Agricultural College, Madison, Wis.

As I come before you today, the cheese business is in the most flourishing condition that it has been in for a number of years. Our state is particularly adapted to cheese production, and it and New York state make the great bulk of cheese produced in the entire country. You who have seen the numerous factories may wonder where it all goes to. That is easily seen when we remember that our southern states, the great west, and the mining regions north of us produce no cheese to speak of, and that the United Kingdom has a lot of hungry people who do not produce as much cheese as they can eat. Great Britain consumes about 240,000 tons of cheese a year, of which 60 per cent. or about 150,000 tons is produced at home. The rest of it comes mainly from Canada, United States and Holland.

Canada Leads Us—Why?

Our home trade is what we should cater to first, and we find that we must have a pretty firm, solid cheese to stand the hot climate of the southern states, and fortunately England wants about the same kind of cheese, and we can send our surplus there. In fact we want all the English trade we can get, but Canada has rather got the start of us.

In the accompanying chart it will be noticed that from 1884 to 1890 the United States led Canada in the amount of exports of cheese to Great Britain. We find that the next year Canada topped us, and you will notice that the annual supply from the United States was about on an average up to 1892, and from that time there has been a rapid decrease, while, at the same time, the supply of cheese from Canada has run up, and from 1886 there has been an increase over the year before, every year, in the amount of cheese sent from Canada to Great Britain. Now, the cause of the great drop was the filled cheese sent from this country. They discovered that the stuff was coming from the United States, and they preferred to buy from Canada where they could get what they wanted. We were getting too sharp. Canada has had a rapid increase, so that in 1894 she supplied double the amount of cheese that we did. Canada supplies, perhaps, an evener grade of cheese, and on the average, a better quality than we do. I believe that we can make just as good cheese as Canada, in fact we do, but we make it in smaller lots, and our cheese is not as even in quality.

Too Many Small Factories.

Now, let us look and see what the cause of the difference in quality of the cheese is. In 1890 I visited the factories of western Ontario where the very best of the Canadian cheese comes from, and I found that they had large factories that handled from 20,000 to 30,000 pounds of milk a day; the smallest factory that I visited was getting 5,200 pounds daily, which we would consider a large factory in this state, and would probably come to the conclusion that the maker is making too much money and that we had better start another factory. This has been the principle upon which we have worked, and the result has

been that a great many small factories have been started. In Canada they make up 20,000 to 30,000 pounds of milk a day; they keep their cheese so that they ship a month's make at a time, and there will be one or two carloads of cheese going out, and cheese that is uniform; not only is it all the same from the same factory, but it is the same from the next factory, built. The whey does not go back in the milk cans. At most of these factories it is left and fed to hogs, that are kept in barns a suitable distance from the factory, and it is fed sweet, so that they get the full feeding value of the whey and the cans are not contaminated.

Poor Makers—Dirty Factories.

Now, let us look at our own fac-

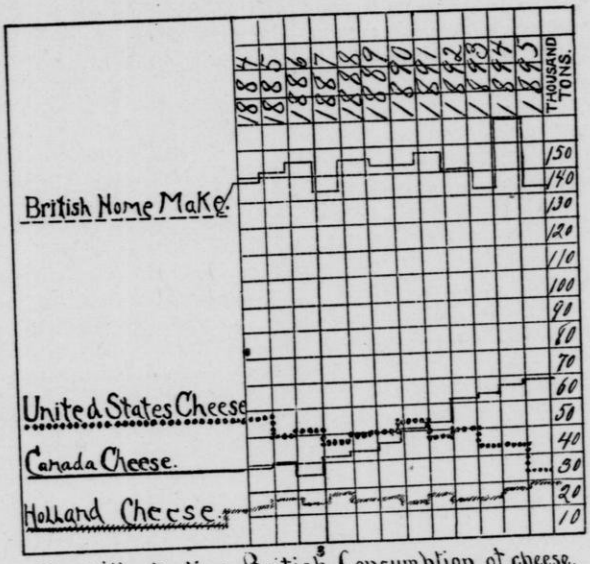
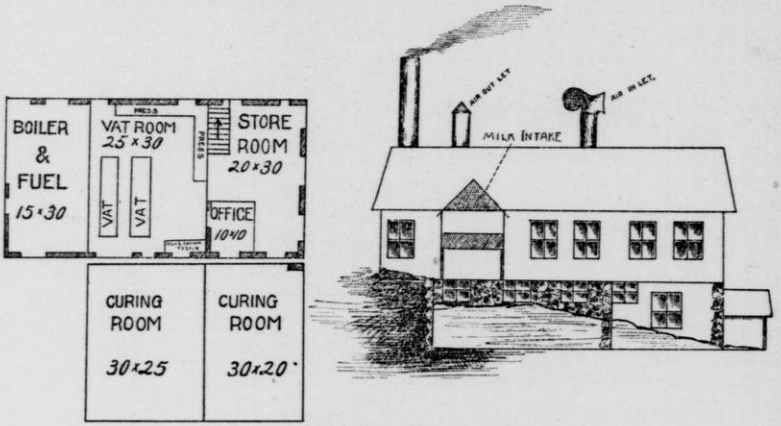


Chart illustrating British Consumption of cheese. showing home make & the exports from U.S. Canada. & Holland in thousands of tons for the years 1884 to 1895 inclusive. Weddel & Cas figures used as a basis

and the result is that they have large quantities of cheese that is just alike, and when it goes to England and the consumer gets a piece that he likes, he knows he can go back to the dealer and get more just like it. The factories in Canada are better built and equipped. A model factory costs $5,500 or $6,000 such as the Tavistock factory; the Blue Vale factory cost $3,800, and these two factories have been models after which other factories have been tories in this state. They are almost all small factories. The object has been to cut down the price for making, and many times the makers could not afford to make for a certain amount, and where they have refused to come down, the farmers have built factories to run in opposition to them. They have hired a cheese maker who has worked maybe two or three weeks or possibly a season, because he will work for less money; they take him for this

reason and regardless of what he knows of the business, and the result is that we have a lot of poor makers and small factories where they receive small quantities of milk. We might combine two or three such factories into one and one good maker could do the work and the cost would be less to everybody in the end. The factories are also poorly-equipped—little shanties, costing from $200 to $500, with poor machinery, many with heater vats. In the factory it is necessary to have steam to scald out the utensils; it is necessary to have scalding hot water to get things thoroughly cleaned up, and with the heater vat you cannot get water that is hot enough for that though it may be hot enough to heat up the milk, and the consequence is that things get very dirty. In the southwestern portion of the state there is not a heater vat known, and it may be said that in Richland and Iowa counties they have the start of this section of the state. As a general thing they have a better class of factories and makers and the work of the instructors there has been telling, for the factory men have been insisting on having the services of the instructors and they have been securing a more uniform quality of cheese than has been produced in this portion of the state.

To make first class cheese it is necessary to cure it at a temperature of about 65 degrees. But in the common curing rooms which are about like dry goods boxes, the temperature often runs up to 90 degrees, and though cheese is well made in the first place, it may be spoiled in that hot temperature.



Plan of cheese factory.

A Model Cheese Factory.

People have asked me how I would build a factory, and how much it would cost. I have here an illustration that will suggest how to build a factory, and I think it can be put up for about $1,200.

If possible I would build it into the side of a hill, for two reasons: First to get a cellar curing room in which an even temperature can be held, and second, to secure an elevated whey tank without it being necessary to elevate the whey. I would build a basement with two rooms for curing cheese. One room can be kept fairly dry for the new

cheese. New cheese ought to dry on the outside for a few days until a good rind is formed and then they may go into a room containing a more humid atmosphere where they will dry out less; in fact they will cure better. One reason why our people complain that the cheese is too dry is that the makers have to make the cheese firmer to stand the hot curing rooms and the cheese is dried still more in such rooms.

The building above the ground can be built fifteen feet longer to accommodate a boiler room at the end right on the ground, as it will be necessary to get a foundation in the ground for the boiler. The rest of the building above ground can be divided into a making room and a store room for supplies. The floor of the making room should be well supported from below to stand the heavy weight upon it. It should also be double thickness with tar or something similar between, to prevent water running through. It must also be remembered that the insulation from the warmer rooms above must be secured for the curing rooms. Of course it is understood without much emphasis that the inside of the building should be properly ceiled and painted.

Ventilation of Curing Rooms.

For ventilation of the curing rooms I would run two galvanized iron pipes one foot in diameter through the roof, one for an inlet of air and the other for an outlet. On top of the inlet I would have a funnel with a vein to it so that it could always swing on a pivot toward the wind. The air would then flow down the funnel into the room below and the air in the room would be forced out of the other tube. For times when there is little air moving a steam jet may be inserted into the outlet. A small jet of steam escaping will cause a surprisingly strong current of air that will make a partial vacuum in the curing room and of course air will rush in through the inlet.

The Sub-Earth Duct System.

For buildings that cannot be built on a side hill I would recommend a sub-earth duct for ventilation. The ground is warmed in summer and cooled in winter down to a depth of about ten feet. To secure an even low temperature we must go down ten or twelve feet. Air drawn through a long tube laid in the ground at that depth will be cooled and a curing room built above ground but well insulated can be kept at a temperature of 60 to 65 degrees Fahr. There are three important points that must be observed in securing a good sub-earth duct: First, depth in the ground—the first ducts were not put in low enough to cool the air. Second, surface of duct in proportion to size of room—the air is cooled by coming in contact with the walls of the duct; the first ducts were too small in diameter and not long enough; the air must pass along slowly. Third, the curing room must be properly insulated from outside temperatures. The approved plan up to date is to dig a trench ten feet deep and one hundred to two hundred feet long, and lay down about ten rows of six inch drain tile. A brick chamber is built up to the ground at each end, and the earth filled in. One of the brick chambers is connected with the curing room, while on the other one is erected a wooden tube not less than twelve inches in diameter and fifty feet high (at least higher than surrounding objects). On the top of this long tube is a funnel as described before, that always faces the wind. An air outlet is placed in the top of the curing room. The wind blows down the tube, passes slowly

along the tile, where it is cooled, and then enters the cooling room. The warm air of the room passes out of the outlet at the top. The curing rooms owned by Phil. Kasper, at Nicholson, Wis., and W. P. Hamm, Kohlsville, Wis., are ventilated in this way, and are easily kept at 63 to 66 degrees, in the hottest weather. The patrons do the digging and pay for the tile, etc., and the cost is from one hundred to two hundred dollars. Such a duct in a cellar cooling room would be a good thing. The patrons are paid for their trouble and expense not only in better cheese, but more of it, as the cheese not only do not dry out so much, but it is not necessary to make them so hard.

DISCUSSION.

Mr. Nelson—What do you think of this lactic ferment?

Mr. Decker—Our cheddar cheese that we make is an acid cheese, that is we have to develop the souring of the milk to a certain point. This is caused by certain germs that get into the milk, in fact all the changes in milk are caused by different classes of germs that get into the milk. The most common fermentation is the souring of the milk where it thickens. This lactic ferment is a certain germ that is put into the milk; cultures are put into a little milk and a starter made. By putting this into the milk we can secure the proper ripening. I believe it is a good thing where we are getting bad milk.

A Member—Can't we get a uniform cheese by having lots of cheese factories, if the factories cooperate and get one uniform way of making it?

Mr. Decker—I do not think you can get as even. Of course it is better to have instructors going from one factory to another and keeping the makers in the right line, but I think it is a mistake to build too small factories. We certainly have as much milk as they have in Canada and I believe that our disadvantage is in having too many small factories.

Mr. Nelson—How far ought milk to be carried from the farm?

Mr. Decker—Oh, four or five miles. It is better to have milk haulers than for each patron to take the time to haul his own milk. One man can do the hauling of the milk for eight or ten patrons, and the patron saves his own time and also the time of his team and does not have to keep a milk wagon.

Question—Does rich milk make more cheese than poor milk?

Mr. Decker—Yes, it does. It does not increase the yield in proportion to the amount of fat, but it makes a richer cheese. For instance, three per cent. milk will make cheese that contains about 29 per cent. of fat. Milk that is 4 per cent. will make cheese containing about 38 per cent. of fat, and 38 per cent. of fat cheese will bring a higher price on the market, and you can figure it right back to the fat content of the milk.

Question—Is the Babcock test the right way to pay for cheese?

Mr. Decker—Yes, sir, it is.

Mr. Hoffman—Our cheese men try to make us believe that that rich milk isn't worth as much for cheese as poor milk, and they therefore want to buy our richer milk cheaper.

Mr. Decker—For any kind of cheese the more fat there is the more cheese and the better cheese it makes.

A Member—Can't you get the water hot enough with heater vats to clean the utensils.

Mr. Decker—They do not do it; it ought to be boiling hot. You cannot kill those worst germs unless you get a very hot temperature.

A Member—Will freezing the milk hurt the cheese?

Mr. Decker—I never find any trouble from that, but there are makers who claim that they have found trouble.

Mr. Root—Is not Canada better adapted to making cheese than Wisconsin is?

Mr. Decker—No, sir, I think we are just as well adapted to it as Canada is.

A Member—I think the same rule applies to fruit growers as to cheese; we all know that they produce better keeping fruit in Canada than they can in portions of Michigan and Wisconsin, and I think that the same rule, in a measure, will apply to cheese making in Wisconsin.

Mr. Decker—The fact is that we do produce just as good cheese, some of it, in Wisconsin, as they do in Canada.

Question—How can we get our cheese marketed without shipping to Chicago and sometimes having it come back?

Mr. Decker—There is a market at Milwaukee where cheese is sold under contract. I am in hopes that is going to meet that difficulty.

Question—Have we obtained any advantage by virtue of the law cutting off the making of filled cheese?

Mr. Decker—Most certainly. The filled cheese was a great injury to the trade and we have gotten higher prices already since the law went into operation; the demand is better.

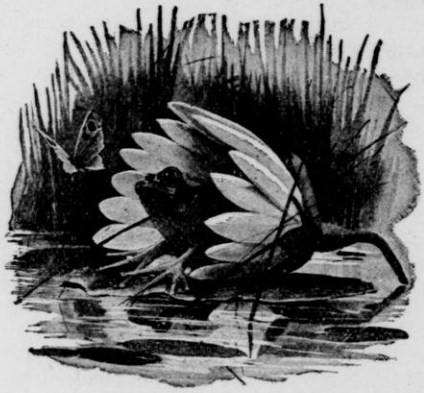
Question—What would you recommend to make cheese in, a vat or a kettle?

Mr. Decker—The vat is used universally for American cheese.

Mr. Nelson—I found last season what I called a kind of abnormal condition of the milk, along about the latter part of June, and I found that in order to get first class cheese, I had to cook the milk to about 110 degrees. What do you think caused that?

Mr. Decker—That is pretty hard to say though I have found it in a few factories. I will say this, that we get a good deal of bad milk from these germs that get in the milk. They produce bad flavors. These germs may be in the milk when it is received in the factory in a dormant condition, but as soon as the milk is warmed up, they begin to grow and it will cause trouble. It has been stated that a cheese maker ought to know when he takes the milk in at the factory, if it is bad, but if these germs are in a dormant state, they cannot be detected until the milk is warmed up. During the past year we have worked out what is known as the "Wisconsin Curd Test." We take a sample of each patron's milk in a pint jar, and we put all of these jars into a tank that has a wire rack to hold the bottles in place, and the tank is closed up tight. We heat the samples up to 98 degrees, put in ten drops of rennet extract and wait until we get a firm curd in the bottom of the bottle; then we leave it at a temperature of about 98 degrees to ferment. In the course of six or eight hours we open up the bottles and in some cases the germs have developed a gas, and if there is gas produced in any one patron's milk, it will show it—the flavor will also be developed. In this way we can trace down the gas or bad flavor. In a brick cheese factory in Dodge county they had considerable trouble with gas last year; one maker had been obliged to leave the factory and two others had had trouble—one of them a student; the milk came in apparently all right, but in about twenty-four hours the gas would begin to be produced and the cheese would huff up, so that they were losing three or four cents a pound on the cheese. These two men had done

their best to find out the difficulty. The student then called on me and asked if I could give any suggestions. I suggested the use of this curd test. They put it into operation, and soon located the trouble in two out of thirteen patrons' milk. They then examined everything carefully to see if they could find any sort of dirt or contamination in the milk. They tried each cow's milk, in fact they made twenty-six tests altogether, and finally located the trouble in three cows' milk; when that was kept out they had no trouble, and the use of the test in that case saved at least three cents a pound on all the cheese made after that. A circular will be issued by the Dairymen's Association along in the early spring which will explain that test.



RESOLUTIONS.

Mr. Culbertson moved the adoption of the following resolution, which was unanimously adopted:

"Resolved, That this largely attended eleventh annual round-up Farmers' Institute do heartily endorse the anti-pool selling bill, introduced into the Wisconsin assembly by the Hon. George Wylie, and do hereby ask for its passage."

Your committee on resolutions hereby submit the following:

Resolved, That we contemplate with pleasure the continuous advancement of public sentiment in regard to the construction of good roads in our state. That we propose to continue to foster this sentiment, and in all proper ways work to the end of having systematic work and permanent stone roads leading to the various business centers in all localities, thus ensuring to every tax payer personal benefits proportionate to the amount of taxes he may pay.

Resolved, That while we believe roads should be under local control, to the end that all that may be benefited, shall in some measure bear a part of the expense, therefore we favor the passage of joint resolution No. 10, A., which contemplates an amendment to section 10, article 8, of the constitution of Wisconsin, allowing state aid in the construction of wagon roads for free public travel.

Resolved, That in the selection of Appleton, one of the most beautiful cities in the state, for this the closing Institute, the superintendent made no mistake, as is manifest by the large attendance, the great enthusiasm, and complete accommodations, and that for the cordial reception and many attentions of its citizens we tender our profound thanks.

Respectfully submitted,

Alex. A. Arnold,
H. A. Briggs,
W. W. Chadwick,
Committee.

LOCAL RESOLUTIONS.

Before this Institute comes to a close, the citizens of this county and especially those of our city desire to express their obligation to those citizens from surrounding counties and neighboring cities who have aided us in securing this annual round up, and who have by their presence and interest here contributed to make it a success.

We also wish at this time to express our appreciation of the work of the conductors of this Institute and of all those who have taken part in its proceedings.

Therefore, Be it resolved that the thanks of our citizens be and hereby are extended to our neighbors who have so aided us; and to the very able corps of conductors of this Institute and those speakers from abroad who have done so much to make this Institute the great success that it is.

COOKING SCHOOL.

Held in Connection With the Eleventh Annual Closing Institute, March, 9, 10, 11, 1897.

Conducted by Mrs. JENNIE A. JAMISON, Neenah, Wis.

FIRST LESSON.

TUESDAY AFTER NOON, MARCH 9.

There is an old saying that the good things of this world are not evenly divided, and I know there is a part of Wisconsin that thinks things are very unevenly divided in regard to cooking schools. Appleton had one last year and another this year, and some of the other cities have been left out entirely. I understand there is considerable fault-finding, but I hope this fault-finding has not been and will not be in Appleton.

This school is conducted, as probably most are aware, in connection with the Farmers' Institute, which is a part of the university work at Madison, and under the same direction. The idea in the minds of those having the planning of the work for the Farmers' Institutes, has been to provide information for the wives and mothers that was especially needed in their line, as they have heretofore provided help for the farmers themselves. The greatest objection, in fact the only serious objection that has been made to this part of the work in connection with the Institutes has been that it takes the wives and mothers from the Institute proper; and there has been some complaint on the part of the men that they could not see the cooking; but perhaps they have not cared so much that they could not see, as that they could not taste the results. But there is no rose without a thorn, and there are some things that must be put up with in the best way possible.

The farmers discuss not only the raising of grains, etc., and the condition and preparation of the soil, but they discuss very largely the raising and feeding of the animals on the farm; and yet, until the last few years nothing has been said about the feeding of the best stock that the farm produces, the farmer's children. So the Institute managers have wisely provided that the women should be gathered together and discuss these questions; and when I say discuss I want you to understand that I am here only as a leader, and not to express to you what I know, excepting in a way in which it may help you; the meeting should be of mutual advantage.

There is no housekeeper of any experience who has given thought to

COOKING SCHOOL AUDIENCE.

the preparation of food, who cannot offer suggestions to another housekeeper who may have had equal experience, and yet not the same. While I am talking from my own standpoint, or from a general standpoint, you are working in the real department, under different conditions, in different parts of the country, with different means and different conveniences, so that I cannot expect to help every one of you in the same degree; but I hope where I fall short some one will make a suggestion or ask a question that will bring out more clearly the knowledge that others possess.

As you know, these cooking lectures will be continued for three afternoons this week, with different recipes for each lecture. Each of the lessons is a bill of fare arranged with three objects in view; first, to present a combination of foods which will give approximately the proper proportion of the different elements necessary for the nutrition of the body; second, to use only such materials as can be had conveniently on the farm; and third, to give some suggestions in regard to economy and using things that may be left over. In the course of the demonstration, if these points are not brought out clearly, I will consider it a great favor if you will ask the why and wherefore, or suggest in what way these points may be developed.

The bill of fare for this afternoon is as follows:

Baked Bean Soup. Croutons.
Celery and Cabbage Salad.
Fried Salt Pork. Fried Apples.
Queen Pudding. Meringue.

White Soup Stock.

I shall begin the work this afternoon, however, with the preparation of a dish that is to be finished tomorrow, because it is to be a stock soup, and you know we cannot make a stock soup in one afternoon. This white soup is to be composed of veal and chicken, and water of course, seasoned with vegetables. In speaking of a stock soup we mean a meat soup that can be kept in stock, on hand, and drawn from as needed, and this white soup is made according to the same principles that regulate the making of any sort of a stock. This being a white stock, we do not brown any of the meat, but brown stock can be made on exactly the same principles, remembering that it is better made of the red meats, as beef. It is also wise to brown some of the meat in making brown stock.

Two pounds knuckle of veal, 3 or 4 pounds fowl, 3 quarts of water, 1 tablespoonful salt, 6 peppercorns, 2 tablespoons each of onion and celery. Wipe the veal and clean the chicken but do not cut it up. Cut the veal in small pieces and put with cold water and salt into a kettle; add also the onion and celery. Heat slowly; when it boils put in the fowl; simmer until the fowl is tender, then remove it, but cook the veal four or five hours. Strain and cool. Next day remove the fat. To each quart of stock add 1 pint of milk or cream, and 2 tablespoonfuls each of butter and flour cooked together. Season with salt and white pepper. A richer soup may be made by omitting half the butter and flour, and pouring the hot soup, when ready to serve, over 2 beaten eggs. The fowl may be used for some other purpose.

In purchasing meat for soup remember that we can use meat that could not be used for some other purposes, and it is not economy to buy the nicest kinds of meat for soup. The best cuts of meat would not make as good soup as some of the poorer, for we get from the bone which we use for the soup, some of the goodness of the bone itself which can only be obtained by the long, slow process of extraction as in soup

making. So we purchase a shank or knuckle bone which also contains gelatine. This helps the food of itself, and also helps in the keeping of the stock. Veal contains more gelatine than beef does, and the stock is very sure to jelly.

Question—Is there any nutriment in gelatine?

Mrs. Jamison—There is supposed to be nourishment in gelatine. There is some dispute about what its action is, and how it is performed in the body, but it is found by experiment that a body can be nourished with less protein matter of other sorts when gelatine is used. It seems to take the place of protein matter for the nourishment of the body, and yet it cannot be found that it actually makes tissue. It is easily digested and for that reason also is valuable, and it is classed with the protein foods.

Meat that is to be used for any purpose should of course be carefully sponged off; even if we know that the butcher is a neat man, we cannot tell how the meat was handled before he got it, and even if handled in the neatest manner it is not as clean as it might be. It should not be put in water to clean it, because in that way it loses much of its nutriment. In using veal for this soup stock our object is to extract all the nutriment we possibly can, and in order to do that we cut the meat so that the juice may come out. The juice is held in the longitudinal fibres in these muscles, and we need to cut the fibres across so that the juice can escape. It is not necessary to cut the meat off the bones; it is best to have them cracked because then the meat will go into the kettle easier, but only cut frequently across the grain of the meat so that the juice may more readily escape. This is to be remembered always when the object is to extract the juice. Where we are to keep the juice in the meat we endeavor not to cut it at all, or very much less, at least.

The second principle in soup making is to put cold water on the meat, for that draws out the juice. Where we wish to retain the nutriment we use boiling water, so that the outside of the meat is seared. The albumen is hardened, and the juices do not so easily escape. In this case we wish to extract all the nutriment of the juice.

This meat is full of tough membrane and not anything that would be pleasant to serve, and is cheap enough so that after we get the nutriment out we can throw it away. It is not extravagant to do that, because we get substantially all of the nutriment out of the meat. If we taste meat that has been cooked in this way there is no flavor in it. If it is to be used for a made over dish you need to add flavor of some sort to it and it has been found by experiment that an animal, a dog, will live but a few days if fed on meat left from soup.

In making this soup the veal and cold water are put together, and the salt added at the start. As we do not wish to get all of the juice out of the chicken, because we wish to use it for another dish, we do not put it in until the water boils, and put it in whole.

I wonder if some of you housekeepers who have no gasoline stove have ever used alcohol to singe a chicken. It does its work without any smoke, which in such a case as this is very desirable. The chicken is to be prepared in a similar way to the meat, carefully washed off. Of course it needs more washing than the meat, on account of having a skin on it, which holds the dirt more, but while some housekeepers think it necessary to plunge a chicken into plenty of water, and others even advise using a little soap in the cleansing, I have found that it is very satisfac-

tory to use only a small amount of water and a cloth with a good deal of hard rubbing. I think the rubding takes the dirt off more than any amount of water.

In drawing the chicken, the nicest way is to loosen all the membranes inside until you reach the heart, and then getting hold of the heart pull everything together, and all will come out without breaking. It is much easier than taking one part out at a time. All the organs will come out except the kidneys and lungs, which lie too closely embedded in the bones to come out with the other parts, but which should always be carefully removed. Of course the inside of the chicken needs very good rinsing and washing out with a cloth. We always want to avoid cutting the meat of the chicken when putting it in water, unless we wish to draw the nutriment out, and we wish only to take enough out in this case to flavor the soup, and yet retain enough to flavor the chicken itself. In dressing a chicken for market it is not essential to make an opening in the breast because the windpipe can be drawn from the end of the neck by loosening the membranes. If the chicken is to be roasted it presents a better appearance if there is no gash in the neck. It is generally better to open the heart because there is often a clot of blood in it; and of course care must be taken not to break the little gall sack near the liver. But it is not easily broken if we understand that it must be looked after and taken out.

I am sometimes asked if chicken fat is useful. It can be used in place of other fats, even in cakes in place of butter, if not entirely, to take the place of part of the butter. It is also very nice for warming over vegetables, for fat for sauces and for greasing tins. It does not burn as readily as butter, and it seems nicer than lard for some things.

In preparing the gizzard for cooking remember that the toughness lies in the little blue membrane which is on the outside, and that can easily be cut off; the gizzard makes a more delicate bit if this skin is carefully removed.

For seasoning this stock add a heaping tablespoonful of salt, six peppercorns, and two tablespoonfuls each of celery and onion. In making a white soup we should take care not to put in anything that will darken it much, and unless the peppercorns are at hand it is wiser to use the white pepper for the appearance, as well as for the better flavor.

Now our soup is well started and will need no special attention except to keep it simmering. It should never boil, but simply simmer. I will allow it to come slowly to a boil, but after the chicken is in only keep it simmering. Meat does not get tender by rapid cooking. It must be kept under rather than over 212 degrees. The nearest approach you can come to it is to let it stand where the water bubbles up only at one side of the kettle.

Question—Do you skim the soup?

Mrs. Jamison—I do not think there is any necessity for skimming unless a clear soup is desired, and then it is almost always clarified with white of egg afterward, so that we might say it is never necessary to skim it. The scum that rises to the top is some of the albumen, and of value to the soup; besides it settles after a while and will disappear to the bottom of the kettle and can be strained out, if desired, with any other parts that are not liquid.

BAKED BEAN SOUP.

Recipe.

Take cold baked beans, add twice the quantity of cold water and let them simmer until soft. When nearly done add half as much tomatoes as beans. Rub through a

strainer or sieve. Season with salt and pepper and dry mustard, if liked. Rub the mustard smooth with the salt before adding to the soup. If tomatoes are not liked they may be omitted and slices of lemon served in the soup. Serve with croutons.

Baked Bean Soup.

For this baked bean soup I shall have to use the canned baked beans, because, of course, I could not prepare and bake the beans to make the soup of, in so short a time. The virtue of this soup is that there always seems to be a surplus of baked beans; they appear on the table, either hot or cold, until the family are tired of the sight of them, and then they have to be thrown away. That is extravagance. It makes no difference how cheap a meal is, it is extravagant to throw it away, and in even so inexpensive a dish as beans we have a great deal of nutriment. We cannot make people eat what they do not want, but sometimes a dish may be prepared in a new way and present such a difference in appearance that it will be partaken of with relish.

The flavor of the baked bean soup is somewhat different from the flavor of the ordinary boiled bean soup, because the beans gain in flavor by baking. These beans I am using were canned with tomato sauce, the tomatoes added for flavor mainly, but they also help in the digestion of the beans. If mustard is added it should be according to the usual proportion of seasoning, that is, one-fourth as much pepper and nearly as much mustard as salt. It is sometimes well to know the particular proportion of things that commonly go together, because it gives us good ideas of how much to put in and saves tasting, though tasting is one of the essentials of good cooking. One of the best definitions of a cook is given by Ruskin:—"To be a good cook means carefulness, inventiveness, watchfulness, willingness and readiness of appliance. It means the economy of your great-grandmothers and the science of modern chemists. It means much tasting and no wasting. It means English thoroughness, French art and Arabian hospitality."

Question—Is frequent tasting unhealthful to the cook?

Mrs. Jamison—I was in conversation a short time ago with a graduate of the Boston cooking school, who made the statement that when she was in the cooking school she was always tasting things, and she said she was never healthier in her life; the reason was that the cooking was all good, and it is the bad cooking that makes people sick. You may take the argument for what it is worth. I think, however, that a cook needs to taste very little, when she once learns the taste of people she is cooking for.

Question—Don't you think that cooking is healthy work?

Mrs. Jamison—Yes, I do. I think in moderation, with other work, cooking is one of the most healthful pursuits a woman can engage in.

Question—Can you use canned tomatoes for this soup?

Mrs. Jamison—Yes, certainly.

The straining of this bean soup renders the beans more wholesome for some people than the baked beans, because we get rid of the smooth coat of the bean in this way, and that is practically indigestible. The smooth coat of any fruit or vegetable is practically indigestible. Of course it does not interfere in any way with the digestible parts and does not cause any inconvenience in a normal, healthy stomach. But where disease is present in the digestive organs, even in a slight way, these smooth skins are better eliminated from the food.

Croutons.

The next thing that I will prepare are the croutons to be served with

the baked bean soup. This is merely an illustration of ways of using stale bread. I shall have to use fresh slices from a whole loaf today, but ordinarily you can use pieces that are left—parts of slices cut into shape nicely. They are nice to serve with soup, to take the place of crackers in a thickened soup, especially cream soups, and of course are more economical and will keep crisp as well as crackers. Stale bread is preferable, and home made bread makes better croutons than the too much raised baker's bread. The crust should be removed and the slices of bread cut into narrow strips and then into even cubes. The crusts can be used afterwards for other purposes, and the croutons present a better appearance if they all look alike. They can be simply cut and browned in the oven or buttered and browned in the oven, or browned in deep fat and in that way used as a garnish for a fancy dish of bird or fish.

There is some training of the eye and of the hand necessary in cutting croutons. It is almost always one of the first lessons given to girls in the cooking school, because of its value in training the eye to the size and shape, and their hand to make the size and shape, and it also gives them an idea of the care necessary in baking, especially when made of stale home made bread, as that browns so much more quickly than baker's bread or fresher bread.

These pieces that I am trimming off I shall use for the Queen pudding which I shall make later in the lesson. Crusts and crumbs of stale bread can be dried and rolled, and used for crumbing articles cooked in deep or in a little fat; anything that is to be fried that needs a coating can be coated with the fine dry crumbs. Muffins and griddle cakes can be made with the addition of bread crumbs in substitution for part of the flour.

Question—How long ought the croutons to bake?

Mrs. Jamison—It depends upon the heat of the oven and what bread they are made of. These need quite a little, because the bread was so very fresh. They should be watched and shaken or turned until a nice even brown. They may be prepared at any time and warmed when wanted for use.

CELERY AND CABBAGE SALAD.

Recipe.

Take equal parts of chopped cabbage and finely cut celery. Make a dressing of one cup of sour cream, one tablespoonful of sugar, one-half teaspoonful of salt, one-half saltspoonful of white pepper, and one tablespoonful of lemon juice. Mix the dressing with the vegetables and garnish with celery leaves.

Celery and Cabbage Salad.

This salad dressing is one that can be conveniently made on a farm because cream is one of the things we suppose the farmer has in abundance though like eggs it does have a cash value. It is a very simple dressing and can be easily prepared. The time of preparation very often counts with the housekeeper, fully as much as the material, because time itself is money.

In making a salad more than almost any other dish we make, the housekeeper has the privilege of using her own judgment and taste, because what we require of a salad dressing depends on the flavor. The salts of the green vegetables and also the fat furnished by the dressing, whether it is cream, butter, or olive oil are the nutrients. Of course the amount of acids and amount of sugar must vary much, because the cream varies in

acidity, and lemons also vary. If you have not lemons you can use vinegar, but it is not so wholesome an acid as lemon juice.

Question—Do you use mustard with your dressing?

Mrs. Jamison—No mustard. It is going out of fashion. I would not recommend it to be used in this cream dressing at all. It does not have an agreeable flavor in this as in oil dressings, but even in those it is often omitted. The salad itself, which in this case is to be composed of cabbage and celery in the proportion of two parts of cabbage to one of celery, should be salted, and you may also pepper it a little if you like the hotter flavor. The celery should always be cut and the cabbage may be either shaved or cut according to taste. The salad should not be mixed until about the time to be served or shortly before; it loses its freshness by standing. I am going to add a little finely chopped onion to this salad. Sometimes I use the onion juice. It requires but very little to flavor the whole salad.

If you do not have sour cream with which to make this salad, the sugar may be omitted and sweet cream used, but it is not so good. The dressing may also be used for other vegetables and vegetable and fruit salads.

FRIED SALT PORK.

Recipe.

Cut the pork in thin slices; dredge with flour; cook in a hot frying pan with a very little fat. Turn often until brown then cook more slowly. Cook 8 or 10 minutes. Take up the pork, add flour to the fat in the pan until thick; then pour milk in gradually until the sauce is of the desired consistency. Cook three minutes; serve in separate dish.

Fried Salt Pork.

The next thing will be salt pork and fried apples. In cooking the pork I do not know that I can suggest anything new, though I can make a suggestion that is, perhaps, a little uncommon, and that is to dip the pork in fine dry bread crumbs instead of flour. I am going to use bread crumbs today instead of flour, which is more commonly used. If we put on a coating, we retain more of the nutriment of the fat. Salt pork is one of the most convenient foods for the reason that it keeps so well, and can be so readily prepared. Care should be used, however, in partaking of it, especially by those who do not get a great deal of outdoor exercise. The farmer himself may eat pork with much less danger of being hurt by it than can his wife and children, and while we do not think that it is necessary to cook different kinds of food for different members of the family, a difference in the diet should certainly be made for those working out of doors, and those working indoors. A person in the house a great deal should not eat pork in so large quantities as one who labors actively in the open air.

The salt pork furnished by the butcher is not always of as good quality as what we get on the farm; or, though it may be of as good a quality of pork it is not put down as carefully. That is one reason, I think, that the pork at a farmer's table always tastes better than any we get in town.

The pork should be cut in very thin slices, and it is sometimes necessary to freshen it. It can be freshened by being put in cold water and brought to a boil. Another nice way to freshen salt pork is to let it lie in skim milk. Some kinds of meat are perfectly wholesome and even better, rare, but pork should always be thoroughly cooked.

Question—Is there any way you can tell whether the pork is too salty or not?

Mrs. Jamison—No, there is no way that I know of; sometimes it shows on the outside; as a rule pork is too salty to use without freshening.

FRIED APPLES.

Recipe.

Wipe the apples but do not pare them unless the skin is tough. Cut in slices across the core. Cook in pork fat or drippings until tender, turning carefully so that the circles do not lose their shape. Use as a garnish for the pork. Or, cut the apples in thin lices around the core and let them cook soft, stirring frequently. Heap in the center of the platter, and lay the slices of pork around.

Fried Apples.

The fried apples I am going to prepare by cutting out the blossom and the stem and cutting each apple into about four slices across the core. They are very pretty for a garnish this way; it takes a little more time but it pays on some occasions, at least. The prettiest way is to put the pork in the center of the platter and the apples on the outside. There is a dietactic reason for serving apples with pork, as the acid helps the digestion of the pork besides giving an agreeable complementary flavor.

Question—What is the object of leaving the core in the apple?

Mrs. Jamison—The slices are apt to break. Of course they would look better if the core were taken out.

QUEEN PUDDING.

Recipe.

Soak 1 pint of bread crumbs in a quart of milk one hour. Add 1-2 cup of sugar, 1 teaspoonful of salt, 1 tablespoonful of butter, and the yelks of 4 eggs. Bake an hour slowly. When done, beat the whites of the eggs stiff, add 4 tablespoonfuls of powdered sugar; spread jam or jelly over the top of the pudding, pile the meringue on top of that, and brown in the oven. Let it dry before browning.

Queen Pudding.

I do not know but I may be accused of deception in giving such a name to bread pudding, though I may plead that it is not original with me. It is called "queen pudding" because it is an extra nice bread pudding. Ordinarily I think bread pudding is made too much by guess. We have some dried bread that must be used some way, because we cannot throw it away, and sometimes we have more bread and less milk, or less bread and more milk; sometimes eggs are plentiful and we use several, sometimes scarce and we use only one. And so we make a pudding that is sometimes eaten and sometimes must be thrown away.

I use the yelks of four eggs for this pudding; the whites are to be used for the meringue. There is another object than economy, however, or at least there is an object of economy in another way than at first appears, in using four eggs in the pudding. If you were to serve the bread pudding with roast beef it would be just as well to omit the eggs, because the meal would contain enough of the muscle making food, but in serving a dinner of salt pork, it is better to increase the number of eggs; it is not extravagant to do so as the eggs supply the muscle making material which the pork lacks. Salt pork is a fuel food, and contains almost no protein or muscle making material, which should, therefore, be added in some other part of the bill of fare.

It is not always economy to save in eggs that furnish so large an amount of nutriment in so desirable a form; without giving the matter very much consideration we are apt to use what we have the most of. In speaking of economy in the use of eggs, I am reminded of one of the standard cook books by a most excellent compiler of recipes, in which I found the statement that tapioca and rice were economical because it took only a very little to make a large pudding. If bulk were all that is necessary, this might be true, but you get no more nutriment from a tablespoonful of rice, even if it is swelled to four or five times that quantity. It does not furnish any different proportion of nutriment after, than before soaking, and while there are housekeepers who have the idea so carelessly expressed by this maker of cook books, because they do not consider the matter enough, it is a grave mistake. The question of economy should be considered more from the nutriment we need and the best way we can get it, than from the actual cost of the ingredients. We know we can get nutritious food at a very low cost, and at the same time food that is well flavored and palatable.

True economy consists in seeing that nothing is wasted, if it be even a little white of egg sometimes left clinging to the shell, and thrown out, where it might be carefully cleaned out with the finger and go into the dish we are cooking. (I am suspicious that these are not all fresh eggs because the white is so very thin.)

In separating eggs, it is quite necessary, if the white is to be beaten light that there should be none of the yelk or any foreign matter allowed in, because it will not beat. It is not always economy to use packed eggs, and in using a cheap quality of butter you are not gaining, but are losing in real value; it is better to substitute some other form of fat than to use butter that is too bad to sell.

It is almost impossible to make anything that will suit every taste, but the taste can be trained to like the things that are wholesome. We can also be trained to eat things not exactly to our taste, and such training is eminently wise, whether we train ourselves or others in that way. The taste can be trained just as early as our hands or eyes. We take pains to train our hands to do the work we are given to do; we train our eyes to see beauty, to discriminate in colors, and we can train our taste just as well for things that are wholesome. It is not necessary to become epicures; it is the part of wisdom to cultivate tastes that call for a wholesome diet.

I would not recommend this queen pudding for dessert after a hearty meal, for the reason that it it so hearty in itself, and so is appropriately served after such a meat as salt pork. Often, probably, we would be better off without any dessert at all, but we have not come to think so yet.

In adding the sugar and salt to this pudding, it is better to put them in apart from the eggs, as the yelks will harden, especially with the sugar, and are apt to produce lumps. If the meringue is not desired with the pudding, the whole of two eggs may be used instead of the yelks of four.

I do not know that it is necessary in a town already furnished with a public cooking school, to explain about cooking school measures. The children, of course, have not trained either their hands, eyes or judgment, and so it is more necessary in their case, to have arbitrary rules for the measurement of materials to be put together. Things put together by guess or without any definite rule, will not uniformly produce good results. The old cook

who has learned by experience how much a tablespoonful is, measures by her eye or judgment, and does not need to use the spoon or cup so much, but by measuring carefully and repeatedly the children learn how much a tablespoonful is, and in that lies one of the strongest arguments for the value of cooking schools. The older housekeepers have had to learn by experience, and sometimes it has been a very sad and hard experience. One of the benefits in many lines to the present generation is that they may learn by rule instead of by experience, and so are saved a great many heartaches and tears that our grandmothers had to endure.

In teaching the children about the measures, we use for a standard the half pint cup, and where we can have the cup divided into thirds and quarters, they are not at a loss to know how to measure any part of a cup. The cup holds sixteen level tablespoonfuls, or eight rounded tablespoonfuls, and so we get our measure of the tablespoonful. The tablespoon holds almost three teaspoonfuls; it is not exact, but it is approximately so, and these measures give material for the following little table which the girls can learn as they do their tables of long measure in the other schools:

4 saltspoonfuls make 1 teaspoonful.
3 teaspoonfuls make 1 tablespoonful (nearly).
8 rounding or 16 level tablespoonfuls make 1 cup.
2 cups make 1 pint.
2 pints make 1 quart.

Meringue.

The last thing that I shall make this afternoon will be the meringue for the pudding, and this is to be made of the whites of four eggs, with four tablespoonfuls of sugar. We can beat eggs light and yet not have them stiff. With the meringue we are more sure of success if the eggs are beaten until dry. They are to be beaten light for plain cakes and muffins, griddle cakes, etc., and stiff for sponge cake or any cake depending upon the lightness of the egg, but should be beaten dry for anything that is to hold its shape as a meringue. That should be beaten light and dry before the sugar is added. One tablespoonful of powdered sugar is added to the white of each egg, and the pudding or pie should have the meringue spread lightly over it after it has cooled a little. I will spread some jam or jelly over the top of the pudding and then put on the meringue. Then set it on the top shelf of the oven until dry. It is generally wiser to leave the oven door open until the meringue is dry, and then close it that it may brown on the top.

"Fuel Foods."

The fuel foods in this lesson are the salt pork, and the cream of the salad dressing. Fuel is furnished to the body by the carbonaceous foods in a manner similar to the way in which heat is produced in a steam engine. The carbon of the food unites with the oxygen taken in through the lungs, producing combustion by a process similar to the combustion of coal or wood, only very much slower. These carbonaceous foods are in two classes. The fats and the carbohydrates, both containing hydrogen and oxygen, the hydrogen and oxygen being in different proportions in the two classes. The fats include the fat of meat, cream, butter, and the vegetable oils, of which olive oil is the chief. The carbohydrates include starch and sugar, sugar being the cane sugar, honey, and the sugar of fruits. The starches include the starchy vegetables, as potatoes, and the cereals, such as rice, corn, wheat and oats. Fuel is also furnished by the protein foods, but as their chief service is to supply

material for repair, it is wiser to reserve the protein foods for that purpose alone, as the heat and energy can be much more economically obtained from the carbonaceous foods. The purpose of these foods is twofold; first, production of heat, and second, of physical and intellectual energy.

While the three classes, fats, starches and sugar, serve the same end, they cannot with equally good results, be substituted one for another. The sugars and fats, though less difficult of digestion than the starches, cannot be used to the exclusion of the starches, as an over supply is liable to produce disease. Sugar needs only to be dissolved to prepare it for absorption into the system. Fat is emulsified, the process taking place mainly in the small intestine by the action of the pancreatic juice and the bile, and is then absorbed by the lacteals and carried by the blood wherever needed. Starch is more difficult of digestion, and needs another process. The first essential to the digestion of starch is thorough cooking, raw starch being almost indigestible. The second process of digestion of starch takes place in the mouth, the saliva being the main agent in the digestion of the starch. Children are frequently reminded to chew meat thoroughly, but the fact that the starch and potatoes, oatmeal, etc., need as thorough mastication is too often lost sight of. Even oatmeal, soft and smooth as it may be, should be thoroughly masticated, not so much to render it finer but to mix it thoroughly with saliva; and hence it is wise to serve with the breakfast mush, crackers, toast or fruit in some form that requires mastication, for if the oatmeal enters the stomach unmixed with the saliva it is scarcely touched by the digestive fluids of the stomach, and though it may be acted upon by the fluids that enter the small intestines, the digestion is by no means perfect, and even if it does not cause distress, much of the value of the food is lost.

Starch is, however, a most important fuel food. Besides being obtainable at low cost, it is probably least likely of the fuel foods to cause blood and skin diseases.

Utensils used by Mrs. Jamison in her Cooking Demonstrations.

Above is an illustration of some of the more uncommon utensils used by Mrs. Jamison, which she heartily recommends to housewives. They are not expensive, and with the possible exception of the cream whip, should be found in some form in any home where comfort and convenience can be at all considered.

At the left is the nickel-plated teakettle; granite is equally good. In the opening on the top, raised to show the rim that prevents its slipping in, stands what is called a "teakettle steamer," which in innumerable cases answers the purpose of a double boiler. It is not patented and can be easily made by any good tin-smith. To the right of the teaketttle is a large granite saucepan, the present day successor of the heavy awkward iron kettle. A smaller sauce-pan of the same material stands in front and a little to the right of the large one,—ten times more convenient than a tin basin because of the handle. If you cannot have granite sauce-pans, get tin ones when your pans wear out.

The cream whip is the central figure, tipped forward to show the dasher, and with the cover leaning against the legs. This is the only cream whip known that actually prevents spattering or overflowing. The coffee pot at the right, just showing the projecting rim inside near the top to hold the stiff wire of the cloth bag that lies near by, will be recognized as the one described in the second day's lecture (page 235). The glass lemon squeezer just in front of the bag is a corrugated cone with pegs at the base, below which is a saucer with a lip, all in one piece. Touching these is the long handle of the granite frying pan which lies bottom up in front of the cream whip. It is nice for all purposes for which a frying pan is used, excepting those requiring a hot, dry pan. The three wooden spoons in front are so easy to the hand, do not get hot when used upon

the stove and make so little noise that if once used will be thought to be indispensable. The split spoon especially, is nice for creaming butter and for beating stiff batter. The curved chopping knife leaning against the small sauce pan, works faster than a straight one. The wire egg beater next is a well known whip for the whites; the Dover beater does better service in beating yelks, or whole eggs. The two measuring cups divided, one into halves the other into thirds, and holding each one-half pint, make accurate measuring easy. The short knife at the right is one especially nice for cutting vegetables. The illustration does not show the flexibilty of the "pallette knife" in the center of the group of knives, whose virtue consists in the perfect way in which it curves to the shape of a bowl and removes all the clinging cake batter, gravy or what not. The broad, sharp knife recommends itself to the housekeeper who has an affection for smooth slices. The wire potato masher at the extreme left, makes mashed potatoes a delight to the eye.

SECOND LESSON.

WEDNESDAY AFTERNOON, MARCH 10, 1897.

I will begin this second lecture by making bread. During the afternoon the following bill of fare will be prepared:

White Soup.
Chicken Cottage Pie.
Bread.
Apple Dumplings, with Whipped Cream Sauce. Coffee.

BREAD.

Recipe.

One pint milk, 1 pint cold water, 2 teaspoonfuls sugar, 2 teaspoonfuls salt, 1 cake of yeast softened in 1 cup tepid water, and about 3 1-2 quarts of flour. Scald the milk, add the cold water, and when lukewarm, add the yeast, also the sugar and salt. Stir in enough flour to make a batter that can be beaten smooth. Then add more flour to make a dough that can be kneaded. Knead 20 minutes. Let it rise until it doubles in bulk, which will be in four hours or less. Then mould and put into the pans. Let it rise about an hour, and bake nearly an hour, if loaves are large.

Bread.

The common saying that "bread is the staff of life" is very true. There probably is no article of food more widely and frequently used than bread. I presume it appears on the table of every American household three times a day, and is therefore one of the most important things to be made. All facts we can get on it are helpful, and when I say that we need all the facts we can get, I mean myself as well as the audience. I have no doubt there are points about bread making that you can tell me, and as I said yesterday afternoon, please to feel free to ask questions and make the meeting your own.

The common, every day bread is made of white flour, water or milk, and yeast. We use the wheat flour because, in the first place it contains the largest amount of nutriment of any grain, and it also contains gluten

in sufficient quantity to hold the bread in shape after it is made light. We need to have it light in order to have it digestible. The best flour is made of the hard wheat. I am often asked the name of a good flour, and always feel willing to recommend the Washburn-Crosby and Pillsbury flours as standard. I do not say that others are not good, but these stand at the head. The best bread flour has a yellowish cast, and is sandy to the fingers, and if you compare it with other flours you will detect the difference both in color and composition.

In the bread I am going to make this afternoon I shall use half milk and half water for the liquid. I generally scald the milk, partly from habit, perhaps, but either the water or the milk must be heated, so I generally heat the milk and put the water in cold, which brings the temperature to about the right point. I make the bread with compressed yeast, because for my purpose, under these circumstances it is most convenient; it can always be depended upon to do the same amount of work in the same length of time under similar conditions. The home made yeast is not at my command; dry yeast is slower; both make good bread, but of a little different flavor and texture. In using compressed yeast we soak it in water, using a cup of water to a cake of yeast. The water is to be tepid, that is, about 60 degrees, and if you try it with a thermometer you will find that water at that temperature feels cool to the finger, rather than warm.

As I explained yesterday, the salt is measured level and the sugar rounded, so that we really put in twice as much sugar as salt. The salt is added to the bread because we need salt in our food. We need some mineral, and none more than the chloride of sodium or common salt, not merely to make things taste good, but because the body calls for it. The sugar is added to the bread because in the process of fermentation the flour loses some of its sweetness.

This proportion of a quart of liquid, a cake or a cup of yeast, and 3 times as much flour, we may call the foundation of all bread doughs. It can be varied by adding more sugar and more shortening, and also can be made into rusks and buns by the addition of eggs and shortening, and fruit if liked. The reason of preference for this bread over the ordinary home made bread, is that it is made quicker, requires less time, and for that reason less of the goodness of the flour is destroyed. The bread is set hard at first—not sponged at all. Since the milk is scalded I shall begin to put the whole together and will mix in all the flour at first, and make the bread hard at the beginning. Then it needs to raise only once before putting into tins—four hours for first raising, and one hour for the second raising. A good sized loaf needs about an hour to bake, so that six or six and a half hours will cover the making of the bread from the time it is begun until finished, even in winter. When you wish to bake the bread early in the morning, set it at night, using only half the quantity of yeast I have given, that is, half a cake of yeast to a quart of wetting. Bread that is raised too much and flattens again is not going to be sweet and wholesome, and care should be taken that it is not allowed to raise too long, so that it falls after it is once raised.

It is wiser for one of inexperience or one making bread by this process for the first time, to measure the flour used; after a little experience one can readily tell when enough flour has been added. If you are using a soft flour, however, the bread requires more flour and should be considerably stiffer than with a hard wheat. The dietetic value of the hard wheat lies in the fact that it contains more of the mineral and prob-

ably more of the gluten than the soft wheat. Most of the hard flour comes from the west because most of the hard wheat is raised in the west. It is more in the wheat than in the grinding, and the main reason why the local millers do not produce flour of equal hardness with the western millers is because they cannot readily procure the same kind of wheat, but use the kind grown in the neighborhood. The flour is not to be condemned on that account, however, for it is wholesome, and good bread can be made of a great many other brands of flour, besides those I have mentioned, even if the wheat is soft. The milk in the bread adds to its nutritive qualities, and it also helps to keep the bread more moist. It is the only shortening put into the bread, but that can be varied to taste or to suit the purpose. If one wishes to use shortening it is best to put it in with the hot liquid.

Cooking loses some of the sense of drudgery which is often attached to it, if we understand that these processes in which we are engaged are chemical and scientific processes. It lifts the every day common housework and cooking from the plane on which they have long been placed, up to that of the other sciences. The process of bread making is essentially a chemical process. We almost think there is a chemical action in the first hard kneading of the bread, because there is such a change in the appearance and texture of the dough. But the fermentation is strictly a chemical process—the yeast plant in its growth in the bread destroys some of the starch of the flour, changing that into sugar, and then into carbonic acid gas and alcohol. It is because of this destructive process that the bread is more wholesome and nutritious, if raised only twice. Enough gas is formed to make the dough light and it with the alcohol passes off in the baking. The lack of flavor of the baker's bread is largely due to the much raising of the bread, and this process of only twice kneading gives us the best flavor because it gives the most nutriment.

Question—Do you knead it on the board twenty minutes?

Mrs. Jamison—I do, though some prefer to knead it in the pan; that is a matter of choice. This first kneading is really all the work of making bread. That may be done with very little expenditure of strength if one knows how, and we can well afford the time necessary to obtain a light, nutritious, nutty flavored loaf of bread. It is not necessary to put a great deal of force in the kneading. The manipulation is what is desirable rather than the strength, and if the motion come as it should from the shoulder, we do not need to expend a great deal of strength.

I am reminded of the suggestion in the direction of physical culture and health about the position a housekeeper assumes at different kinds of work, for instance, bread kneading. If we are working at a table a little low, we bend or settle down, generally settle rather than bend, or if we bend, we bend with the muscles at the waist line rather than the hip joint which was made to bend. The first thing we notice we have a back ache, and think we are working too hard, or over doing when really we have not been standing right. If we avoid bending with these waist line muscles we very often avoid the back ache.

I do not knead this the full twenty minutes, because I do not wish to take the time to do it, but will hand it over to my assistant and I will take the bread set this morning and make it into rolls to be baked and sampled this afternoon.

At the second kneading the bread requires almost no flour; it may need a very little on the board or on the hands, but the less used the better condition the bread will be in.

Flour added at this kneading is not so well mixed with the yeast, and it is likely to make dark streaks in the bread. This moulding requires very little time; it is only for the purpose of breaking the air bubbles. We might make bread with but one raising, but it would not be of quite so fine and even a grain and so we knead it the second time before putting it into the tins, largely for the sake of the appearance. I will make it out this afternoon in biscuits, as they will bake a little quicker than bread.

Question—Do you put shortening in the biscuits?

Mrs. Jamison—No, I do not; I always prefer to add it when the bread is set, because we have to knead it so much to mix the shortening in at this stage, it takes the bread longer to raise, and unless thoroughly kneaded in, it shows in streaks. I should set another dough if I wished to make extra nice rolls.

Question—Does it hurt the texture of the bread to cut it off?

Mrs. Jamison—I have been asked that question often, and have asked the audience, but have never found any good reason for not cutting it. I know of people who prefer to pinch it, but I doubt if cutting it hurts it in the least.

Question—Where a good deal of bread is to be made, is it not a good plan to sit down?

Mrs. Jamison—Yes, a high stool is a very convenient thing in the kitchen.

Question—If you have a good many to do for and have limited time, is there any harm in rolling it?

Mrs. Jamison—I think not, except that the rolls do not look quite as well.

Question—How warm should the dough be while raising?

Mrs Jamison—I think the degree makes very little difference; the main thing is to keep the temperature even. Of course the temperature should not be reduced very much below 65 degrees—75 degrees is better if you wish the bread to raise in four or five hours, but bread dough will stand at a low temperature without injury. If it raises before you wish to bake it, or if you wish to make rolls for supper, you can put it in the ice box or where it is quite cool, and it will not hinder it from being light when it is warmed up again. The temperature generally given for bread raising is about 80 degrees.

Question—If the temperature makes so little difference, why do we have better bread in summer than in winter?

Mrs. Jamison—Is it not because it raises more evenly? But do we have better bread in summer, or only good bread with less trouble?

Question—What kind of shortening do you prefer?

Mrs. Jamison—I always use butter in preference to anything I know of; that, of course, is a matter of taste; some think the bread is not quite so moist with butter as with lard. These biscuits are nice if they are served hot, with no more shortening than the milk.

It may be new to some to know that rolls, biscuit, and other things can be warmed by placing them between two tins that fit closely, and putting them in the oven without any water at all. I have been surprised to find that people who have had considerable experience did not know this. For some unexplainable reason, by placing them thus nearly air tight in a moderately hot oven, they come out almost as good as when fresh; in one respect better, because they are more wholesome than the newly baked bread. You can even put a loaf of bread in the oven and freshen it in this way with a little care. This amount of dough one-half the recipe generally makes about 32 biscuits; I have made 35 today—made them a trifle smaller probably.

The baking of bread is an important part of it, and I may not think to speak of it when the bread is ready for the oven; it should be put into an oven that is pretty hot at first. The object of the baking is first to arrest fermentation; second, to cook the starch; and third, to thoroughly kill the yeast germs.

The oven should be at a temperature of about 450 degrees, but we have no way of telling that excepting by our hand, and that needs considerable experience. In a cooking school there must be some other test, and as yet, until we have a practical thermometer it must be practically by the way it feels to the hand; but for bread the oven should be so hot that it will begin to brown by the end of the first fifteen minutes, so that you can be pretty sure it will not raise any more; then the heat may be lessened, and the bread should bake altogether from forty minutes to an hour. The reason of the necessity of insisting on the long baking, is probably pretty well understood. It used to be considered a point of art in a cook to be able to produce a fairly well done loaf of bread, and have it white on the outside, but that fashion, I am happy to say, has changed, and now we admire the looks as well as the flavor of a nut brown loaf. We know that the starch, as mentioned yesterday, must be thoroughly cooked before it can be digested, and also that the yeast plant must be killed. The germ of fermentation permeates the entire loaf. If it is not killed the fermentation proceeds in the stomach, and dyspepsia is a result; I have no doubt that this underdone or slack-baked bread has been one of the chief causes of dyspepsia. The crust of the bread is positively the most wholesome part of the loaf and should not be discarded. The chemical change which occurs on the outside of the loaf, converts the starch into sugar, which is more easily digested than the starch itself. Changing the starch into sugar accounts for the sweetness of the crust, and also gives a hint of the benefits of toasted bread.

The question has been raised and perhaps not always answered to everybody's satisfaction, in regard to the greater wholesomeness of yeast raised or soda raised bread. As the subject comes to be better understood, we are at least learning means of improvement in many respects, and the need of understanding the laws that, rather than luck, govern bread making.

This will finish the bread talk unless there are some questions.

CHICKEN COTTAGE PIE.

Recipe.

Remove the meat of a cooked chicken from the bones, and cut or chop it. Put in a baking dish, with half a cup of thickened gravy to each cup of meat, and season. Boil and mash six potatoes and spread over the chicken. Bake 20 or 30 minutes. Other cold meat may be used, also cold mashed potatoes, heating them first with a little milk.

Chicken Cottage Pie.

The next thing will be a chicken pie. In saying chicken pie I do not mean the rich, old-fashioned delicious chicken pie with a butter and flour crust; I mean the economical and healthful chicken pie that can be made of any warmed over meat, with a potato crust. It is one way to use left overs, and for the pie today I am going to use the chicken left from the soup yesterday. You remember we made a white soup of a shank of veal and the chicken. That chicken has been cut fine and is to be used for the pie today. If made for dinner, it would probably be just as convenient to use freshly cooked potatoes, but for breakfast we can use potatoes that have been cooked the day before. As I said

before, the pie can be made of any kind of cold meat suitable for such purposes, with half the amount of thickened gravy that you have of meat, and a potato crust. I do not like to say hash in connection with this dish, but that is exactly what it is, and if there are no gentlemen present I sometimes speak of it. But to a man who has a prejudice against hash, I would never mention it, and he will never find it out. The gravy is generally on hand, but in this case I have none, so I will have to make some. I am going to make it of some of the stock from the soup, as there is more than I shall need. This stock was made yesterday, you remember, with veal and the chicken. The chicken was removed when tender. And then after the veal had simmered a long time, the liquid was strained and cooled. This chicken was a young one; an old fowl would be all the better. In making a gravy you do not need stock of this quality. Stock made from odds and ends of meat, seasoned with a little vegetable and simmered on the back of the stove, makes a stock good enough for a great many sauces or soups, and costs almost nothing.

The process of putting together is the same for quite a variety of sauces, so that I will explain particularly about it in making it. The recipe for a thick sauce is a tablespoonful of flour, a tablespoonful of fat, and a cup of liquid. I am going to use today a tablespoonful of butter;—sometimes there is enough fat on the meat but there was not enough today, so I shall use butter, flour, and this veal and chicken stock, and thus have a rich sauce—rather more extravagant than is necessary in the present case. You see I melt the butter, then stir in the flour; I shall need so much to serve this large audience with even a taste that I must treble the quantities. Now, after the fat and flour are smooth, I add the cold stock; stirring rapidly off the fire that it may not lump at the first. Then it must be watched and stirred pretty constantly until thick and smooth. While it is cooking, I will tell you how to make the other sauces I spoke of, with the same proportion of fat, flour and liquid, and how to obtain the varieties.

Drawn Butter.

One tablespoonful of butter, one tablespoonful of flour, and one cupful of hot water. When the liquid is added hot, stir over the fire continuously, pouring the liquid slowly or adding it in smaller quantities, as a third of a cup, stirring smooth before adding more. This is perhaps, the best method for a beginner, but after one has become expert, the liquid may be added hot or cold as convenient. This plain drawn butter may be made into a richer drawn butter—by the addition of another tablespoonful of butter added, bit by bit, to the thickened sauce. The addition of a tablespoonful of lemon juice makes a variety especially adapted to serve with fish. Olives, capers, cucumber pickles chopped, minced parsley, either separately or in combination, make suitable sauces for canned salmon and other fish dishes, or for "made dishes" of chicken or other white meat. The drawn butter without these additions, or with only the lemon juice, is suitable for such vegetables as asparagus and cauliflower.

Brown Sauce.

Another sauce may be made by browning the fat, adding the flour and browning again, then add the water. This may be used for many sorts of dishes made of the dark meats, and the fat may be some of the fat of the meat. The beef drippings generally kept on hand by a thoughtful housekeeper,

may serve as the fat for almost any brown sauce. Additional flavor may be given, especially where the stock is not on hand, by cooking chopped onion or onion and carrot for sometime in the fat, being careful that they do not burn. Stock is better for this sauce than water. Chopped olives may be added, making quite a pretentious dish when served with a plain broiled steak. This is good also with duck.

White Sauce.

Butter, flour and milk make the ordinary, but exceedingly useful White Sauce, which is good with "fish, flesh or fowl." It may be served suitably with many vegetables, sweetbreads, oysters or eggs, or on toast. It may be enriched by being poured hot onto the beaten yelk of one or two eggs, and this made and served with baked potatoes is an admirable and sufficient evening meal without meat. By using half milk and half white stock, we have the sauce called Bèchamel.

Tomato Sauce.

For Tomato Sauce which cannot be excelled for croquettes, fried fish, mutton chops, etc., use strained tomato or stewed tomato, straining it after it is finished. Cook with the tomato, a little chopped onion, a spring of parsley, two cloves and a bit of bay leaf, or laurel. For macaroni, omit the spices and the vegetables also if preferred.

Currant Jelly Sauce.

Currant Jelly Sauce, calls for a half glass of currant jelly added to a brown sauce. It is a handsome sauce, especially nice with mutton.

To return to the pie,—it should be seasoned with salt and pepper according to taste. The chicken did not get sufficient salt in the soup because if we had salted it enough to season the chicken, it would have been too salty for the soup. The potatoes should be seasoned with salt and some milk put in to make them brown, and spread better. There is no butter put in; that can be added if desired, but there is fat enough in the sauce and chicken for the pie.

Question—Do you always chop the chicken?

Mrs. Jamison—Chop or cut it fine; it serves nicer, and the object is to save left overs. Left over meat is often in too small pieces to make a nice appearance unless it is chopped.

Question—About how thick is that crust?

Mrs. Jamison—Nearly as thick as the meat itself.

Question—Would it be necessary to have an opening to let the gas out of the crust?

Mrs. Jamison—It is necessary in a flour crust to have an opening for the escape of the steam, but it is not so necessary in the potato crust. If you use cold mashed potatoes, heat them in a little milk in a sauce pan until they are smooth; or you can mash them in hot milk if they were not mashed before. The flavor of warmed over mashed potatoes is not so good as the freshly cooked ones.

APPLE DUMPLINGS.

Recipe.

Three cups of flour, 3 teaspoonfuls baking powder, 1 teaspoonful of salt, 1-2 cup of suet chopped fine, 1 and 1-4 cups cold water, 4 apples, and 2 dozen raisins. Sift the flour and baking powder, add the salt, suet and cold water to make a dough. Roll out and cut in eight pieces. Lay half a pared and cored apple on a piece of the dough, with three raisins where the core was taken out. Press the dough over to cover the apples. When all are prepared, lay them on a buttered plate in a steamer. Steam one

hour. Serve with a sweet sauce, or with whipped and sweetened cream.

Apple Dumplings.

For these dumplings I use three cups of flour and three teaspoonfuls of baking powder. The flour was sifted before it was brought to the table. It is always advisable to sift flour before measuring it because there is quite a difference in the way it measures.

Question—Do you have even teaspoonfuls of baking powder?

Mrs. Jamison—Slightly rounded. I believe I gave the rules for measuring yesterday. This is substantially the same as the rule given on the outside of the can, which is two heaping teaspoonfuls to a quart of flour. I am using a slightly rounded spoonful in the proportion of four to a quart. Slightly rounded means just a trifle more than level and is more accurate than heaping. As I explained yesterday, a rounded spoonful means just twice as much as a level spoonful.

It is always best to keep baking powder covered. A very good way to mix the baking powder and flour is to sift the two together several times. It takes but a minute to do it, and it really requires no extra dishes, because the extra bowl is not soiled and can just be wiped out. For shortening I use the chopped suet for two reasons: One is, that it seems to make the mixture a little lighter than any other form of shortening, and it is cheaper than butter. The flavor is not noticed at all, after the pudding is cooked. You cannot use it so well in pudding that is to be baked, because it requires a longer period of cooking than other forms of fat. I have learned a new point in regard to chopping suet, and that is, that it chops easier if slightly cooked; this suet was prepared in this way. Take the skin off and bring it to a boil, take from the water, and then let it get thoroughly cold. It does not stick to the chopping knife so badly.

This dough mixture is substantially the same as any soft dough. It comes in the class of soft doughs. In the cooking school we classify different mixtures as flour mixtures, etc., as the botanist classifies his roots or flowers. We classify flour mixtures under four heads:—First the batter, which is the mixture for pancakes, griddle cakes, and popovers—the measure of liquid and flour are equal. In a muffin mixture the proportion is one and a half to one;—one and one-half of flour to one of liquid. In soft doughs like dumplings, biscuit, etc., the proportion is two measures of flour to one of liquid. In bread, three to one; in pastry, four to one. Of course these measures do not apply to doughs or mixtures that are much sweetened or thickened with eggs—a different proportion is required under those circumstances. These general rules apply to all sorts of bread mixtures. This dough will call for one and one-half cups of liquid. With suet it always seems best to use water. In making a dough that is to be handled, you need to scant the measure of water, so that I will only add about one and a quarter cups instead of one and a half.

Question—How long do you cook the suet?

Mrs. Jamison—Just bring the suet to a boil, just enough to heat through. I have been using it uncooked and cooked, and find that it makes no difference in the way it works. Put it in cold water and let it come to a boil.

Question—If you did not have the suet, how much butter would you use?

Mrs. Jamison—A tablespoonful and a half for three cups of flour. The dumplings in that case need not cook so long. I am going to cook them an hour; the apples might not cook

through in less time than that. In making a soft dough of any kind, it is very essential not to mix it any more than to get the liquid and the flour thoroughly blended. It is not necessary to handle the dough at all until it is cut and turned out on the flour board, rolled about half an inch thick, and cut into pieces. I generally prefer to cut in triangular pieces; it seems to be a better shape for the half apple than if cut square.

Question—Did you put a few seeded raisins in?

Mrs. Jamison—Yes, a few seeded raisins in the cavity of the core. They are merely for variety; they give a nice flavor. Other dried fruits like dates or figs might be used in the same way. I lay on each section of dough half an apple that has been pared and cored, and in the cavity made by the removal of the core, place four or five seeded raisins.

Question—Do you put salt in the dough?

Mrs. Jamison—The recipe calls for a teaspoonful of salt.

Question—Do you steam them longer in using suet than if you had used butter.

Mrs. Jamison—Yes, but in steaming apple dumplings you should steam them long enough to cook the apple.

Question—Do you add sweetening?

Mrs. Jamison—No sweetening whatever. Add the sweetening to the sauce. I am going to serve sweetened whipped cream. It is a good plan to put the dumplings in a hot steamer after being worked out, because it takes a little time to heat, and the sooner the dough begins to cook, the better. If you use butter you may use milk with it for wetting. Yesterday I spoke about the economy of using milk, eggs and other things that furnish nutriment. Sometimes we do not need the extra nutriment, and many things can be made successfully without. I think cake is a little more tender if water is used instead of milk.

Coffee.

I am making and advocating the drip coffee, for two or three reasons, which seem to be very good ones. One is that the drip coffee, not being boiled, is probably less liable to have disastrous effects following than boiled coffee. The extractives that cause disturbance are not drawn out by this method of making it, as they are by boiling. Another reason is that a cook, however unskillful, cannot fail to make good coffee; it is sure to be good. A third reason is that it is much cheaper. Two-thirds of the quantity ordinarily used will give as good results by this method, as regards strength. The coffee used for this process should be ground as fine as your groceryman ever grinds it, or as you can grind it at home, but not exactly pulverized. It is put into a sack or receptacle of some kind, inside of the coffee pot, and hot water poured over it. It is also better that the coffee pot should have a spout from the bottom. Such coffee pots as this cannot be procured, at least not very easily; I have tried myself and have not been able to get them. There are several patent coffee pots on the market, but they are so hard to keep clean that I am afraid you will do as some have done—discard it and go back to the old way of boiling the coffee. You can have one made by procuring, instead of a coffee pot, a nickel teapot with a spout at the bottom. On the inside near the top have four rivets soldered to hold the wire ring to which the open bag is attached.

Question—What kind of coffee do you use?

Mrs. Jamison—The kind of coffee must be the kind you like the best. The most common mixture is the Java and Mocha. The Java is the mildest flavored, the Mocha next,

and the Rio the strongest. You can mix them in the proportion to give the desired flavor, and the amount used must vary according to taste. We do not wish to become slaves to our appetites, and if we are wise, it is probably only necessary to realize that we are better without a thing, to make us willing to give it up. If we find that coffee positively disagrees with us, I am sure we will always be wise enough to give up its use. If drank without cream or sugar, the stimulating effect will be secured and there will be less of the evil effects. Coffee without cream, certainly, while it may not taste so well, is just as stimulating and more wholesome than when cream is used. It is never advisable to give coffee to children or to growing youths, though I do not suppose it is necessary to speak of that because probably the practice is not followed to any extent in an educated community. It is nothing to be ashamed of to confess that some of us, as we grow older, do need a little stimulant and if coffee and tea have no injurious effects there is probably no harm in their use unless one becomes addicted to the habit, as people too often do.

Used in moderation, both coffee and tea may be beneficial though they are by no means food. The new cereal coffees used more and more largely seem to have no bad effects, and take the place very well of the regular pure coffee.

Question—What is the bag made of?

Mrs. Jamison—Unbleached muslin.

Question—Does an egg strengthen the coffee?

Mrs. Jamison—I do not know that it does. Its office is to settle the coffee. The only objection, however, that is made to the flavor of this drip coffee is the lack of the flavor of the egg, which some people like so very much.

Question—Do you pour the hot water over the coffee more than once?

Mrs. Jamison—I generally pour it through twice. It can be done more often than that if you wish to get more goodness out of the grounds, but twice is generally sufficient. The coffee need stand only long enough to drip through.

Muscle Makers.

The chicken pie and the bread furnish the protein or muscle making material for this bill of fare today. Yesterday we spoke of the heat and energy producing foods, and found that the body might be likened to a steam engine in its ability to convert carbon into the energy necessary to perform not only the bodily functions, but all the mechanical and mental work which is required. The body is, however, unlike a steam engine, and superior to it, in the fact that it is able to keep its own substance in repair. Like any machine it is constantly wearing out; every motion, every breath, every heart beat is breaking down cells and wearing out tissues, and this waste must be constantly repaired to keep the body in a normal, working condition. This waste is supplied by the protein foods, which contain the same elements that are lost by exercise. This class of foods includes lean meat, eggs, cheese, peas and beans, wheat, oats, etc. These classes may be divided according to their digestibility into animal and vegetable, the animal foods being much more readily digested than the vegetable proteins. Meat and eggs are digestible in a raw state, most easily digested when the albumen is slightly coagulated, but extremely difficult of digestion when rendered hard by long cooking. It is worth while to cultivate a taste for underdone meat and soft boiled eggs. Though they furnish no larger

amount of nutriment than when more thoroughly cooked, they require less energy to be assimilated in the system. The greatest advantage in the use of the tender cuts of meat, is in the gain in digestibility. The tougher parts, which, because there is a greater supply of tough meat than tender, are always cheaper, furnish exactly as much nutriment, can be rendered palatable, and in health are fully as valuable as the more tender cuts. Where the digestion is in any way impaired tender meat slightly cooked is the only sort that should be used. This of course is confined mainly to beef and mutton; pork and the immature tissue of veal and lamb should be thoroughly cooked to make it wholesome. Cheese, one of the animal proteins, and an extremely valuable one because of the amount of nutriment furnished at a low cost, is generally supposed to be most digestible raw, but it is found that when slightly cooked it can sometimes be partaken of by those who cannot use it uncooked. The objection to cooked cheese and the discredit too often cast upon such dishes as Welsh rarebit, should be laid at the door of too rapid, or too long continued cooking, which renders it tough and indigestible. The vegetable proteins furnish all that is needed for muscle repair, as is demonstrated by the vegetarians; but from the greater ease with which the animal proteins are digested it seems wiser to use both in our food. Part of the indigestibility of peas and beans lies in the smooth outer coat or skin, which is entirely indigestible, and though it does not interfere with the operation of a healthy digestive apparatus, may often be eliminated to advantage. The same may be said of the outer coat of oats and wheat, which though rough, are composed mainly of cellulous or woody fibre, and have no food value.

Like most vegetable carbohydrates, the vegetable proteins require thorough cooking, and beans and peas, and breakfast foods of wheat and oats, should be subjected to slow, long continued cooking. The proportion of these different food elements necessary for maintaining the body is given on the chart issued by the agricultural department at Washington, and which was prepared by Prof. Atwater, of Wesslyn University, an acknowledged authority on foods. The standard dietary for a man at moderate work, which applies pretty fairly to a woman doing housework, providing she gets a good proportion of outdoor air, is protein .28 pounds; fats, .17 to .33 pounds; and carbohydrates, .88 to 1.21 pounds. This proportion, as will be seen, is about the proportion of our every-day diet, for even if we have given no attention to the science of food, habit and custom, back of which is probably a God-given instinct, has guided us often more wisely than we know.

THIRD LESSON.

THURSDAY AFTERNOON, MARCH 11.

Bill of Fare.
Scalloped Potatoes.
Apple and Celery Salad.
Mayonnaise Dressing.
Graham Biscuit. Cheese Fondu.
Coffee Cake. Boiled Frosting.

COFFEE CAKE.

Recipe.

I will make the cake first this afternoon as it must get cool.

One cup of butter, two cups sugar, one cup molasses, one cup cold coffee, four eggs, four cups flour, one teaspoonful each soda, mace, and cloves, two teaspoonfuls cinnamon, and one pound of raisins, seeded. Cream the butter and add the sugar, molasses and spices. Beat the yelks of the eggs, and add them; dissolve the soda in the coffee and add that in alternation with the flour. Mix the raisins with the last of the flour and finally beat the whites light and fold in. Bake slowly thirty to forty minutes.

Coffee Cake.

I am afraid if I was the cook on a farm I would not think it necessary to make cake often enough to have it on the table as many farmers' families do, two or three times a day, but perhaps the reason is that I am not fond enough of cake, although it may be a good thing to have in the house.

The cake that I am going to bake this afternoon is one that keeps nicely and so has the virtue of being one that we can have on hand and yet not have to make so often. With the multitude of things that the farmer's wife has to do, it is quite advisable that she prepare things sometimes that will keep. Some things are scarcely fit to eat the second day after being made; other things can be kept nicely, and others warm over well. This cake is made with molasses, which helps it to keep moist and good. The liquid in this besides the molasses is made coffee. The first thing in putting the cake together—and these rules apply to the making of any butter cake—is to cream the butter. Very frequently a recipe for cake will give direction to cream the butter and sugar, and the novice will usually follow the recipe, putting the butter and sugar together. It is easier to cream the butter first, and afterwards add the sugar. It is a good plan, especially when the butter is hard, to warm the bowl by turning hot water into it, and the wooden spoon must always be wet with hot water so that the grease will not be absorbed by the wood. I find a wooden spoon better for creaming purposes, and I like it for beating and stirring, because it is so light and noiseless; then, in creaming butter it has the advantage of not coloring the butter at all as a metal spoon sometimes does.

It is always best to avoid the use of a tin pan in making cake. In this age of the world when cooking utensils made of other materials are so easily procured, it seems unwise to use tin for a great many purposes, for the granite or enamel ware is reasonable in price and does very much better service. It certainly is no more expensive than tin because it lasts so much longer. I see that one of the hardware dealers in your town has this white enamel ware in different shapes. It seems to me as though housekeepers are more indifferent to the utensils they use than are men doing work of different kinds that re-

quire tools. A housekeeper will put up with poor utensils, when at an outlay of a small amount of money and a little thought she saves trouble and very often expense—certainly strength and patience. An earthenware bowl is even better than a bowl of this kind for creaming purposes, because it is heavier and holds itself down better, and is cheap enough to be within reach of all.

I have been very much interested in the very little that I have had the opportunity of learning about the new sugar industry in Wisconsin, the beet sugar. I have learned that the beet sugar is preferable for canning, and especially for jellies, and I think the reason is that it does not grain so quickly as the cane sugar does, but so far I have not been able to gain any accurate information on that point. I have been told, however, that a great deal of the sugar we are using nowadays is beet sugar, and I know there seems to be quite a difference in the way sugar cooks.

This is a coffee cake, not a coffee bread, but a cake in which the wetting is made coffee. This, as you see, makes a very large cake, and half the recipe is enough for a family at one time. It keeps well, however, so it is worth while making it in large quantities. The molasses, fruit, and spice help to keep it. It is not a cheap or economical cake; if we have a cake for the taste we want it nice, and if for the food value in it we can get it cheaper, at least at less cost of time and exertion, in some other form.

Question—Is there any advantage in adding sugar in small quantities at a time?

Mrs. Jamison—I think it is easier than putting it all in at once. There certainly is an advantage in creaming the butter first.

In using molasses of course the necessary raising material must be soda.

Question—What kind of molasses do you use?

Mrs. Jamison—I think the dark New Orleans molasses is generally considered the best for cooking, though personally I have a great preference for sorghum. I think, too, in using sorghum, that less soda answers the purpose, as the sorghum seems to have less acid than the molasses, at least that has been my experience in the little I have tried.

Question—Do you have your coffee strong?

Mrs. Jamison—Reasonably strong, yes; it makes no difference except in the flavor of the cake, and it is not very pronounced anyway, with the spices. This, as you see, is really made with water, but it is rich enough, and tender enough—more tender probably than where milk is used. In using milk you not only get the richness of the fat, but also the casein which hardens and toughens somewhat in the cooking. In making a small cake I sometimes find that I can push the sugar and butter to one side of the dish and beat the yelks of the eggs in the other side, and thus avoid using another dish for the eggs, and still beat them light. It is generally wise to separate the whites and yelks when making a cake; the cake is more spongy if this is done.

Question—Do you use white sugar in preference to brown?

Mrs. Jamison—I think the white sugar produces a better effect than the brown sugar.

I was interested a few days ago in hearing the opinion of a housekeeper as to the economy of different kinds of cake. She spoke of a cake that she had recently seen made, that I believe she said took fifteen eggs; I found later that she referred to an angel cake. She thought it was a very extravagant cake because it took so many eggs, but it really only took half that number, as only the whites were used and the yelks were valuable for some other purpose. While it is a cake that does not keep very well, it is exceedingly whole-

some, as any sponge cake is more wholesome than a butter cake, and the eggs are almost all the cost that there is to it.

Speaking again about the convenient utensils, it often requires thought to see the convenience. The dish for beating eggs, for example, or for creaming butter, is so much more convenient if it has a round instead of a flat bottom, and yet without giving any special thought to it, a cook will often take a dish with a flat bottom when one with a round bottom is just as available. One must use considerable discretion in purchasing, or learn the value of the different utensils from someone who has tried. Then, what suits one housekeeper does not always suit another.

As soon as the cake is thin enough to be beaten the beating should be commenced. It should be continued to the end, and the cake made with as little stirring as possible. In putting in the liquids and flour there must be some stirring, but it should be as little as possible. The proportion of soda for molasses is very regular. It does not vary so much with molasses as with sour milk, because the molasses is more stable an acid. A teaspoonful is the proportion for a cupful of molasses, or for two cups of ordinary sour milk. The best way to add the soda, I find, is to dissolve it in a little liquid of some sort. It may be dissolved in a little water; sometimes it can be dissolved in the milk. If put in the water you can see a little better that it is dissolved. I think it is better than mixing with the flour, and cold water is better than hot water because the gas does not form so quickly. The flour was sifted once before being measured; that is sufficient for an ordinary cake. If we are making a sponge cake with no raising material excepting the eggs, it is better to sift the flour several times to make it exceedingly light. If baking powder is to be used it is wiser to sift it and the flour together, as I did yesterday for the dumplings. In adding spice remember that the rule is the same as for soda; it should be measured level, and the general rule is twice as much cinnamon as any other spice. I find myself always scanting the measure of cloves a little, because the flavor is so objectionable if too strong. Of course other spices can be used; the mace can be omitted if not at hand and a little more nutmeg substituted, though the flavor is not quite the same. Speaking about flavors and seasonings, I wonder if many of you have tried mace for seasoning meat dishes. It is exceedingly nice for veal and oysters in some made dishes. I discovered its value as a seasoning in oysters though I had known it was nice for veal, by a mistake in the cooking school by one of the pupils who did not look at the label and put in mace supposing it to be cayenne pepper. That gives a hint as to the amount to be used.

With the last cupful of flour I shall mix the raisins, and I am scanting this measure of flour because the flour I am using is bread flour, and this recipe was designed for pastry flour. I was told they did not use much of it in Appleton, and I could not procure it, so I am using the bread flour; pastry flour is softer, and the mixture requires rather more of it than of the bread flour.

When making a cake with baking powder, it is generally wiser to beat the white of the eggs that are to be added before adding the baking powder and flour, but soda will bear waiting a little better than baking powder, and if the eggs are fresh it does not take long to beat them, for they do not need to be beaten dry, as they should be for meringue, but only light and stiff. It is not necessary to beat them very stiff. You know the longer eggs are beaten the more tasteless they are. I hope that every

one who makes cake has one of these little pallette knives; they are so nice for cleaning every bit of the egg and butter and all ingredients from the sides of the dish, and you get the value of every particle. I think such a knife pays for itself in a very short time.

In adding the whites of course you wish to preserve the lightness as much as possible, and a folding motion is much better than beating or stirring. It is the best way to add whites to almost any mixture when they are added for the lightness as in the case of cakes, omelets, and such things. I have generally advised against the use of granite baking tins until I had an opportunity of using some of the new granite ware that is being made somewhere in our own state, in Milwaukee, I believe. I find it is considerably thinner than the old granite ware and bakes very nicely.

It seems strange that fashion should regulate opinion, but it seems that layer cakes are going out of fashion and flat cakes coming in. Today I shall bake this in shallow square pans. If it is to be kept for any length of time a thicker cake is better; it does not lose the moisture as quickly. This cake with molasses needs rather a slow oven. I presume that most of you in making a cake would not use as many dishes as I have. I would not if I were not talking. All the ingredients can be measured with the same cup, by measuring the flour, then the sugar, and then the liquid. I spoke a few minutes ago about sponge cakes being more wholesome. They can also be made with fewer dishes than any other cake, and with uniform success, for, as Mrs. Campbell has said, in one of the lectures on Household Economics which she gave at the University at Madison, there is no "luck" about sponge cake—it is a scientific process. The word luck is not recognized in the cooking school. The girls soon learn that they must not talk about having luck at home, but always find the reason for the failure, if they have one.

Cake in baking, should go through four processes: first, it should rise in the first quarter of the time; in the second quarter it should begin to brown; in the third quarter it should finish browning, and in the fourth quarter it should shrink from the sides of the pan. The shrinkage is not always perceptible. I like to let the cake cool a little before taking it out of the pan. In preparing the pan, a good plan is to butter the tin and sprinkle flour over it; then shake off all the flour you can and that coating makes a smooth crust over the bottom and is not so likely to stick.

BOILED FROSTING.

Recipe.

One cup of granulated sugar, one-third cup of water, white of one egg. Boil the sugar and water without stirring until it hairs or threads when tried. It will take about six minutes. When the sugar begins to boil beat the white of the egg stiff, and when the sugar has boiled to the right degree pour it slowly on the beaten white, beating all the time. Beat till stiff enough to put on the cake. An ounce or one square of Baker's chocolate may be melted over the teakettle and added during the beating.

Boiled Frosting.

It certainly seems to me that there is very much less danger of the sugar graining now, in making frosting, than there used to be, and I think it must be the beet sugar, though it is not labeled in any way,—and that the difference in cooking is due to the material from which it is produced. For this frosting I use a cupful of

granulated sugar and a third of a cup of water, cooked until they spin a thread. I think one trouble in making this boiled frosting is that people do not measure the water; another trouble is that they sometimes cook faster and sometimes slower, and still another is that they cook in different dishes. You cannot make a large omelet successfully in a small sized pan, and the rule applies in this also. You must look out for the size of the dishes you use. If you use a frying pan or one with a large surface evaporation is too rapid. If you put your sugar to cooking in a small dish when it begins to boil you can beat your egg. The test for the boiled sugar is when it threads, that is, when dipping up the syrup it will fly off in a fine thread. A good test is to dip the spoon into cold water and then you can tell by the way the syrup acts. It will form a ball when cooked to the right degree that will roll, and will not stick to your fingers. If it is disturbed very much it may grain. It makes very little difference whether hot or cold water is added, if you watch it very closely, but I generally put on cold water, and then I know just what it is going to do. When I use hot water it does not give me quite the time that I like to allow.

The cooking of sugar is a vast field in culinary operations, because there are so many degrees to which it can be cooked, and with such different results. I do not pretend to know anything about it. There is a great deal to know and one needs a great deal of experience and practice to do the various things that can be done with boiled sugar, but with a little care this frosting can be made nicely, even by one who has not had a great deal of experience. One thing I started to speak of in regard to boiling frosting is that it is affected by the weather. On a clear day one is more sure of success. In this age when we have cooking utensils that are perfect, means for learning scientific methods of putting things together, materials that are as nearly perfect as can be manufactured—there is very little on which the cook can depend for excuse for her occasional failures, except the weather.

Question—How many whites do you use?

Mrs. Jamison—One. If you put in two whites the frosting is thicker, but it is more spongy. I do not like it as well, but two whites can be used.

Question—Do you ever have any trouble with the frosting being sticky?

Mrs. Jamison—It will not be sticky if you cook it to the right degree. This is the hardest thing to do. I think the test of the soft ball is the best, and it will not be sticky after it reaches that. The eggs need not be beaten dry.

I will give a recipe for a frosting without eggs.

Boiled Cream Frosting.

Two cups granulated sugar, three-fourths cup of cream. Boil fifteen minutes, beat until thick, spread on the cake while warm. This is not as white as an egg frosting, but it is suitable for a dark cake, such as the coffee cake given above. If cream is not at hand milk can be used, adding a tablespoonful of butter.

APPLE AND CELERY SALAD.

Recipe.

Equal parts of small thin slices of apple, and cut celery. Mix together with a mayonnaise dressing. English walnuts may be added, broken or cut in small pieces, and half walnuts may be used for a garnish. Do not chop the walnuts, it makes too much dust or fine powder, but cut them. Celery tops can be used for a garnish, and if the apples have red skins leave a little of it on the slices and use them for a garnish also.

MAYONNAISE DRESSING.

Recipe.

The yelk of one egg, one-half teaspoonful each of salt and sugar, one-half saltspoonful of paprica or a speck of cayenne pepper, one teaspoonful each of lemon juice and vinegar, and a half cupful or more of olive oil. Mix the sugar, salt and pepper, stir in the yelk, then add the oil a few drops at a time till too thick to stir. Thin with a few drops of lemon juice, then put in more oil, alternating with lemon juice and vinegar until all the acid is used and the dressing is as thick as desired. Use on vegetable, fruit, or meat salads.

Mayonnaise Dressing.

The next thing I will make will be the mayonnaise dressing for the salad. There is nothing new about this dressing to those who are in the habit of making it, but to those who have not had experience it sometimes seems a difficult undertaking. It is very simple. The rule that I have chosen for this dressing differs from those in the older cook books by omitting the mustard. It is a dressing that keeps nicely in a cool place, and though the recipe I give is in small proportion, it can be doubled, as I shall do today. The more oil that can be worked into the yelk of the egg the finer the dressing is supposed to be. In putting it together mix first the dry ingredients, that is the seasonings, then add the yolk of the egg, then the oil, a few drops at a time, until the mixture gets pretty thick, then the acid may be added, and after the acid the oil may be added in larger quantities. It can be mixed with a wooden spoon or with an egg beater. I like the Dover beater; after it gets worked up a little I beat it with the egg beater, which gives it a very much lighter color, and it is considered handsomer.

Question—Is there any special brand of olive oil?

Mrs. Jamison—I am using the Lucca though you can sometimes get an olive oil with a milder flavor, and I would suggest if one were trying to cultivate a taste for it, to procure it from a drugstore. I think one reason olive oil is not liked at first, is because we do not always get it good. The California oils are being sold and used quite a little. I think they come mostly in bulk, at least I have not seen any California oils with the label on, but I know they are used to some extent in this part of the country. They would be more agreeable, perhaps, to some tastes; they are considered the very finest. We can believe they are doing their best in the manufacture, in California, because they are trying to work up a trade and get a market for their oil, and they are undoubtedly producing the best article possible.

It is more reasonable to cultivate a taste for olive oil than for the pickled olives. Yet, while we know that in general fish, eggs, and apples are exceedingly wholesome food—food that is always to be recommended—there are individual cases where even those things cannot be used. Some people can eat cooked apples who cannot eat them raw, and there are people who cannot endure eggs and fish in any manner. We probably all remember among our acquaintances those who cannot eat some one thing. I know a lady who cannot endure the odor of apples, and will not allow them in the house. Her oddity is a trial to her boys because they cannot even conceal them in their pockets without being detected. Another lady could not eat fish, and her partaking of it always resulted in a slight prostration or something of that sort. So it is with olive oil; while there is often a distaste for it, because it is not commonly used, often a repugnance to it, some times it is an individual peculiarity that cannot be overcome at will.

Question—Do you ever use butter instead of oil?

Mrs. Jamison—Yes, butter can be used in place of oil in making this dressing. Cream the butter very thoroughly, then add it to the egg, and add the acid to it.

Question—What proportion would you use?

Mrs. Jamison—I hardly think I can answer that offhand; I think probably you could use about the same amount as of oil, that is, half a cup of butter instead of half a cup of olive oil; one could readily tell by trying. Put in all the egg will take. On this point I might give the opinion of Mrs. Rorer, who is undoubtedly known to you as one of the most eminent lecturers on dietetics, who lectured at the World's Fair, and is now conducting a very able department in the Ladies' Home Journal. She avers that the salad without the olive oil is not a salad at all, and should not be served as a salad; that is, the virtue of the salad lies in its digestibility and wholesomeness, and the olive oil with the green vegetable furnishes the most wholesome combination, especially for persons indoors, and is very much more easily digested than butter. If we use butter it is for the flavor rather than for its greater wholesomeness, and while its use in salad dressings is not to be recommended, those questions are largely such as each one must answer for himself or herself, because we know best what we can eat, and whether we can train our taste to like the things we want to like.

One thing I should have spoken of in regard to this mayonnaise dressing—it is advisable to have the ingredients somewhat cool, but it is sometimes dangerous to have them too cool. Olive oil is often kept in the ice box, and if taken out and used immediately it is sometimes too cool and the dressing is sure to break. It would be better to have it of medium temperature. This dressing may be thinned, if desired, or the flavor of the olive oil toned down by the addition of whipped cream, when it is ready to be served. The cream is not to be added until the dressing is served, as it will not keep as well as the oil. This as you see, is very stiff and light colored.

I am not sure but this salad dressing may be considered very inappropriate in a lecture before a Farmers' Institute, where the audience is supposed to be composed largely of farmers' wives, but I know of no reason why farmers should not have the very best things to eat. Olive oil is one of the most wholesome and digestible forms of fat and is being prescribed largely for diseases where waste is going on rapidly.

GRAHAM BISCUIT.

Recipe.

One pint of graham or whole wheat flour, one-half teaspoonful of salt, one teaspoonful of sugar, two teaspoonfuls of baking powder, one-half tablespoonful of butter and one scant cup of milk or water. Sift together the dry ingredients and work in the butter; see that the oven, the tin, cutter and rolling pin are ready, then add the liquid, mix as little as possible; turn out on the board, roll, cut, place in the tin, and bake a little longer than white biscuit.

Graham Biscuit.

The process in making graham biscuit is very similar to the dumplings I made yesterday. There is no reason why soda and baking powder should not be substituted for each other, if the proportion to be used for each is understood. A slightly rounded teaspoonful of baking powder to a cup of flour, or half a teaspoonful of soda to a cup of sour milk. It is not so necessary to sift the graham flour as it is white flour, because it does not pack as white flour does, and perhaps I do not need to repeat here the answer

to the question I was asked yesterday about sifting graham flour. I shall not sift this today, because I think it is better not sifted if you can eat it with the coarse parts in, but if you cannot I would always advise sifting it out. I am referring of course, to good graham flour. I think it is better to fill the cup with some other dipper than to dip the measuring cup in, because it does not pack so much in that way. In using baking powder for these biscuits, it is advisable to mix it very thoroughly with the flour. That can be done by sifting and then turning the coarse part in with the rest, or it can be done by very much stirring. A coarse sieve is very convenient where one is using very much graham flour.

I am going to substitute for the milk (it is supposed always to be sweet milk where it is not designated) sour milk and soda, instead of sweet milk and baking powder. The butter can be worked in dry with the fingers. In pastry it is better to keep the hands out altogether because the warming of the butter will render the pastry more tough. There is so small a proportion of shortening in the biscuit that it makes very little difference, and the butter should be worked in until it is lost.

As I said yesterday, in making a soft dough, work it is as little as possible after wetting it; put part of the wetting on one side and work that, and then wet the other part and work that. The only difficulty in using soda is in knowing just how sour the milk is. If it sours in your own hands you know about how sour it is, and how much soda it will require. These biscuit are rather harder to handle than the white flour biscuit, because they are shorter; no more shortening is put in, but the graham flour itself, because it is coarser, has the appearance of being shorter, that is, less tenacious. It is just as well, if not better, to use white flour in working it up. Like dumpling dough it is to be turned on the board and rolled, without necessarily touching your hands to it, always remembering the less you mix, the nicer it will be.

I shall have to do as housekeepers sometimes have to do in an emergency, today, and use something else in place of the right utensils, because I forgot to bring my biscuit cutter. It is always advisable to use a small cutter for biscuit as they bake nicer if they are not too large. The object of the hole in the top of a biscuit cutter is to allow the air to puff out. This can is less convenient because it has none.

Always try to get as many biscuit out of the first cutting as possible. These rules for biscuit apply to all soft doughs, doughnuts, cookies, etc.; the more they are worked the tougher they are, so that the less dough there is to work up the second time the better. Always be sure to have the rolling pin, cutter, and everything ready, as you get the best virtue out of the material if it goes into the oven as soon as possible after it is wet. A very good rule and a saving of time and very often hurried steps, is to have the utensils ready and the ingredients measured before beginning to put anything together.

CHEESE FONDU.

Recipe.

Put one cupful of milk in a saucepan; add one cupful of grated or crumbled cheese and one cupful of fine bread crumbs. Season with one-half teaspoonful of salt and a speck of cayenne pepper or a half saltspoonful of paprica. Cook carefully until the cheese is melted, stirring continually and serve at once.

Cheese Fondu.

For the cheese fondu which is the principal protein part of this meal,

we season with a speck of cayenne pepper. Cayenne seems especially adapted to cheese dishes, not only in flavor, but it helps also in the digestion of the cheese, and is very much better to use than white pepper, though that may be substituted. The principal thing to remember in cooking cheese with milk, is to heat the milk first, in order to make a smooth dish, and keep the mixture in motion after the cheese is added. Otherwise it will be stringy. The cheese is to be grated, and for that reason you need dry cheese instead of fresh. If it is very fresh you must crumb it with a fork. It is always a very good plan to grate the bread using the inside of the loaf. The crust can be used for bread pudding or some scalloped dish. This cheese fondu can be prepared very nicely in a chafing dish and it takes but a few minutes to do it. It is very well liked even by people who are not very fond of cheese. Cheese put through this grater is so very light that I pack it down as 1 measure it. If you are buying cheese for some dish, it is well worth knowing that a cupful is about one-fourth of a pound.

Question—How is cheese fondu to be served?

Mrs. Jamison—It should be served onto plates right from the dish in which it is made, as it spoils quickly.

SCALLOPED POTATOES.

Recipe.

Use cold boiled potatoes sliced rather thick. Make a white sauce of two tablespoonfuls of butter, two tablespoonfuls of flour, and two cups of milk. Put the potatoes and sauce in a baking dish in alternate layers, seasoning with salt and pepper. Cover with buttered crumbs, using one tablespoonful of butter melted, and one cupful of crumbs. Bake from twenty to thirty minutes.

Scalloped Potatoes.

I have been asked so many times for my recipe for scalloped potatoes, that I thought it might be well to put it into this lesson. There are raw potatoes scalloped by being cooked a long time in milk, and then there are the scalloped potatoes which are first boiled and then put together with the milk and butter, which is the kind I am going to make today. The potatoes were boiled this morning with their jackets on. The advantage of cooking them this way is to retain all the flavor of the potato or of the wholesome mineral salts. For this dish of scalloped potatoes, I am going to make a white sauce. I referred yesterday to white sauce, giving the different kinds of sauces, and now I will make this ordinary white sauce, or milk gravy. I can make it a little quicker by heating the milk. Yesterday I put the liquid in cold, as it was not convenient to heat it, but I think it is a good plan to heat it, if convenient. I shall use the same proportion I used yesterday in the gravy for the chicken pie, a tablespoonful of butter, a tablespoonful of flour, and a cup of liquid.

The only point in this dish of scalloped potatoes that differs from the more ordinary way, is that the butter, flour and milk are combined in a sauce instead of being put in separately. Very often the potatoes are put in in a layer, then butter put over, and flour sprinkled on and milk turned over the whole, with the seasoning. I use the same ingredients in the same proportions, but make a sauce instead of putting the milk, flour and butter in separately, and it seems to make a smoother dish of potatoes. You will remember I stated yesterday in adding the liquid to the flour and butter, if it was added hot it should be added a little at a time, and the mixture might be cooking slowly while it

was being added. If the liquid is added cold it is best to draw the saucepan to one side so that it does not boil at all while being added, and then it needs pretty good stirring until completely mixed. There is a good deal of virtue in beating, in making things of this sort; it will often bring the lumps out when it seems as if they would never come out.

In heating the milk it is better to place the dish containing it in hot water, as it need not then be watched so carefully, and the dish is not so difficult to wash. Sometimes a saucepan on the top of a teakettle is a very convenient way, or still better, a teakettle steamer. I will season the sauce with a little pepper and salt, and the potatoes with a little more salt, because, as the boy said the "Salt is the thing that makes potatoes taste bad if it is not put in." Other vegetables besides potatoes may be scalloped in a similar way, or in some cases it is just as well to put the vegetables in a dish and pour the white sauce over them. It is a nice way to prepare cabbage or onions, having them cooked first, and it is also nice for macaroni. Over the top of the scalloped potatoes I am going to put a dressing of bread crumbs, using a tablespoonful of butter to a cup of crumbs. These crumbs, of course, are not dried crumbs, such as we use for the pork in the first lesson, but crumbs of stale bread, and in the preparing buttered crumbs, where you wish the top brown, and the dish does not require very much cooking, it is nice to know you can brown the bread crumbs in the butter. If you do not wish to take the trouble to prepare the buttered crumbs, a sprinkling of the dried crumbs over the top makes a good finish to a scalloped dish, and it is better than to let them cook without any such covering, because the sauce on the top skims over and does not look well, and is harder to serve

The Unknown Factor.

If the farmer had to consider the individual tastes of each one of his cows and his sheep, he would find his work considerably complicated.

Probably this is the greatest difficulty to be found in preparing food for the human animals. It has been suggested by some, in considering this subject of taste and its relation to digestion, that the difference is mainly in the fact that what we use is cooked, while the food for the farm animals is more commonly raw, and we do not fully understand the chemical processes which these different food elements undergo in cooking nor the full influence of heat on flavors. I have no doubt there is a great deal in that, but even that does not clear up the mystery. A few years ago people ate what they fancied, and gave very little thought to it, so long as it did not really hurt them, as to whether it was the best sort of food for them or not, but we are beginning to understand that food has a value besides the physical effect it produces, and that mental and moral qualities depend somewhat on what we eat. In considering the different nations, the pugnacity of the Englishman has been ascribed to his diet of beef; the hardiness of the Scotchman, to his oatmeal, though we must remember that with them that diet is always accompanied by plenty of outdoor air and exercise;—the docility of the Chinaman, to his diet of rice; and so we might go on through all the nations. Of course we will admit that these characteristics are influenced also by climate, temperature, etc., but the food plays a larger part in it than has been thought until recently, and so food is being studied along those lines, and especial attention is being given to food as a thought producer. We would all like to know what to eat to make us bright. Of late, fruit stands at the head; it used to be fish. Fruit does not contain a great deal

of nutriment, but it does contain the salts and acids which are exceedingly wholesome, and which aid very materially in the digestion and absorption of other foods. There is both sense and nonsense in these considerations. The great value of fruit for people of sedentary occupations, is undoubtedly that it satisfies appetite, and yet does not overload the system with carbon or nitrogen that requires physical exercise to assimilate.

One element, surely, on which the wholesomeness and nutriment of food so much depends, is the flavor. We very often eat more than we want, unconsciously, because we are searching for something that tastes good and are hardly aware what it is. I was interested several years ago in a talk I heard at a meeting where food subjects were being somewhat discussed, with the experience of a lady who said she had never in her life had any special liking for candy. She did not think she had a sweet tooth. She lived in her own home until she went to take care of a friend in another place and the meals were prepared by a maid in the kitchen, who was ignorant very likely of the rules of flavoring, seasoning, etc. The lady said she began to have a craving for candy, and did not know what it meant until after some thought, she concluded it was because the food she was eating lacked in flavor. The first object in preparing food is that it may be nutritious, but the nutriment depends on the flavor more than we are aware of. The digestive fluids are not called out as they will be by an acceptable flavor. You know that sometimes the thought of a delicious dish makes the mouth water, literally; the very thought of it stimulates the glands so that the saliva is secreted. This is one of the mysteries of digestion that it is hard to account for, but it goes to show how much our food depends on flavor for wholesomeness; not only the glands of the mouth, but likewise the glands that secrete the intestinal juices are stimulated by certain flavors. Hence while it is wise to train our taste to like wholesome things, it is not wise to carry this too far or insist upon ourselves or others eating things for which there is a positive dislike. While the food in itself may be perfectly wholesome and not in the least indigestible, it may disagree with the person taking it, in which case very little nutriment can be obtained from it. This seems to be proven by circumstantial evidence, which is all we can say so far, no experiment having yet been made further than that. It becomes the ambitious housekeeper of the present day, then, to study not only the food, but the people she has to feed, and to prepare dishes that are not only nutritive, but palatable, yet without pampering to the depravities which beset appetite.

Closing Remarks.

Mrs. Jamison—At the close of this series of cooking lessons I wish to thank the ladies for their attendance, and for their apparent appreciation of the work that has been done, often at a disadvantage. I also wish to acknowledge my gratitude and appreciation to the young ladies from the Appleton cooking school, who have appeared in their white caps and aprons to serve the various dishes that have been prepared. I think their help can be laid to the fact that you have thoroughly practical and wideawake school officers, for which you ought to congratulate yourselves. I have enjoyed the afternoons spent with you very much, and shall remember them with great pleasure.

Mrs. Cary—Mrs. Jamison, in behalf of the ladies of Appleton and the ladies in attendance at this cooking school, I thank you for the instruction you have given us. Ladies, I think it fitting that we give Mrs.

Jamison a vote of thanks. (Moved and seconded that a vote of thanks be tendered Mrs. Jamison).

Mrs. Jamison—I thank you for these kind words, and am free to acknowledge that very much of the success of the work has been due to the good arrangements that the ladies of the committee have made for me.

EDUCATION OF THE FARMER'S WIFE.

Mrs. L. O. GROVE, Monroe, Wis.

Read at the Farmers' Institute held at Monroe, February 23–24, '97.

I am a firm believer in Farmers' Institutes and always glad of the privilege of attending one in this beautiful and hospitable county seat of ours. I was asked to read a paper at this Institute, and the subject I have chosen to write a few suggestions about, is the education of the farmer's wife.

The farmer's wife requires a large and extended knowledge of a great many things. Of course she should be well grounded in the elementary branches taught in our schools—arithmetic, reading, spelling, writing, grammar and geography. After these I think she should acquire a pretty thorough knowledge of and training in vocal music, and instrumental also if she can afford it, but surely if she can't afford the instrumental she can the vocal, for the throat is a wonderful instrument when by cultivation and practice its range is 2 1-2 octaves or more. And a home without music and without singing is deprived of one of the greatest pleasures of life, and one of the most tender influences. Auerbach says, "Music washes away from the soul the dust of every day life."

The late ex-Governor Fairchild said when he visited the cooking school which was held here at the Roundup Institute in 1895 that it was a habit to say "an honest man is the noblest work of God," but he thought a good cook was the noblest work of God; and that there was more truth than poetry in the old saying that the royal road to a man's heart is through his stomach. So it must be of great importance that the farmer's wife (and other women as well) who usually do all the cooking or at least have to oversee it done, should have a good knowledge of the great art of cooking. She should know how, and be able to make good bread and to cook meats, vegetables, and pastry, coffee and tea, so as to be both palatable and healthful.

It is well to know proportion in arithmetic but it is just as necessary for a woman to know the proportion of saleratus to sour milk, or baking powder to sweet milk, and the other things accordingly. And as I believe there is intemperance practiced in a great many things (if you doubt it look up the definition of intemperance in Webster's International dictionary), I also believe it is a woman's duty at all times to put in a word against intemperance, for we all know, or ought to know, that it is unhealthful and degrading to both soul and body. Let us also study our cooking and see to it that there is no intemperance practiced in that, by using too highly spiced and seasoned foods, and too rich, which is also unhealthful. I hope the time is

not far distant when there will be cooking schools established at every county seat, or some other convenient place, where the girls can attend a regular course of cooking, pass an examination, get a diploma, and that it will be considered an accomplishment to have this diploma, just as well as to be able to play Mendelssohn or Handel on the piano.

Again the farmer's wife is so often called upon to attend the sick, and being generally remote from the doctor and required to administer to the suffering, she ought to have a good knowledge of the human body, its diseases, and treatment. This can all be acquired by a very little labor and small expense. She should know the general laws of health and proper sanitary conditions. Her education would be incomplete unless she has learned to cut and fit to advantage, the various garments used in her household, and to do this not only for comfort and economy, but for beauty as well. Most children get their ideas of the beautiful and good from their mothers. To continue this practical education, she should read good books and magazines and reflect. Edmund Burke says that "reading without reflection is like eating without digesting," and no doubt that is true. One book she always has and that is the bible; this is the best of reading for it contains words of wisdom as well as the knowledge of salvation.

I believe it to be her duty to familiarize herself with the grand sayings and teachings of the holy scripture, and her life will be made happier. She should cultivate a cheerful disposition; her trials are many and severe and unless she is hopeful and cheerful by natural disposition, or acquire these virtues by practice and cultivation, her life will be hard, the children quarrelsome, and the home dismal.

The farmer's wife should thoroughly understand the keeping of accounts, for to her is left most of the buying, and she is largely responsible for the expense of living, and by entering the ordinary business transactions in an orderly way, much trouble will be averted, and the wife becomes the trusted and indispensable companion of her husband without whose assistance and counsel, he attempts nothing. These are a few things I believe a farmer's wife ought to know and her education be along these lines.

I now will close by quoting what Hanford says:

"I am willing a woman should
read Latin and Greek;
Should German and French and
Italian speak;
And be up in the latest aesthetical freak,
If she only knows chicken from
turkey.
I'd like her in music and song to
take part,
Read poetry, science, and cultivate art,
If husband and children were
first in her heart,
And if she knew chicken from
turkey;—"

"Knew barley from rice, knew a
tart from a pie;
A boil from a stew, a broil from
a fry;
And if she went into the market
to buy,
Knew very well chicken from
turkey.
For to make home happy, all
knowledge must blend;
Art, science, and service their
benefits lend;
Then, ladies so clever and wise
condescend,
To know about chicken and turkey."

DIVERSIFIED FARMING.

JAMES H. BREWER, Berlin, Wis.

Read at Farmers' Institute held at Eureka, March 2–3, 1897.

The farmer's lot reminds me of a certain fish, or fish story I have heard—that in the beginning when all the various kinds of fish had been created, there still remained a lot of superfluous bones on hand, so one more fish was made, the bones bundled up and thrown in, and the fish called a red-horse. And a very good fish it turned out to be. And so I have thought that at about the same time, when various trades and occupations were being distributed—one to the doctor, another to the merchant, the lawyer, etc., of course the easier ones all being gobbled up first, there still remained a lot of hard, tough jobs, very similar in name and appearance, and only one class of people left to take them; and so they were all bundled off to the farmer. I like the word, farmer, as Crabb is quoted by Webster as saying, "A farmer is always a practitioner, the agriculturist may be a mere theorist."

And so the farmer, living as he does, sixteen hours out of the twenty-four in God's free air and sunshine, inhaling oxygen from the fields and cow stables, building up muscle and brain from the "fat of the land," with his brawny arms, his broad shoulders, and broader views, is better adapted and qualified to accept adversity cheerfully, yes, or even prosperity, although it may sometimes seem a long time in coming.

Farming is as much of a science as most of what are called the learned professions. Crops do not depend so much on the kind of soil on the farm, as they do upon the kind of man that is upon the farm. Brains must be mixed with the soil as well as manure.

And so the farmer to be successful, must be educated and intelligent. He should be a whole encyclopedia in himself. He should be a chemist, that he may determine the composition of the soil he cultivates, and the articles cultivated in order that he may supply the deficiencies in either, and that he may know the constituent parts in various kinds of feed, that he may feed his cows for milk, his horses for muscle, his colts and young stock for growth, and his porkers to weigh 200 pounds in the shortest possible length of time.

We are each year advancing in all lines of agriculture, and he who would keep abreast of the times, will have to be ever on the alert for easier, more rapid and economical methods of production. By means of railways, and increased steam navigation facilities, we are compelled whether we wish to or not, to compete with the markets of the world. And so the larger variety of products we have to dispose of from our farms, the more apt are we to get a fair remuneration for our toil, and our incomes will be more evenly distributed throughout the year.

I would not confine myself to stock raising or grain; to grow the one we must have the other. And do not let us be satisfied with poor stock, poor crops, or poor farming. The first two of these will inevitably follow the latter. To remedy the first we may have to be to some extra

expense for breeding stock at the start, but when this is once obtained with a little extra outlay of money, annually, mixed with good judgment, we may go on improving our farm stock, until we have that suited to our especial needs and purposes. For me, the stock that suits me best is that, that I can realize the most profit from. This may mean different breeds of stock, in different sections or localities, and on different farms.

So let us study what it may be with us individually, and then get it. Let us have the best, from the old mother here with her brood of plump Plymouth Rock chickens, along with the pigs that we can make the most pork from in the shortest possible time, and with the least feed; the sheep that is best adapted to our locality, be it for either wool or mutton; the cows that will make most butter and that will respond the more readily to good feeding; and horses that will find ready sales at good prices.

In regard to other farm crops I would not confine myself to either hay, wheat, corn, rye, oats, barley, beans, potatoes or sugar beets, but would study the law somewhat of supply and demand, and govern myself in a measure accordingly. Grain can be kept sweet and good for years, by being stored in a dry place and shoveled once or twice a year from one bin to another, thus giving one a chance to look up a market. To do this, a man should be out of debt, or at least have no one carrying him in such a way that he would be forced to sell his produce to or through his creditor.

The only way to feel free and independent is to keep out of debt, to pay as you go. If you can't pay, better not go. By this I mean the making of store bills, and for farm machinery, repairs, etc. Most of us had to go in debt for our farms at first or we might never have had one.

The average yield of wheat in our state is about thirteen bushels per acre; that of oats and corn thirty-two, potatoes about one hundred bushels; our meadows average a ton of hay to the acre, and our cows one hundred pounds of butter per head. This is an average yield. Of course there are a great many farmers in our state that double this yield, when at the same time there would be many others who would only get one-half of it. To double or largely increase the yield of our farm crops is absolutely necessary to be successful. To do this may somewhat increase the labor and cost but should not in proportion to the increase in yield. And so there is a vast field of possibilities and resources open to the intelligent farmer. With the various kinds of marketable grains, hay, stock, fruit and vegetables he can grow, he should never be without some kind of produce that he can turn into ready cash.

Another good feature for the farmer is,—he need never be out of a job. Dr. Franklin once said, and I believe he must have had the farmer in mind at the time: "Are you your own master? then be ashamed to catch yourself idle." There are always "odds and ends" that are liable to get behind in the rush of the business season, that may be looked after when favorable opportunities occur. An hour's time can be very profitably expended once a week in picking up and putting to rights around the lawns and farm buildings. There is nothing that will call attention quicker or advertise a farm better than when in passing to see every thing in shape and place, and neat and tidy around the home. It takes eternal vigilance to keep it so, but the satisfaction one takes in seeing it, well repays him for all labor expended.

The shop is a very necessary adjunct to successful or "diversified farming." In it there should be car-

penter and blacksmith tools, and woods and iron, suitable for any repairs that may be necessary to make. And so many a trip may be saved to a distant town in a hurrying time, and the repairs made at home, often in a few minutes' time. And many a stormy day may be utilized to good advantage in the shop. It makes me tired to see great big two-fisted farmers in perfect health, growling about their lot in life, and about the oppresson they imagine they suffer, when the truth is, they are or should be, the most independent and happy people on earth. Slovenly farming and wasteful habits, with lack of energy, is more the cause of their imaginary misfortunes than any thing else.

Farming is a business (or many different kinds of business in one), and he who neglects his farm in any way neglects his business. Industry and good management will cure most of the imaginary evils farmers are complaining of. Let the farmer educate himself and family, make his home and farm attractive, and his surroundings as pleasant as possible, be diligent, be honest and upright in all things, then all the blessings of life and prosperity will be added unto him. It is necessary for farmers as well as merchants or any other class of men to educate themselves, and vote their opinions, and the truest of wisdom to so express their opinion for the greatest good to the greatest number. But politics will never cure the effects of the drouth or a man's laziness or neglect.

One must work out his own salvation on the farm, and it is better that it be not done with fear or in a trembling manner. Wise Plato said:

"The world with men was stored,
That succor each to other might afford."

And so he who makes the world better for having lived in it, has surely not lived in vain. A farmer who, having high ideals, has striven to reach them, has helped to place this grand occupation of his on a more elevated plane. If his talent is not what he may wish it to be, let him do his best with what has been given him, and in so doing he will assist in elevating his calling, and at the same time be instrumental in benefiting his brother tradesmen and all their posterity.

HOME BUILDING—A PLEA FOR BETTER HOMES FOR FARMERS.

W. H. Pickford, Monticello, Wis.

Read at Farmers' Institute at New Glarus, Feb. 16–17, 1897.

When a friend comes to visit you, have you not noticed that there are different degrees of visiting? During the day time you take him around with you as you go to your work, and you talk about your stock, your crops, your buildings and such common place things; but when evening comes and the work is done, supper is eaten, and the children put to bed, then you draw your chairs up to the fire and talk of those things which are nearest to your hearts, and which for some reason you could not bring yourself to speak of during the day. It is in some such spirit as this that I have chosen to speak to you on a subject which I believe is dear to most of us, and should lie at the very core of our lives.

I do not wish to underrate the importance of those subjects which relate to the raising of revenue on a farm, but I will leave them to others who have been successful in some special line, and will ask your attention to one which I think is of the greatest importance to us. I refer to the subject of home building. You may have heard of the farmer who wanted to buy more land, to raise more corn, to feed more hogs, and so on. There are many such men, but many of us would stop that rotation and put in the phrase—to build a home. I did not say house, because house and home are not synonymous. A house is only part of a home.

Ever since I have been a farmer I have been impressed with the home building possibilities of our occupation. I can readily see how a person living in a city can occupy a dozen different houses and become attached to none. He buys his house room just as he buys his groceries, and he gets as much as he can for his money. So when he finds he can get better accommodations for less money, off he goes, with as little regret for the house that he leaves as I have when I throw aside an old pair of shoes. But I cannot see how anyone can begin with a piece of raw prairie or timber land, and through years of toil and care, convert it into a home, without growing into it, taking root in it, as Oliver Wendell Holmes says: "What a sense of ownership comes to a man who has seen trees, planted by him, grow from twigs to giants." What man or woman is there that does not become attached to a place where every building, tree, bush and flower represents so much of their thought and effort. What a companion is an apple tree that one has planted and pruned and guarded until it begins to return fruit to him for his care! Shall we smile at a man who says he has some affection for trees and buildings? It is a good sign when a man begins to take root; and happy is he whose roots strike deep and wide, for he is anchored from many an evil. There has been too little of this taking root in this busy western country.

But the change is coming. I know many men to whom the market price

for land would be no temptation to sell. They are there to stay as long as they are active farmers. When a man begins with bare land, and works and worries until he has a comfortable house, ample barn room, sheds, fences, a well that is no longer an experiment, an orchard that is bearing him fruit, and all the other things that are needed to make farming a comfortable, as well as a profitable occupation, he begins to find out that there are many things that have cost him both money and labor, that he will sell at a loss if he sells the farm, because houses and barns are somewhat like clothing, they are intended to fit the owner; they seldom fit a stranger so well; hence, they do not have as much value in his eyes as in those of their builder.

We all desire to be successful, and the world worships success. But success is a relative term, and means one thing to one man and something quite different to another. To some it means the simple accumulation of wealth, the making of a "pile," the adding of one forty to another until one has the largest farm in the neighborhood; the biggest bank account. If this alone were success, then most of us are doomed to failure. To others it means the finest house, the largest barn, the biggest crops; and judged by this we are most of us failures. But I believe that a man and a woman have a right to call themselves successful, who for their life work have built a home wherein is found plenty and comfort, and out of which come children who make useful and honorable citizens, and this notwithstanding they may always have been a little pinched for money, and sometimes felt hard times. If I am right in this then success lies within the reach of most of us. It will be of a kind not embittered with envy. We shall enjoy it while we are earning it. It will breed a healthy contentment. Our life work will make the world a little better, and we ought to be happy.

The general tone and character of these country homes has a greater influence than many persons suspect. In every political crisis the nation finds that the country is the balance wheel, and the brake on the body politic. The shrewd politician is always a little anxious until he hears from "wayback." But it is in business more than in politics that the effect of country homes is felt. The country is continually furnishing new blood and vigor to the city. The majority of the successful men in the cities were country boys, and they tell us that other things being equal, the country boy has a better chance than the city boy, because of his having greater endurance, more frugal habits, more tenacity of purpose, and more self reliance; all of which are a natural result of life on a farm.

The isolation of farm homes is a benefit or a detriment to our children according as it is used. It gives parents more complete control over children than is possible in cities, and with proper training may be a benefit to them. On the other hand, if they are allowed to grow up untrained, the result can only be uncouth, ill-mannered, and possibly immoral children. They absorb much from their surroundings, hence the necessity of making their environment as favorable to good growth as our means will allow. Shall we rest content with giving them all they need of food and clothing? We do as well as that by our cattle. Shall we not also feed the eye, the ear, and the mind? If they are eye hungry, let us feed them with flowers in and around the house, with pictures that appeal to their higher natures. If they are ear hungry, feed them with music and song. I know of nothing that will tie members of the family together as well as music, only let it be distributed among all the members

and not all heaped on one. Let them sing songs of sentiment and love, providing they are pure and noble; but most of all, get them to sing those deeply religious songs and hymns that most of us can remember that our mothers used to sing, and which we keep tucked away in our memories with other sacred things.

The best time to teach a child is when he wants to know. There is a time in the child's life when he is mind hungry. Can you not recollect it in your own life? It is just as much our duty to provide good mind food for them, as it is that we make them healthy and strong. But, my friends, we cannot do this if all the tools we have to work with are the country newspaper, and almanac, and a horse doctor book. Neither can it be done with half a dozen costly subscription books. For these half dozen, let us buy fifty or more. The novelist will show us human nature. The historian will recall the past for us. The scientist will study and experiment for us. The traveler will go from pole to equator, and they will all wait upon our humor; and come and sit with us when we invite them. In this age of good cheap books, there is no need of a farmer's child being mind hungry, and going unsatisfied for want of them. Buy a few at a time, but keep buying. Whether they are farmers or join the army that moves cityward, this training will be in the right direction. It will tend to make them gentle in nature, as well as manly and womanly.

This movement of our young men to the city, is to a certain extent, unavoidable. It is the natural restlessness of youth. It is not desirable that all of our boys should be farmers, or that all of our girls should become farmers' wives. But it is desirable that they shall not leave us because our homes are bare, or our lives are dull. It is desirable that the one who by chance or choice is a farmer, shall not regard himself as the unlucky one of the family. And yet you will not deny that they sometimes do. Why should not the farmer have as much comfort and as many conveniences in his house as a townsman of equal means. Why should farmers who are well to do, allow professional men, merchants, and even clerks, to pre-empt furnaces, bath rooms, hot and cold water apparatus, cisterns, and such luxuries or necessities—just as you choose to look at them? Do you know of any farmer who has worried along the best part of his life without these things and more too, and then moved to town, and on the income of one-third of his farm felt able to afford all of them? Why could he not afford them on the farm? Simply because he did not. Suppose we look at it this way. The farmer is looking over his machinery on a June day, and he thinks haying is nearly here. He has an old four-foot mower that will cut grass well enough although it may need a few new sections or minor repairs, but his neighbors all have six-foot machines; so he goes to town and makes a trade for a new machine, letting his old one go for a little more than the price of old iron and he gives perhaps, in exchange $45.00 cash. There is nothing unusual about that, is there? Maybe you have done it yourself. Just as like as not, the dealer sells him a patent hog waterer, fully equipped, for $5.00 which is a nice thing both for him and the hogs. And now he comes home feeling that he is an up-to-date farmer, with a six foot mower and a patent hog waterer. Now, suppose after dinner, when they have admired the paint on the mower and he has explained the workings of the patent waterer, his wife were to say to him, "James, I wish you would fix up the bathroom and have hot and cold water tanks and pipe it

to the bathtub and kitchen sink." Would not his face be a study? Would he not say, "Mirandy, do you suppose I am made of money?" Out of which investment would he get the most benefit? Now, if anyone needs a bath regularly and often at certain seasons of the year, it is the farmer; but when he must steal a bath as he would a melon, he deserves great credit if he keeps himself clean. If anyone needs a kitchen sink with hot and cold soft water on tap at all times, and a drain to that sink, it is his wife. Just think of the tons of water some one must carry out of a farmer's kitchen in a year, and the law of gravitation lying idle.

I may truly say that we are an enterprising set of farmers. We always buy the latest made machines and some of us are so enterprising that we do not half wear out our old machines before we buy new ones. Why should we not be as careful to fix up our wife's workshop as our own? Let us make our homes as nearly as possible, suburban—keeping all the advantages of the country, and adding as many of the conveniences of the city as lies in our power. I believe if more farmers would make home building and home adornment an aim in life, we should be more contented as a class. We should not be in a hurry to move to town. We would be less envious of persons who make a great show. In estimating one's position, it makes a great difference to one's feelings as to which way he looks. It sometimes pays to look backwards. I believe that every man owes it to himself to be above his business in the sense of saying to it, "You keep your place. I am greater than you." How successful is that man who has farmed so well that you cannot touch him any where, but farming oozes from him. I recognize the power and convenience of wealth; but if in acquiring it we lose either health, honor or happiness, it comes too dear. Let us be good to ourselves and to those committed to our care. Let us live this life well, remembering that when the Great Equalizer, Death, comes to us, of all the things that we have accumulated, there is but one that we can keep, and that is the character that we have built around the personality which this body encloses.

OPPORTUNITIES AFFORDED YOUNG MEN FROM THE FARMS AT THE UNIVERSITY OF WISCONSIN—AN AGRICULTURAL EDUCATION WITHIN REACH OF EVERY ENERGETIC YOUNG MAN WHO WISHES TO EXCEL IN GENERAL AGRICULTURE.

R. A. MOORE, in Charge of Short Course.

By a wise provision of our legislature in 1895 the Farmers' Institute Bulletins now reach every district school in the state, and are not only read by the young farmers attending district school, but are drawn from the libraries and read by those at home under the same rules and regulations as other books of the libraries.

With this distribution of eight thousand copies and a general distribution of 52,000 copies by Superintendent McKerrow at Farmers' Institutes, Bulletin No. 11 will reach the homes and firesides of more people than any previous issue, consequently a chapter to young farmers seems very essential.

There is no longer any doubt as to the advisability of the farmer being trained in the vocation he follows in order to succeed, as he has as deep and intricate subjects to fathom on the farm as the doctor, lawyer, or manufacturer, consequently he should have the same opportunities afforded him to secure this proper training.

Courses in the College of Agriculture.

The University of Wisconsin has made ample provisions for agricultural instruction in the College of Agriculture, which now gives the following courses to young farmers: The Graduate Course, the Long Course, the Short Course and the Factory Course in Butter and Cheese Making.

Graduate Course.

The Graduate Course is for graduates from our own and other universities who wish to further their education by original investigation and professional training; rare opportunities are afforded such students in the Experiment Station and scientific laboratories.

Long Course.

The Long Course which requires four years for completion affords special and scientific training in agriculture. It is designed for young men who wish to secure training along agricultural lines commensurate with that given in the scientific and engineering courses of the University. It is treated fully in the University catalogue which can be had by applying to the Secretary of the Board of Regents.

The Short Course in Agriculture, and the Factory Course in Dairying are popular courses for young farmers, and of these courses, in particular, we wish to give information through the Bulletin.

The Short Course in Agriculture.

The Short Course meets the needs of the average young farmer who cannot arrange to leave the farm for the entire year, but who can conveniently enter the college at the beginning of winter when the major portion of the farm work is over and less help needed at home. This year the term opens Nov. 30, and continues 14 weeks, closing March 3, thus letting the young men back to the farms before active work begins in the spring.

The Short Course extends through two winters, and upon completing the studies embraced in the course, the student receives a certificate from the Board of Regents.

Special arrangements are made for young men who can only attend one winter and do not wish to work for a certificate. To meet the needs of these an opportunity will be given to take all studies which can be completed the first winter and such other work in the second year as they deem most essential, providing it does not interfere with their schedule of studies.

The majority of young men now do not wish to stop half way so arrange to take the second winter and complete the course.

Employment for Short Course Students.

Dairymen, Stock Breeders, Horticulturists and general farmers, realizing the worth of young men having training in their especial lines of work, apply to the college for our students. During the past few months over one hundred applications have been made for our young men from different portions of the United States. In many cases responsible positions are tendered them with corresponding salaries. Since the close of the last term thirty of our former students have accepted such positions.

The time is near at hand when the young man who wishes a responsible position on the farm will be confronted with the same question that meets the teachers of our public schools, namely: "What are your qualifications?" The age demands that a man should be proficient in the work he undertakes if he wishes to push to the front.

The general satisfaction given by our students to those for whom they labored the past season seems to warrant a larger call for them at the close of the coming term than ever before, and no pains will be spared in filling such places satisfactorily and promptly with the young men fitted for such positions.

The larger portion of our students return to the homes of their parents to put into practical use the knowledge acquired while in the college.

Lines of Work Pursued in the Short Course.

The experience gained during the twelve years the Short Course has been in existence has enabled the agricultural faculty to arrange a systematic course of study, thoroughly practical and especially what is needed by the average young man from the farm, so as to gain the greatest amount of knowledge in the least possible time.

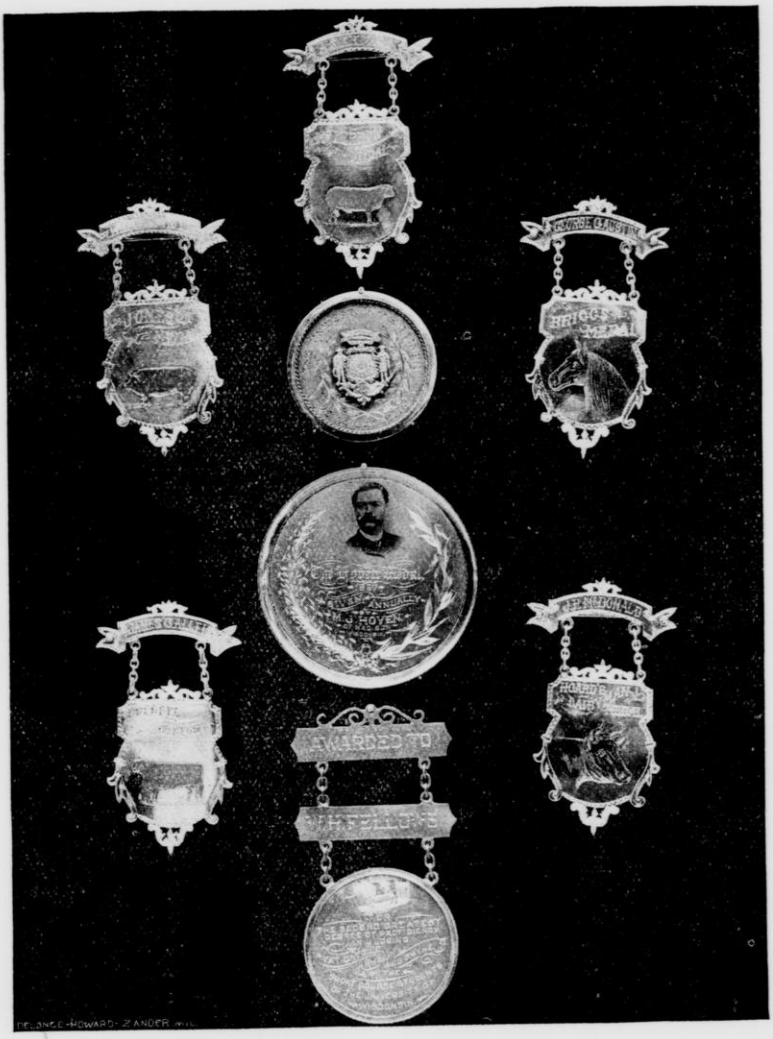
Live Stock.

The increasing live stock interests of our state demand much attention, consequently three instructors are employed in this department.

First: the dean of the college takes up the work in feeding, giving students a general idea of the composition of the most important feeds, and standard rations used by the most successful feeders of Europe modified to suit the conditions of the American farmer. The aim is to make the young men intelligent and economical feeders of live stock, utilizing the products in reach to the best advantage, thus marketing the grain products of the farms through the farm animals instead of putting them on the market at the low prices that are now being paid.

The professor of animal husbandry gives a series of lectures on breeds and breeding of live stock with reference to origin and general characteristics of each type of various animals. Live stock judging has become a very attractive feature of the course, and a great interest is taken in the same by all students.

Heretofore students have done most of the judging outside in the yard near the University barn and labored under many disadvantages, but last winter the legislature came to our rescue and enabled us to build a $15,000



MEDALS AWARDED IN 1897.

Duplicates of these will be awarded to Second Year Short Course Students in spring of 1898.

dairy stable and stock judging building for the use of the students hereafter. With this building and its many conveniences, together with the dairy herd which will soon be purchased, the live stock department will be more interesting and instructive than ever before.

Citizens of our state wishing to encourage the students to further effort, give valuable medals and prizes each year to those showing the greatest proficiency in judging live stock. Eight medals and seven prizes aggregating a money value of $350.00 will be awarded the coming term to young men for proficiency in different lines of work in the live stock department.

STUDENTS COMPETING FOR THE HOARD'S DAIRYMAN MEDAL.

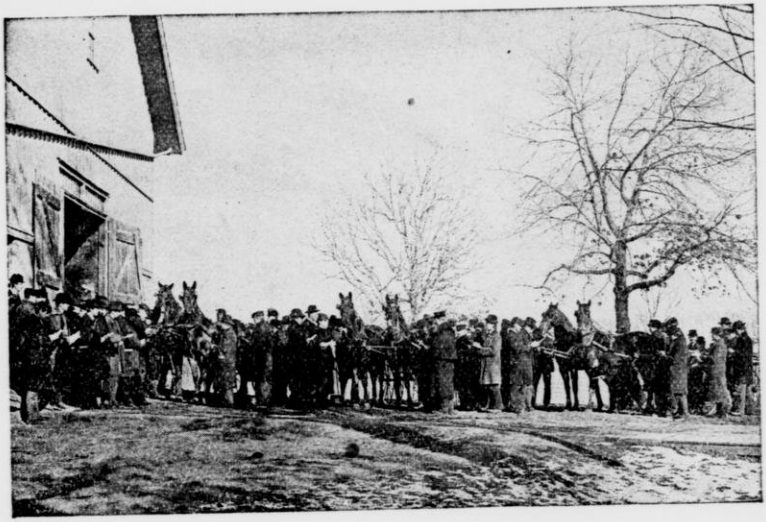
Judging Dairy Cows at the Brown Bessie Stock Farm, Owned by H. C. Taylor, Orfordville, Wis.

The veterinary surgeon treats of the diseases common to farm animals and lecturers on the physiology, anatomy, and hygiene of the animal body. Our object is not to make veterinarians of our students, but enable them to take care of the stock in general. Some of the leading veterinary colleges of America recognize the work of the Short Course and grant special inducements to young men who have taken it. The Chicago, and McKillip veterinary colleges of Chicago, Illinois, will accept our students as juniors, thus enabling them to secure diplomas by attending two sessions. The Ontario College, Toronto, Canada, which has a two years' course, will admit our students as seniors, enabling them to compete for a degree in one session.

Live Stock Judging at County Fairs.

The thorough drill received by Short Course students enables the best of the class to become proficient judges of live stock. The leading county and

district fairs of the state now call upon the Agricultural College to furnish the live stock judges for their annual exhibitions. Last year our students judged live stock at 36 different fairs in Wisconsin, and this year they judged at about an equal number besides being called to do judging at fairs in Iowa, Illinois and Ohio.



STUDENTS JUDGING CARRIAGE TEAMS.

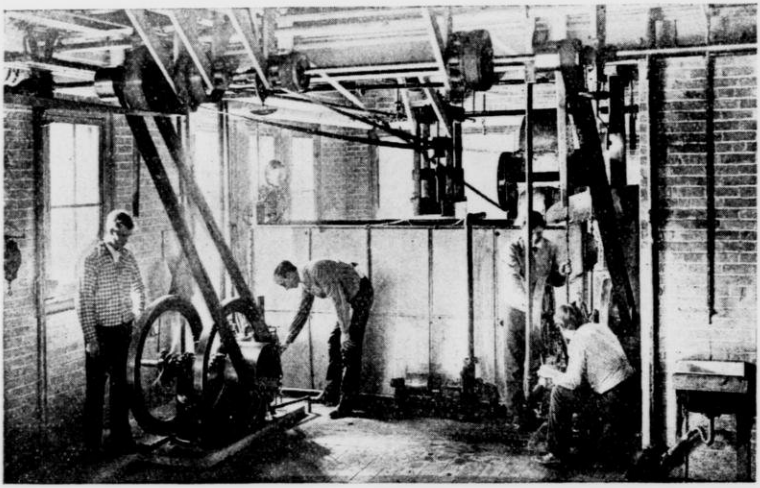
Farm Dairying.

Wisconsin, during the past few years, has rapidly pushed to the front in the dairy business, and our state is especially noted for its choice dairy butter. In order to encourage and still further strengthen this industry, "Farm Dairying" is taught in the Short Course.

Here the students have an opportunity to make butter as it should be made on the average dairy farm. Cleanliness is one of the prime factors and the crusade against dirt is unceasing during the term.

The instruction includes practice in running small separators by hand, steam or tread power, ripening the cream, the use of the Babcock test and the lactometer, churning, working and packing butter either in prints or tubs, and marketing the product to advantage. In addition to the practical work mentioned, the students receive a series of fourteen lectures from Dr. Babcock.

FARM DAIRY.
Students Operating Hand Separators.



A LESSON IN RUNNING AND CARING FOR ENGINES.

Agricultural Physics and Mechanics.

The work embodied under this head has become so important to the farmer that especial attention is given to this branch of study in the Short Course.

The students are drilled to consider the draft of horses, the draft of wagons, the construction of roads, the running of steam and gasoline engines, windmills, tread powers and other farm motors. Attention is given to the construction of silos, stables and other farm buildings so as to have them convenient and substantial; also the questions relating to the importance and control of soil moisture, drainage, irrigation, tillage, etc.

A LESSON IN TILE DRAINAGE.

The completion of the Physics building has added much to the efficiency of this department. The work has grown to such an extent that Prof. J. A. Jeffery, a graduate of our college, has been called to assist Prof. King in his many duties which devolve upon him through increasing work.

Bacteriology.

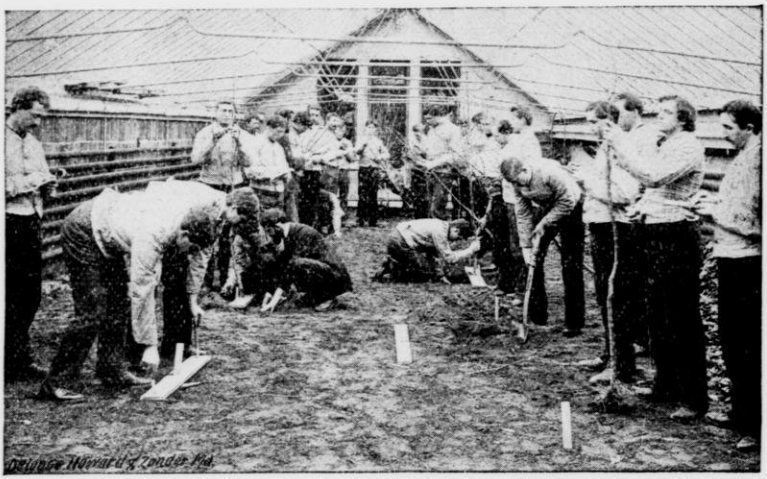
The Second Year students receive fourteen lectures from Dr. Russell on the bacteria that attack animal and plant tissue, and the relation of bacteria to milk and its products, and to soil fertility. It is important that farmers should have a general understanding of the relation of bacteria to the various lines of agriculture.

Economics of Agriculture.

Recognizing the importance of a knowledge of agricultural economics Prof. Wm. A. Scott of the University School of Economics will give a series of fourteen lectures on this interesting subject. The course embraces such topics as: Agriculture in its primitive stages, relation of agriculture to other industries, money and banks and their functions, the relation of the railroad and elevator systems to agriculture, how prices are determined, and the competition that the average farmer of today has to meet in plying his vocation.

Plant Life and Horticulture.

The many natural advantages of the state for growing fruit and vegetables are becoming more and more apparent, and consequently secure the attention in the Short Course that they justly deserve. Under the guidance of Prof. Goff and two assistants the students are taught to propagate their own or-



STUDENTS PLANTING APPLE TREES IN GARDEN GREEN HOUSE.

chards and take care of them properly. They also receive lectures and practical work on the seed and its germination; the nutrition of the plant and its development from the seedling to complete maturity; how plants are affected by external influences, as heat, cold, moisture, dryness, parasites, soil, climate, etc.

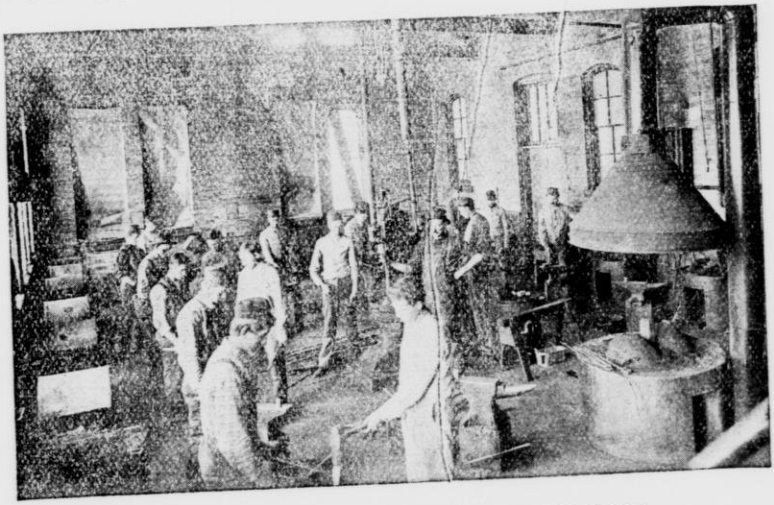
The students are drilled in the horticultural laboratory and in two large green houses where practical experiments are being carried on in plant life.

Agricultural Chemistry.

No longer can the average farmer of Wisconsin plow over the virgin soil and raise abundant harvests as in bygone years, for the soil has been robbed of its fertility by continual cropping. In order to restore the fertility, the farmer should understand the chemical elements contained in the soil, air, crops and manures and know how to utilize and care for all to advantage, so as to get the greatest possible good from them. The students receive a series of lectures bearing directly upon these important subjects from Dr. S. M. Babcock.

Farm Book Keeping.

A course in book-keeping is given to the first year students which includes a farm set of accounts embracing common accounts on the farm for an entire year, also several sets of commercial accounts. The object is to train the student so as to understand the underlying principles of book-keeping, so that he can keep a systematic set of accounts in connection with whatever business he undertakes. In this course are discussed such topics as notes, bonds, mortgages, drafts, checks and commercial paper in general.



STUDENTS AT WORK IN THE BLACKSMITH SHOP.

Practical Mechanics.

A course in blacksmithing and carpentry is given to first and second year students. The instruction includes forge and carpentry work that is immediately applicable on the farm. All farmers should understand the use of

tools so as to do their own repairing, thus saving a great deal of valuable time and money and utilizing material that would otherwise go to waste.

Short Course Literary Society.

Realizing the benefits derived from intelligent discussions our students have an organized literary society where they receive drill in essay writing, speaking, parliamentary practice and debating.

They are also taught how to organize and conduct district school meetings, town meetings and farmers' clubs.

The students find this one of the instructive features of the course, consequently all take a deep interest in the meetings, which are conducted and governed strictly in accordance with Roberts' Rules of Order, from which text the students receive their drill in parliamentary practice.

Libraries and Reading Rooms.

The students find this one of the instructive features of the course, con- and reading rooms connected with the University. The agricultural library alone, has over 4,000 volumes bearing upon agriculture, besides one hundred of the leading agricultural papers of the world. The general University library contains 43,000 volumes, and the Historical library over 100,000 volumes of choice literature.

Gymnasium.

For a small fee Short Course students can take regular work in the gymnasium, and a large number of the students last year availed themselves of that opportunity.

Number of Students That Have Taken the Short Course.

At the present writing 483 students have taken the Short Course. Of this number 64 have come to us from other states, and 419 from Wisconsin.

Short Course Certificates.

Three years ago the Board of Regents decided to grant all students completing the studies of the Short Course in a satisfactory manner certificates signed by the Agricultural Faculty. Up to the present time 68 certificates have been granted.

Requirements.

Students in order to enter the Short Course should be not less than sixteen years of age, and have at least a common school education.

No entrance examination is required; faithful and earnest application to study is expected of all.

Many of the subjects taught are quite as essential to women as to men, for often they have a part or the management of farms and gardens. In order to better prepare them to meet this responsibility, young women are granted all the rights and privileges of the Short Course.

Expenses.

The Short Course is free to all residents of the State; those from other states pay an incidental fee of $10.00 and a tuition fee of $6.00. All students pay a fee of $1.00 for material used in the Farm Dairy Laboratory.

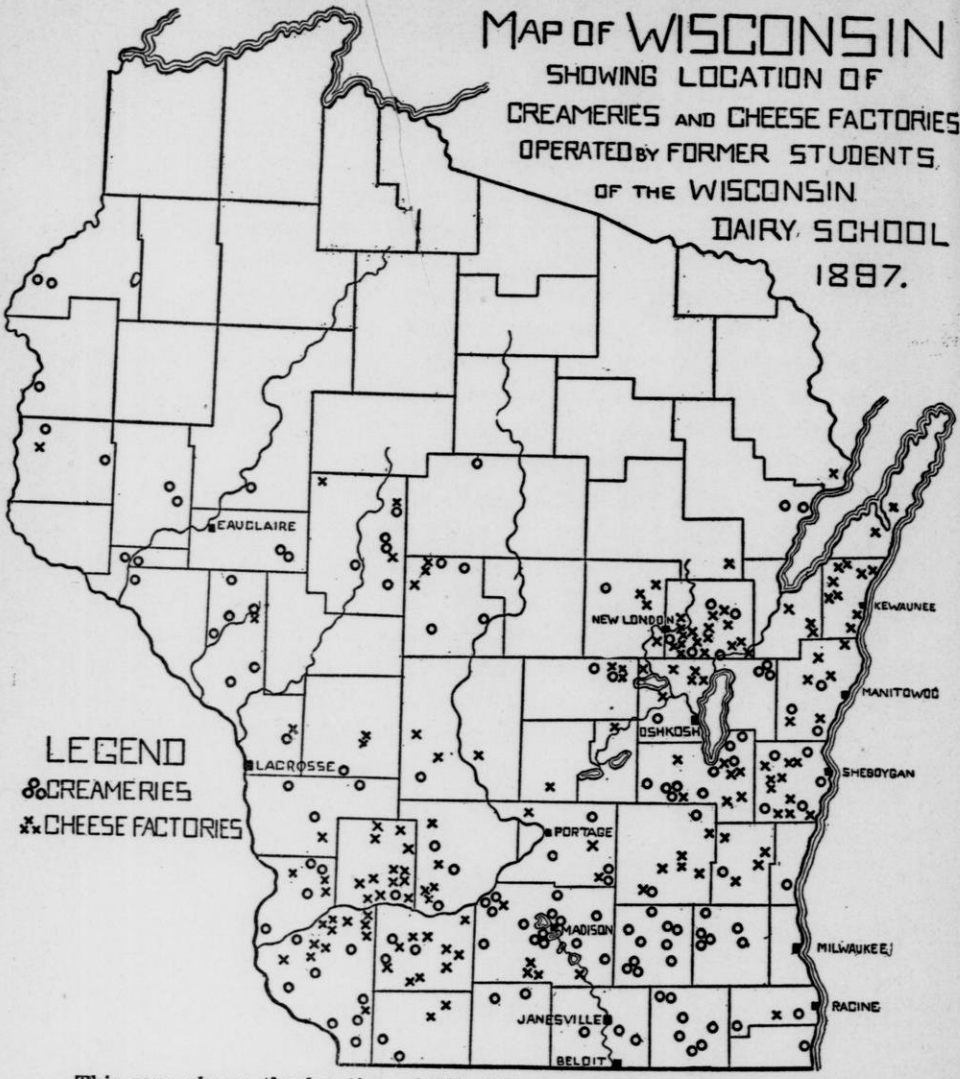
The expenses of the First Year students from Wisconsin including board, room rent, books, incidentals and cost of visiting stock farms will be about $50.00; expenses for Second Year students will amount to about $10.00 additional on account of visiting Stock Farms. The entire cost to non-resident students will be about $66.00 for the first winter, and $10.00 additional for the second.

For full information and Short Course circular, address R. A. Moore, Madison, Wisconsin.

FACTORY COURSE IN BUTTER AND CHEESE MAKING.

PROF. E. H. FARRINGTON, in Charge of Course.

The Wisconsin Dairy School has been called the "Parent" Dairy School of the U. S. Since the erection of Hiram Smith Hall, the $40,000 building and equipment devoted to this instruction, there has been an attendance each year of 100 students which is the full capacity of the present accommodations. This building was occupied by the first class in 1892. The winter term of twelve weeks begins Dec. 1st. The courses of instruction include lectures by eight professors, and from four to eight hours' work each day in either the creamery, cheese factory or milk testing laboratory of the school.



This map shows the location of 141 of the creameries and 149 of the cheese factories operated in 1897 by former students of the Dairy School. Many other factories have been operated from time to time by our students during the past eight years.

Since the opening of the Wisconsin Dairy School in 1891 there has been a total attendance of 665 students; 543 of these were residents of Wisconsin and 122 of other states and countries.

Former students have become instructors at dairy schools in 14 other states.

At the Wisconsin State Fair of 1896, the Dairy School students took eleven out of a possible sixteen prizes offered for creamery butter and cheddar cheese.

A special course in milk and cream pasteurizing is also given for such students as desire instruction in this new branch of dairying.

The milk which the students manufacture into butter or cheese, is bought from fifty-seven farmers or patrons who deliver it daily to the school. The most modern and approved methods and machinery used in creameries and cheese factories are obtained for the instruction in these lines of work, and the milk testing instruction includes twenty-four lectures by Dr. S. M. Babcock, the inventor of the test, on the chemistry of milk.

The dairy students in the past have included young men, old men, and women. Owners of butter or cheese factories sometimes attend themselves, while others pay the expenses of a young man who agrees to work for them after taking the Dairy School instruction. Every one who attends the Dairy School must have had at least four months' experience in either a creamery or cheese factory before entering the school. Each class has contained men who have had years of experience in butter and cheese making as well as those of less experience. Students having this previous experience are able to begin on almost the first day of school to use the six different power separators, eight cheese vats, milk testers, box churns, combined churn and worker, etc., which are in daily operation at the school.

Dairy certificates are granted to students who have passed satisfactory examinations and who have successfully operated a creamery or cheese factory for two seasons of not less than seven months each, and a favorable report is made of their work by the inspector.

Residents of the State of Wisconsin taking the Dairy Course pay fees amounting to $6.00 to the University; those living in other states pay $32.00 fees. The estimated expenses of a student including fees, board, etc., for the term of twelve weeks is $52.00.

Weights per Bushel (Commercial).

	Lbs.		Lbs.
Wheat	60	Flax	56
Clovers	60	Buckwheat	50
Peas	60	Millet	50
Beans	60	Sorghum	50
Potatoes	60	Barley	48
Onions	57	Millet (Hungarian)	48
Corn (in the ear)	70	Timothy	45
Corn (shelled)	56	Oats	32
Rye	56	Orchard grass	14

Seed Used per Acre.

	Drilled. Bus.	Broadcast. Bus.		Drilled. Lbs.	Broadcast. Lbs.
Wheat	1½	2	Clover (red)	...	12
Oats	2	2½	Clover (Alsike)	...	4
Barley	1¾	2¼	Clover (white)	...	3
Rye	2	2½	Clover and timothy.. (8 clover, 2 timothy)	...	10
Peas	2	...	Timothy	...	5
Buckwheat	...	½	Orchard grass	...	25
Beans	1½	...	Rape	1½	3
Oats and peas (mixed for hay) (Oats 1, Peas 2)		...	Turnips	1	2
			Carrots	2	...
Flax	...	½ to 1½	Beets	4	...
Millet	...	1			
Corn	¼	...			
Potatoes	10	...			

Vitality of Seeds if Properly Kept.

Turnips	5 years	Wheat	2 years
Rape	5 "	Buckwheat	2 "
Pumpkin	5 "	Corn	2 "
Peas	3 "	Timothy	2 "
Beans	3 "	Rye	2 "
Clover	3 "	Flax	2 "
Oats	3 "	Millet	2 "
Barley	3 "	Orchard grass	2 "

Yield of a Good Crop of Farm Products per Acre.

Oats	50 bus.	Rye	25 bus.
Corn (shelled)	50 "	Hay	2 tons.
Barley	50 "	Potatoes	200 bus.
Wheat (winter)	30 "	Turnips	500 "
Wheat (spring)	25 "	Mangels	800 "
Beans	15 "	Sugar Beets	500 "

INDEX TO ADVERTISERS.

	PAGE.
Acker & Gartenbau Zeitung (German)	279
Agricultural Epitomist	279
Allen, M. T., Potatoes	292
Alsmeyer, E. C., Nursery Stock	293
American Grange Bulletin	278
American Sheep Breeder	277
Arnold, Alex. A., Shorthorns and Berkshires	309
Boynton, W. D., Nursery Stock	308
Bradley, W. C., Jerseys	305
Breeders' Gazette	279
Champion Milk Cooler Co.	283
Chicago & North-Western Ry	286, 287, 294, 295, 306, 307
Chicago, Burlington & Northern Ry.	282
Chicago, Milwaukee & St. Paul Ry.	298, 299, 314, 315
Coe & Converse, Nursery Stock	297
Convey, Thos., Poland-Chinas	276
Cornish, Curtis & Greene, Dairy Supplies	296
Currie Bros., Seedsmen and Florists	297
Davisson, E. B., & Co.	281
DeLaval Separator Co.	cover or 318
Dickinson, Albert, Co., Seedsmen	276
Dowden Mfg. Co., Potato Diggers	284
Drake, H. B., Short-horn Cattle	276
Edwards, F. C., Nursery Stock	288
Edwards, J. M., & Son, Nursery Stock	301
Egerton, J. F., Jerseys	276
Elkhart Carriage Co.	281
Ellwood Mfg. Co. (Woven Wire Fence)	275
Farmers' Review	279
Farmers' Union	277
Farm, Field & Fireside	276
Fox, A. O., Sheep and Electric Dynamos	cover or 320
Fuller & Johnson Mfg. Co., Farm Implements	313
Fulton, D. C., Farm Lands	283
Genesee Salt Co.	284
German Kali Works, Fertilizers	283
Green Bay, Winona & St. Paul Ry.	300

Hanson, Chr., Butter Color 283
Hatch, Bingham & Co., Nursery Stock 305
Hoard's Dairyman 279

Illinois Central Ry. 302, 303
Indiana Farmer 277

Kellogg, Geo. J., & Sons (Nursery Stock) 312
Keystone Mfg. Co., Agricultural Machinery 281

Martin, J. W., Red-polled Cattle 276
Merrell, F. H., Jersey Cattle 280
Minneapolis, St. Paul & Sault Ste. Marie Ry. 290, 291

National Stockman and Farmer 278
Northrup, King & Co., Seedsmen 296
Northwestern Agriculturist 278
Northwestern Farmer 277

Ohio Farmer 277

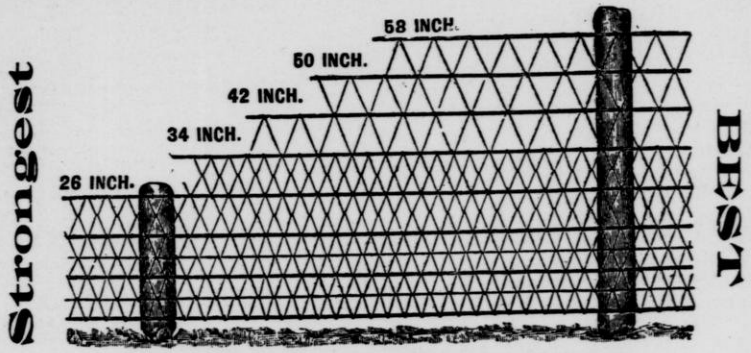
Payne, J. C., Shropshires 276
Prairie Farmer 278

Scofield, E. J., Nursery Stock, Swine 288
Scott, Kennedy, Potatoes, Poland-Chinas 285
Selle, A., Poland-Chinas 292
Skordemannen (Swedish) 278
Smalley Mfg. Co., Ensilage and Fodder cutting Machinery ..... cover or 319
Superior Drill Co. 317

Thayer Fruit Farms, Nursery Stock 289
Tschudy, F., and Son, Ayrshires and Chester-Whites 276

Vermont Farm Machinery Co., Dairy Supplies 304
Western Rural 279
Western Wheeled Scraper Co., Road Machinery 316
Wisconsin Central Ry. 310, 311
Wisconsin Farmer 278
Wool Markets & Sheep 277

ELLWOOD
LAWN AND FIELD FENCES.



ELLWOOD FIELD FENCE (Standard Style)

The **Ellwood Woven Fence** is made from the best galvanized steel wire and is fully guaranteed in every respect.

Perfectly Adjustable—Lasts a Lifetime.

• • •

The Original and Genuine....

GLIDDEN BARBED WIRE.

Every Spool Bears This Trade Mark.

ADDRESS

I. L. Ellwood Mfg. Co.,

DEKALB, ILL.

I have been breeding . . .

Poland-Chinas

for Twenty Years, and am still at it. No culls bred or shipped. Prices low, for quality.

THOMAS CONVEY,
Ridgeway, Wis.

J. W. MARTIN
Breeder and Importer of

RED POLLED CATTLE.

Cattle of both sexes not related, for sale at all times. Our herd won 52 out of a possible 57 first prizes at four state fairs in '97.

RICHLAND CITY, Richland Co., WIS.
On C., M. & St. P. Ry.

---

250 Shropshires.

Recorded Rams and Ewes.
Choice Stock and Low Prices.

McDougal's Non-Poisonous Sheep Dip by gallon or case.

For price, write or come and see

J. C. Payne, Hillside Farm, Prairie du Sac, Wis.

SHORT-HORN CATTLE.

Mill Brook Stock Farm.

REGISTERED Short-Horn Cattle of the best dairy families. Poland-Chinas of the choicest strains. Stock well bred and good individually for sale at prices that are right.

H. B. DRAKE, BEAVER DAM, WIS.

Ayrshire Cattle and Chester White Swine.

Stock of both kinds and sexes for sale. 25 sows bred to first prize boar at Wisconsin State Fair of 1896, and a boar bred by Todd & Son of Ohio. Prices low. Write for what you want.

FRED TSCHUDY & SON,
Cold Spring Stock Farm. MONROE, W S.

JERSEY CATTLE.

We claim to have the most select small herd in Wisconsin; headed by Toltec's Signal, 29,501, the best bred Tennessee bull in the northwest and sire of three heifers with records of 14 lbs. and over per week, assisted by a grandson of Brown Bessie, Toltec's Signal and Paradise, three of the best Jerseys ever in the state. No cows kept that will not make 2 lbs. of butter per day. Special attention paid to good udders and long teats. Young bulls, some from tested cows and occasionally a heifer or young cow for sale at prices low for quality. Correspondence solicited. Address

J. F. EGERTON, Footville, Rock Co., Wis.

Cheap Lands.

The Farm, Field and Fireside Sunny South Colony in

NORTH CAROLINA

affords the best opportunity for young men or others who want to secure a farm of their own, or to better their material condition, or are seeking a warmer or more healthful climate. It affords **A DELIGHTFUL, HEALTHFUL CLIMATE, PURE WATER,** two or three crops a year, either of which is of equal value to the one Wisconsin crop.

All the advantages of a southern home amid northern people.

For further information send 10 cents for **The Old North State,** a large, profusely illustrated booklet telling all about the state and colony.

Farm, Field and Fireside Homeseekers' Dept.,
Chicago, Ill.

GRASS SEEDS

CLOVERS,

RED, WHITE, ALSYKE, CRIMSON, ALFALFA,

TIMOTHY, HUNGARIAN, MILLETS, RED TOP.

BLUE GRASS, LAWN GRASS,

ORCHARD GRASS,

BUCKWHEAT, FIELD PEAS, BEANS, POP CORN.

BIRD SEEDS,

FLAX SEED, ENSILAGE CORN,

COTTON SEED AND LINSEED MEAL,

GRAIN BAGS, ETC.

THE ALBERT DICKINSON CO.

COR. CLARK & 16TH STS.,

CHICAGO, ILL.

All up to date Sheep Breeders, Wool Growers and Sheep Feeders read the

American Sheep Breeder.

If you want to buy sheep you will find all the breeds and all the leading breeders represented in our advertising columns. If you want to sell sheep announce them in the *AMERICAN SHEEP BREEDER;* if you want to keep posted on sheep breeding and wool growing in all the foreign countries read the *AMERICAN SHEEP BREEDER.* The veterinary department of the *AMERICAN SHEEP BREEDER* is worth ten times the subscription price. Send for sample copy. Address

AMERICAN SHEEP BREEDER,
W. W. BURCH, Mgr., 124 Michigan Street, Chicago, Ill.

NORTHWESTERN FARMER,

ST. PAUL, MINN.

The OLDEST and BEST

Agricultural Journal in the Northwest.
50 CENTS A YEAR.

Sample Copy Free.

WEBB PUBLISHING CO., Publishers.

FREE FOR ONE YEAR!

THE INDIANA FARMER,

—ONE OF THE—

GREAT WEEKLY FARM JOURNALS OF THE CENTRAL WEST.

Will be sent free to anyone who will send us four yearly subscribers and four dollars.

Address,
INDIANA FARMER CO.,
INDIANAPOLIS, IND.

It will cost you only

ONE CENT

to send your address on a postal and receive free by return mail a copy of **THE OHIO FARMER,** clearly the leader of the Agricultural Press of America. "Up to date" in every way. Helps make the farm pay. 20 pages every week in year. All original matter. Offers great bargains with other papers.

Address THE OHIO FARMER, Cleveland, O.

Free to Sheepmen!

ANYONE who owns sheep can secure one month's subscription to

WOOL MARKETS AND SHEEP

Absolutely Free

By sending his name and address to J. LEWIS DRAPER, Manager, 505 THE ROOKERY, CHICAGO, ILL.

THE ONLY WEEKLY SHEEP PAPER IN THE UNITED STATES.

Regular Price, $1.00 Yearly.

Worthy Work at Fair Wages.

THE FARMERS UNION, is now making a thorough canvass of the country by townships and counties and will add at least ONE HUNDRED THOUSAND NEW SUBSCRIBERS to its list in the ensuing twelve months. At the same time it will collect reports upon Social, Educational, Crop and Economic conditions of Farm enterprise in every community. This work is to be done by our commissioned soliciting reporters. Write us for terms and plan of work. Be careful to tell us in your first letter whether you can work near home only, or whether you could go to other counties, if the work paid you well. THE FARMERS UNION is a weekly and ranks with the best journals in the world. Write at once to

THE FARMERS UNION,
324 Dearborn St., Chicago, Ill.

KENNEDY SCOTT,

RIO, WISCONSIN,

BREEDER OF

POLAND CHINA HOGS.

Bred especially with view to bone and muscle. Hogs guaranteed of good quality and eligible to any record.

SEED POTATOES. The following are my principal Varieties for the Season of 1896: Quick Crop, Early Ohio, Ohio Junior, Early Puritan, Rutland Rose, World's Fair, White Mountain, Rural New Yorker No. 2, Carman No. 1 and No. 2, American Wonder, New Queen.

We have also a limited amount of

The New Barley

▲ ▲ MANDSCHEURI ▲ ▲

Came from Mandscheuri in 1889, and has been grown at the Ontario Agricultural College Farm since, yielding five bushels per acre more in the average than any other variety on trial. In 1892, the Wisconsin Experiment Station obtained a sample from Ontario, and grew it for two years. Prof. W. A. Henry considered it of so much importance that he offered 100 lbs. of this new Barley to each fair association in Wisconsin as special premium for the best exhibit of cereals. Also have the Manshury Barley, White Schonen Oats and White German Oats.

We Breed Registered Shropshire Sheep.

Come and see the Stock. Correspondence solicited.

KENNEDY SCOTT, RIO, WIS.

BIG BERRIES.

WE ARE THE LARGEST NORTHERN GROWERS OF

STRAW
RASP
BLACK
GOOSE

Berries and Berry Plants,

CURRANTS AND GRAPES.

We employ NO AGENTS but ship direct from our soil to yours.

WE HAVE the largest acreage in America of *ANCIENT BRITON BLACK-BERRIES*, the best of all. We have picked in one season over 2,000 bushels from ten acres, and over 300 bushels from one acre.

WE HAVE over ten acres of Nemeha Black Raspberries — the best of all black caps.

WE HAVE the largest acreage in the West (excepting the originator of that greatest of all Red Raspberries, for which we are the NATIONAL HEADQUARTERS,

THE LOUDON.

Our plants for 1898 will be the best ever sent out by us.

WE HAVE 20 acres in Strawberries, and ten acres in Strawberry Plant Beds to dig for our customers in Spring of 1898.

"How Big Berries and Lots of Them" Are Grown

ON THE THAYER FRUIT FARMS,

Is the name of Mr. Thayer's book which is given free to each customer.

Our Price List of Berry Plants, Currants and Grapes is FREE.

THAYER'S BERRIES AND BERRY PLANTS are known the world over.

Now is the time to start in with a few Berries, and they can be grown anywhere by following our methods.

OVER 100 ACRES IN BERRIES — A sight during picking season well worth going 1,000 miles to see.

BOYS AND GIRLS OF WISCONSIN — Rent an acre of land, plant and care for it according to Mr. Thayer's advice in his book, read his BERRY BULLETINS (now published by all the leading agricultural journals in the United States and Canada, and placed monthly before ten million readers) — you will realize more from this acre than any 40 acres on the farm.

Remember, Price List Free.

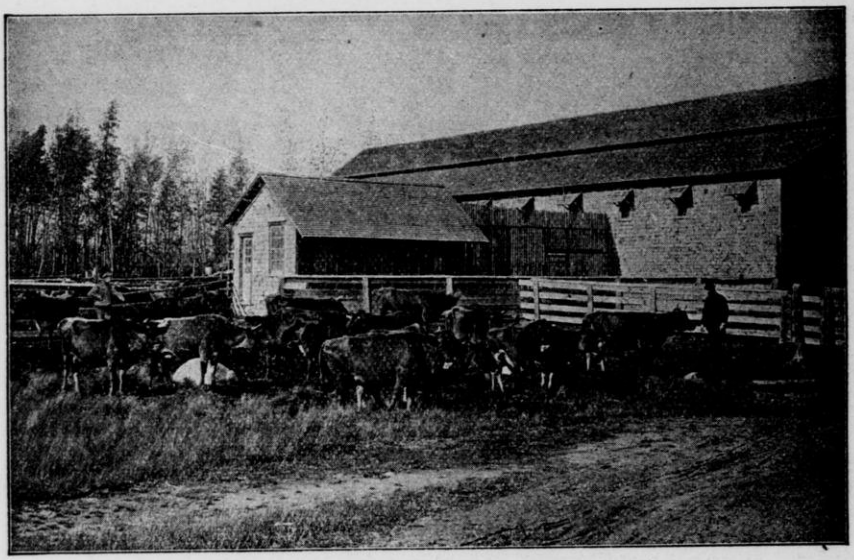
THAYER FRUIT FARMS,

SPARTA, WISCONSIN.

M. A. THAYER, Manager. **C. E. TOBEY, Supt.** **Cable or Telegraph, THAYER, SPARTA.**

Dairy Products in Wisconsin.

THE word "Wisconsin" in connection with creamery products is synonymous with "excellence" in the butter and cheese markets of the world. The State is fortunate in comprising among its agricultural population a large body of thorough dairy farmers from this country and Europe, conversant with the best methods and ever ready to adopt improvements. There is hardly a State in the Union where the people do more to encourage agricultural institutions bent upon promoting the spread of knowledge of correct methods.



Along the lines of the **CHICAGO, MILWAUKEE & ST. PAUL RAILWAY COMPANY** dairy farming is reaching the highest perfection.

The efforts made by Wisconsin dairymen during recent years to avail themselves of the richness which nature has bestowed upon the State have been untiring, and as a result Wisconsin butter and cheese is to-day famed far and wide. For further information, address,

GEO. H. HEAFFORD,
Gen'l Passenger Agent, C., M. & St. Paul R'y,
CHICAGO, ILLINOS.

J. M. EDWARDS.

SNYDER
Best Blackberry for all soils and locations

WISCONSIN GROWN PLANTS

are best for Wisconsin Planters.

A. J. EDWARDS.

Strawberry plant set as it should be.

OUR LEADERS ARE

...IN...

Strawberries

(Pistillate.) Warfield, Crescent, Haverland.
(Perfect.) Bederwood, Splendid, Enhance.

Raspberries

(Black.) Kansas, Ohio, Gregg.
(Red.) Cuthbert, Marlboro, Loudon.
(Purple.) Columbian, Shaffer.

Blackberries

Snyder and Britton.

Currants

White Grape, Victoria, Red Dutch.

Gooseberries

Downing.

Grapes

Concord, Worden, Niagara, Brighton.

We also have a fine stock of the HARDIEST varieties of **Apple, Cherry, Plum and Pear Trees, Evergreens, Shade and Ornamental Trees, Roses, Etc.**

We Warrant all stock sent out by us to be true to name, healthy and in a good growing condition. Should anything prove not true to name, we will replace it free or return the purchase money, but will not be liable for a greater sum than was paid for stock. Can you ask more than this? You will find our prices right. We especially solicit *The Farmers Trade.* Our price lists are free, send for one. If you need any trees or plants write us.

J. M. EDWARDS & SON, Fort Atkinson Wis.

SOME BIG BARGAINS

OFFERED BY THE BOYNTON NURSERIES.

THE PLANTS LISTED BELOW are fine, strong, first-class stock and best leading varieties for home and market fruits. The currants and grapes are strong, two year plants. Staminate or perfect blossoming varieties of strawberries are marked with (s).

LOT NO. 1

$3.00

100 Strawberry—Bubach, and Jessie (s).
100 Strawberry—Warfield, and Bederwood (s).
50 Raspberry—Cuthbert, Marlboro, Gregg.
25 Currants—White Grape and Victoria.
10 Gooseberry—Downing.
10 Grapes—Worden and Concord.
25 Norway Spruce 12 inch trees.

This will make a fine, large, fruit garden, and the spruce will make a nice shelter-belt on two sides.
This lot will be sent, express or freight, charges pre-paid by me to any railroad point in Wisconsin, on receipt of $3.75.

LOT NO. 2

$3.00

5 Apple—Duchess, five to six feet.
5 " —Wealthy, "
5 " —Haas, "
5 " —Whitney No. 20, five to six feet.
5 Cherry—E. Richmond.
25 Norway Spruce—Twelve inches high.

Enough for a nice little orchard. A BIG BARGAIN. This lot will be sent to any railroad point in the State, charges pre-paid, on receipt of $3.50.

LOT ON. 3

$3.00

10 Soft Maple—Five to eight feet.
2 Mountain Ash—Six to eight feet.
1 Cut-Leaved Birch—Five to six feet.
1 Kilmarnock W. Willow—Six feet.
25 Norway Spruce—Twelve inches.

Properly planted and cared for, will beautify any home. Will send this lot, charges pre-paid, as above described, on receipt of $3.50. Compare this with catalogue prices.

LOT NO. 4

$4.00

10 Scotch Pines—Two to three feet.
2 Blue Spruce—Twenty inches.
25 Arbor Vitæ—Six to twelve inches (fine for hedge).
2 Balsam Firs—Two to three feet.
10 Norway Spruces— "

This beautiful lot of Evergreens will be sent, charges pre-paid, on receipt of $4.50, or one-half number, all kinds for $2.75.

☞These Special Lots must be ordered by lot numbers. If your order is sent in early, we can make such changes of varieties and numbers as will better suit you, observing the same low prices if we place other stock that you may want, into these special lots; but we make no changes in lots if orders come in late in the season. Write for special prices on anything listed in our catalogue, and if you are buying in any large quantity, we can always give you some good discounts. The times demand it, and we will not be outdone by any reputable nurseryman.

Very sincerely yours,

W. D. BOYNTON.

SHIOCTON, WIS.

Belle Cottage Nurseries.

GENERAL NURSERY STOCK.

SPECIALTIES—Small Fruits and Seed Potatoes.

GEO. J. KELLOGG & SONS

Can supply you, at low prices, with Choice Nursery Stock—fresh dug—at short notice.
A two-cent stamp will post you on prices which are less than half traveling men charge you.
GEO. J. will answer any questions on fruit that he can after 45 years experience.
We will attend personally to your orders and everything done to make our dealings mutually satisfactory.

LOUDON, is the best Red Raspberry; COLUMBIAN, best Purple; OLDER, best Black.

1,000,000 STRAWBERRY PLANTS of 50 of the best leading sorts. Don't go to an old bed and get all pistillates when a dollar will get you 100 plants by mail, of best four kinds.

APPLE TREES.—Plant hardy kinds. We have 25 varieties adapted to the N. W.
GRAPES. Concord at 3c.; good two-year vines. Don't pay 25c.; get our prices.
CURRANTS Gooseberries and other small fruits 2 to 5c. each.
EVER GREENS, Shade and Ornamental Trees, Shrubs, Plants, Roses, Etc.

POTATOES.— **We are growers of 50 kinds** of choice seed potatoes, best new varieties up to date, at low rates. Get our prices. Mention Bulletin.

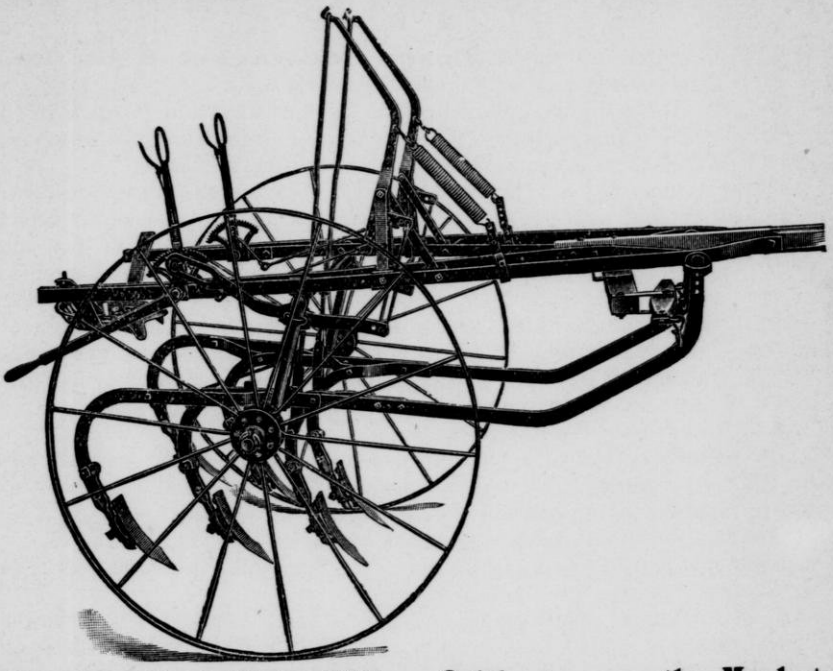
Send 15 cents and get a pound by mail of choice seed Potatoes. We will send you ten choice perfect flowering strawberry plants by mail for 5 cents, and 10 root grafts for 10 cents by mail.

We offer the wonderful PEERLESS Apple 7 ft. trees. This variety we paid $10.00 for 6 small trees; it is claimed to be a winter Duchess; it is the finest grower of a hundred varieties in the nursery. 7 feet trees 50 cents each.

WE WILL FURNISH: (By Freight or Express)
1 PEERLESS, the best new variety; 1 N. W. GREENING, the best hardy long keeper; 1 WOLF RIVER, the biggest fall apple (some measure 15 in.); 1 GLASS GREEN, better than Duchess, and 1 WHITNEY, the best crab, 5 to 7 feet, all for $1.00. *Cash with the order.*

Geo. J. Kellogg & Sons,
No. 1. JANESVILLE, WIS.

SELF-BALANCE HAMMOCK SEAT CULTIVATOR.



The Only Up-to-Date Riding Cultivator on the Market.

GENERAL CONSTRUCTION.

The cultivator is made almost entirely of steel, put together in a way to produce the greatest possible strength with the least weight. **It is fully warranted to be the best all-round Riding Cultivator on the market.**

Ask your dealer for the *Self-Balance Hammock Seat Riding Cultivator*, made by the FULLER & JOHNSON MFG. Co. If your dealer does not handle it write us at the factory.

Plows of All Kinds, Corn Planters, full line of Cultivators, Harrows and other implements. Also Farm Wagons, Buggies and other light Vehicles.

Send for Circulars of our Full Line of Implements, WAGONS and BUGGIES.

FULLER & JOHNSON MFG. CO.,
MADISON, WIS.

Locations for Industries.

THE name of the **Chicago, Milwaukee & St. Paul Railway** has long been identified with practical measures for the general upbuilding of its territory and the promotion of its commerce, hence manufacturers have an assurance that they will find themselves at home on the company's lines.

The company has all its territory districted in relation to resources, adaptability and advantages for manufacturing, and seeks to secure manufacturing plants and industries where the command of raw material, markets and surroundings will ensure their permanent success.

Mines of coal, iron, copper, lead and zinc, forests of soft and hard wood, quarries, clays of all kinds, tanbark, flax and other raw materials exist in its territory in addition to the vast agricultural resources.

The Chicago, Milwaukee and St. Paul Railway Company owns 6,150 miles of railway, exclusive of second track, connecting track or sidings. It traverses eight States.

In Wisconsin there is an immense amount of timber tributary to its lines, including Pine and Hemlock. The Hardwood resources for use in manufacturing are also being rapidly developed.

Taking Wisconsin as a whole, the hardwoods consist of the following and run in the following order: from Red Oak, the most plentiful, to Cherry, scarce:

1. Red Oak.	4. Maple.	7. Black Ash.	10. Beech.
2. Birch.	5. Elm.	8. White Ash.	11. Hickory.
3. Basswood.	6. White Oak.	9. Butternut.	12. Cherry.

During the past few years the Company has made the Hemlock resources of Wisconsin widely known throughout Pennsylvania and other Eastern States, where tanneries are established, and has succeeded in securing several tanneries on its lines. These, in addition to creating traffic for the Company, enable farmers clearing up land to find a ready market for their bark. More tanneries are wanted.

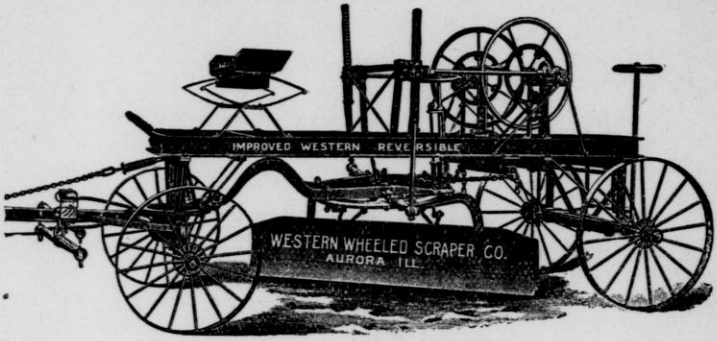
A number of other factories and industries have been induced to locate—largely through the instrumentality of this Company—at points along its lines.

Large deposits of Iron Pyrites having been discovered in Southern Wisconsin, and of which the Company was recently promptly advised, have resulted in steady shipments to sulphuric acid works. Eastern manufacturers can be furnished with practical information in regard to the various raw material resources, and can find profitable locations for plants or branch factories on the line. The specific information furnished regarding any particular industry is reliable.

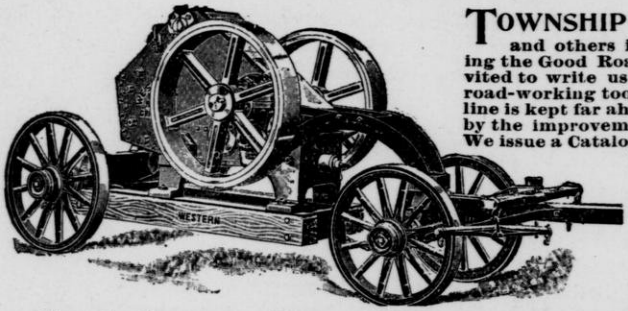
Address, LUIS JACKSON,

Industrial Commissioner, C., M. & St. P. R'y, 435 Old Colony Bldg., CHICAGO, ILL.

Western Wheeled Scraper Company,

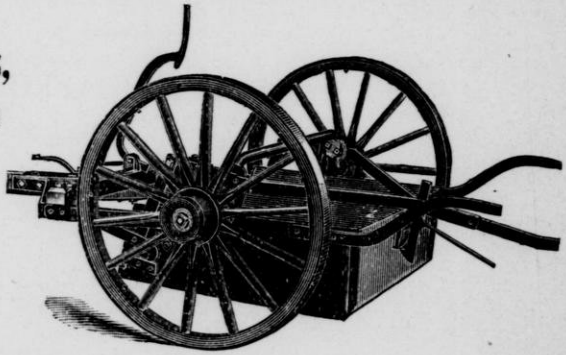


Aurora, Illinois.



TOWNSHIP OFFICIALS and others interested in forwarding the Good Roads movement are invited to write us when in need of any road-working tools or machinery. Our line is kept far ahead of all competition by the improvements added each year. We issue a Catalogue giving full details, with illustrations, of the latest improved machinery for making and repairing roads, and are pleased to forward a copy on receipt of request

Road Graders, Rock Crushers, Wheeled Scrapers,
Road Plows,
Elevating Graders,
Dump Wagons and Carts,
Drag Scrapers,
Wheelbarrows,
Etc., Etc., Etc.



The Superior Single Disc Drill.

PATENTED.

The First and Only Successful Disc Drill.

Buy a Superior Single Disc Drill and increase your yield per acre, and reduce expense for seed and also save time and labor in seeding. . .

Superior Single Disc Drill Sows and Covers Grain wherever a Disc Harrow will run. This is the drill that will not Clog up in Weeds, Corn Stalks, Grass or Trash of any kind. It will not clog up in Wet Soil.

MADE ONLY BY

THE SUPERIOR DRILL CO.,

SPRINGFIELD, OHIO.

DR. BABCOCK
ON
CREAM SEPARATORS.

PRAISE from Dr. Babcock regarding anything connected with dairying is praise permitting of very little comparison with that of anyone else. Conservative, conscientious, careful of every word, and using very few words, commendation from Dr. Babcock leaves no need of commendation from anyone else.

UNIVERSITY OF WISCONSIN EXPERIMENT STATION,

MADISON, WIS., March 5, 1897.

"For the past six or seven years we have used at the Experiment Station and in our Dairy School nearly every type of De Laval Separators, and without exception they have given excellent satisfaction. We have had the 'Alpha' machines in our Creamery and Dairy School since their first introduction in the United States. These machines are easily managed, skim close under varying conditions, run light, cost little for repairs, and give a smooth cream, well suited for pasteurizing and the general trade, as well as for the manufacture of butter."

S. M. BABCOCK, Chief Chemist.

Send for new "Dairy" catalogue No. 257
or "Creamery" catalogue No. 507.

The De Laval Separator Co.,

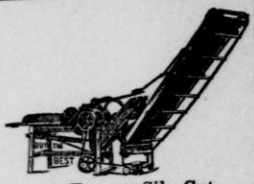
WESTERN OFFICES:
Randolph & Canal Sts., Chicago.

GENERAL OFFICES:
74 Cortlandt St., N. Y.

The Smalley Monarch with Automatic screw feed. Warranted the Best Farm Feed Mill on earth.

..THE SMALLEY FAMILY OF

..Feed.. Savers



Our Famous Silo Cutter. No. 14, with SEMI-CIRCLE Carrier. Equally well adapted for ENSILAGE or DRY FODDER CUTTING.

SMALLEY METHODS OF STOCK FEEDING

EMBRACE BRIEFLY

THE Silo on the Farm and the intelligent feeding of ensilage.
THE Cutting or Shredding of all dry Fodder fed to Stock.
THE Crushing or Grinding of all grains fed to Stock.
THE Slicing or Pulping of all Roots fed to Stock.

Secure a Saving of 30 to 50 PER CENT IN FEEDING and an equal ratio of GAIN IN PRODUCT.

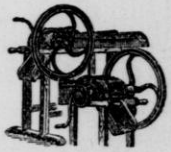
No Up-to-Date STOCK RAISER or DAIRYMAN can afford to ignore them.

Our Electric Root Cutter. No. 13. For hand or power use. THE BEST ROOT CUTTER ON EARTH.

SMALLEY MANUFACTURING COMPANY,

Sole Makers of "Smalley Goods,"

MANITOWOC, WISCONSIN.

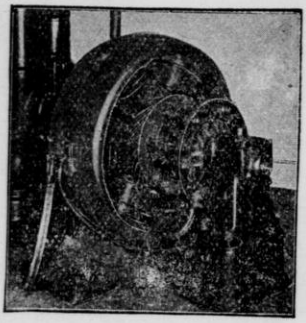


Our Special Cutters, Hand only. Nos. 0 and 00. With one or two knives as desired.

DOES YOUR TOWN WANT BUSINESS?

If so, show the traveling public you are not dead by

LIGHTING YOUR TOWN BRILLIANTLY.



Electricity is Cheapest, Safest, Best

FOR BOTH

LIGHT AND POWER.

The Northern Electrical Manf'g Co. of Madison, Wis.,

Manufacture all sizes of Dynamos and Motors and are prepared to EQUIP TOWNS AND FACTORIES with Engines, Dynamos and Motors.

Town Agents Wanted. Write sending sketch of streets, showing approximately the distances and locations of stores and houses. We will then send you an estimate of what a complete equipment will cost for an ELECTRIC LIGHTING PLANT and will also send you an illustrated catalogue.

Sheep! Sheep! Sheep!

I didn't get scared when the panic came and sell my flock. On the other hand I have taken advantage of the opportunity to make it larger and stronger and NOW I AM PREPARED to supply the demands of those who wish to replenish at moderate prices. I aim to keep up a stock of about

1000 PURE BRED AND HIGH GRADE

SHROPSHIRES for Sale at all times of the year. Come and see my flock, or write

A. O. FOX, Oregon, Dane Co., Wisconsin.

LOCATION:

Oregon Station is on main line C. & N. W. Ry., 9 miles south of Madison.
Fitchburg on Ill. C. Ry., 3 miles west of farm.
Phone: Between Farm, Madison and Oregon.