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Wisconsin Farmers' Institutes

Madison, WI: The Democrat Printing Co., 1898

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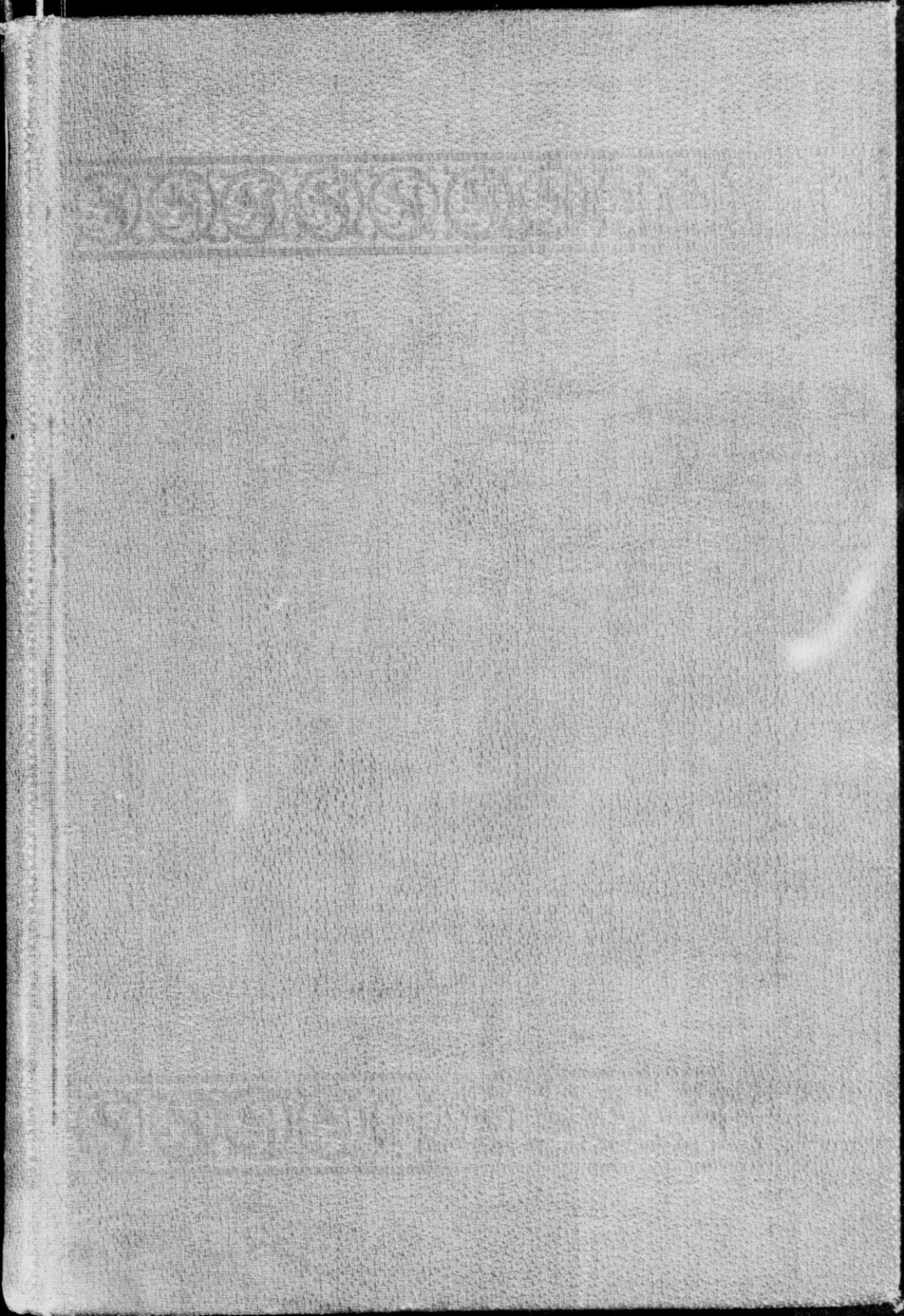
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"Considered in many of its aspects the Farmers' Institute is of first importance to the practical agriculturist. The changing conditions in the production and distribution of crops, the raising of live stock and the necessity of thorough knowledge of the markets—matters which are discussed nowhere with greater intelligence than in the Institute—make it indeed the forum of the farmer and the source of invaluable information."

Editor—"Farmers' Voice."

"I am glad to testify that the spirit of improvement and progress is more general among American farmers than ever before; that the necessity of education along lines pertaining to economic production is more fully recognized, and that the farmer's home is becoming more and more the seat of comfort, the center of intelligence, virtue and happiness, the source of strong men for all vocations, and the sure safeguard of the Republic."

Hon. Jas. Wilson, Secy. of Agriculture.



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WISCONSIN FARMERS' INSTITUTES

A Hand-Book of Agriculture.

BULLETIN NO. 12.

1898.

*A Report of the Twelfth Annual Closing Farmers' Institute held at Janesville,
March 8, 9 and 10, 1898.*

"The effort to extend the dominions of man over nature, is the most healthy and most noble of all ambitions."—BACON.

Edited by **GEORGE MCKERROW**, Superintendent.



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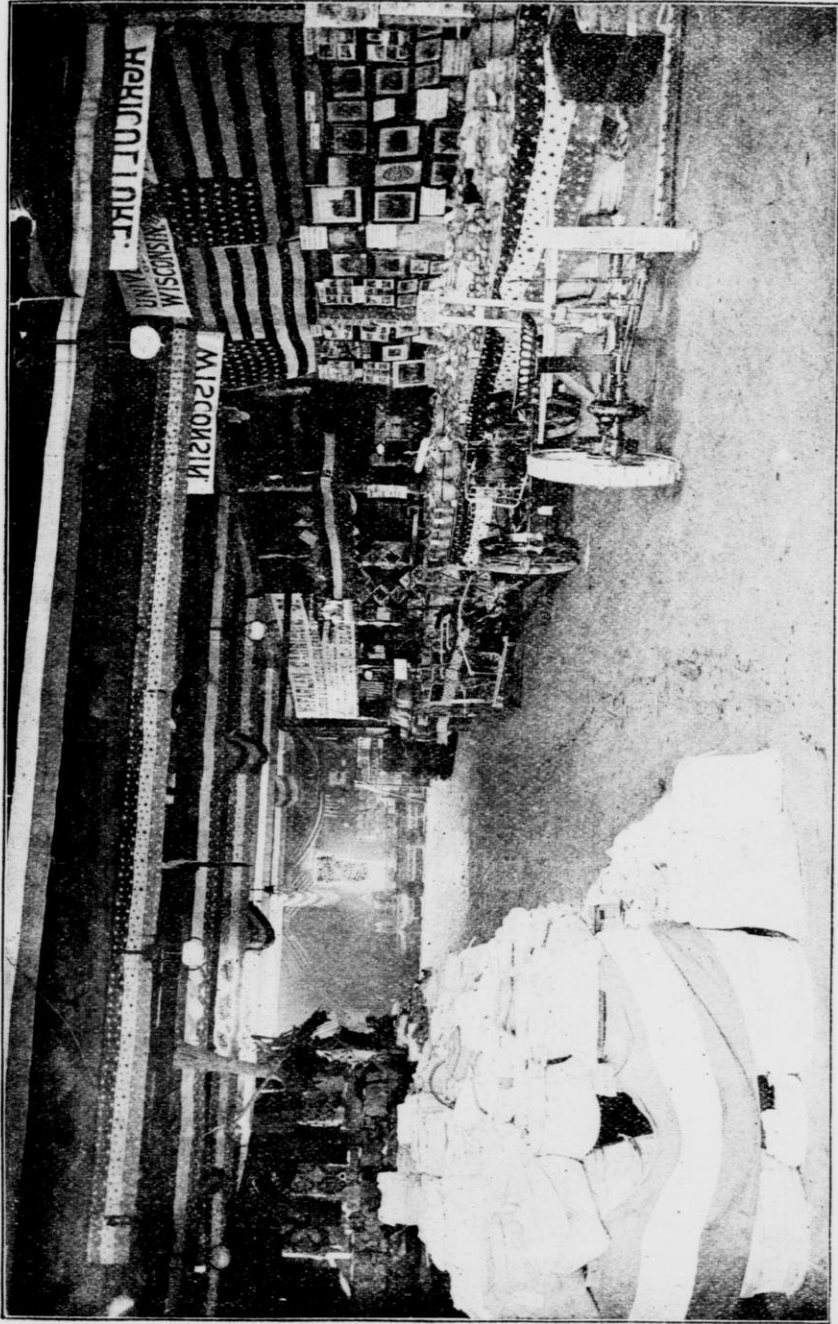
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MADISON, WIS.

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HALF OF THE EXHIBIT AT THE MIDWINTER FAIR HELD IN CONNECTION WITH THE ROUND UP INSTITUTE AT JANESVILLE, MARCH 8, 9, 10, 1888.

LETTER OF TRANSMITTAL.

HON. JOHN JOHNSTON,

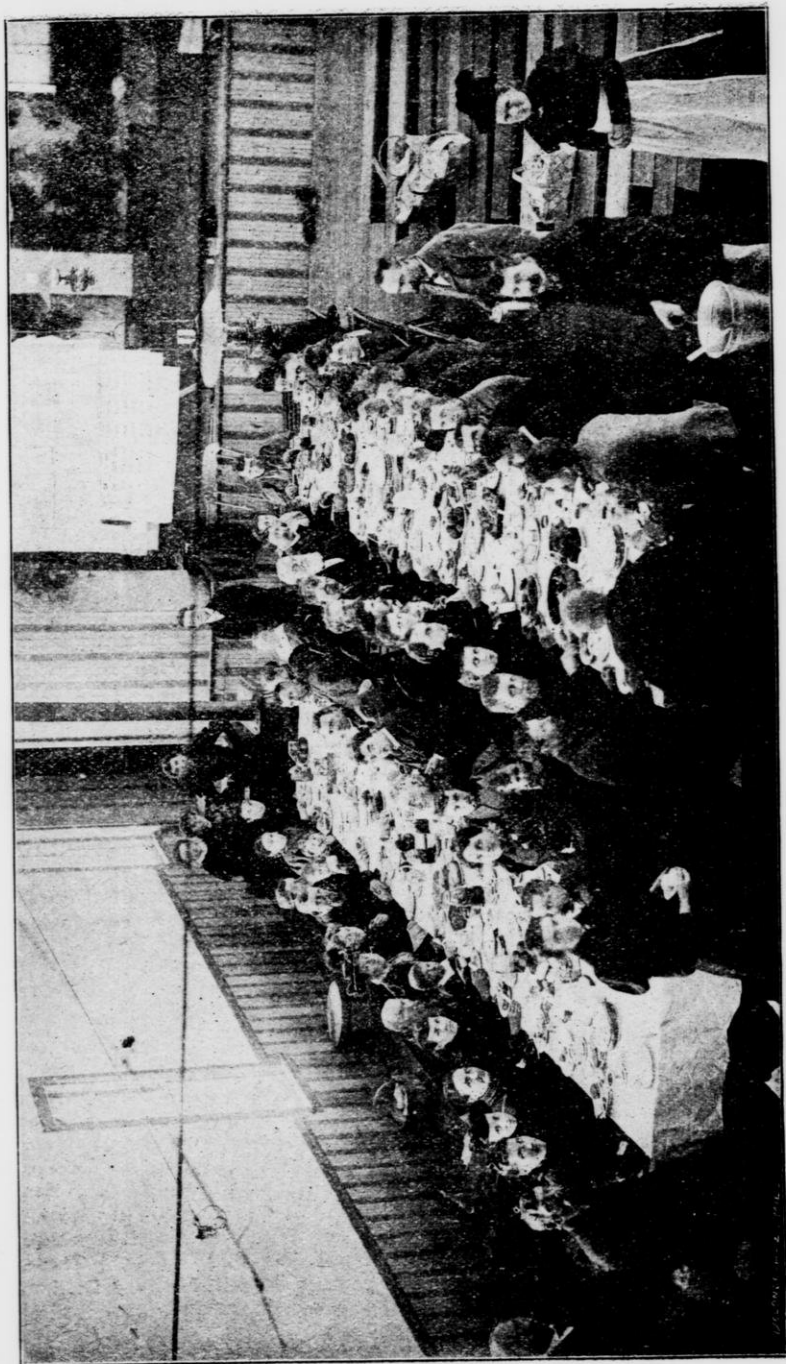
President of Board of Regents, University of Wisconsin:

SIR:—I have the honor herewith of presenting to you Bulletin No. 12, of Wisconsin Farmers' Institutes.

Most respectfully yours,

GEORGE MCKERROW, *Superintendent.*

MADISON, WIS., Nov. 12, 1898.



PICNIC DINNER IN INSTITUTE HALL, AT FARMERS' INSTITUTE HELD AT HILBERT JCT., MARCH 12, 1898.

UNIVERSITY OF WISCONSIN.

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

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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.

School of Education.

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.

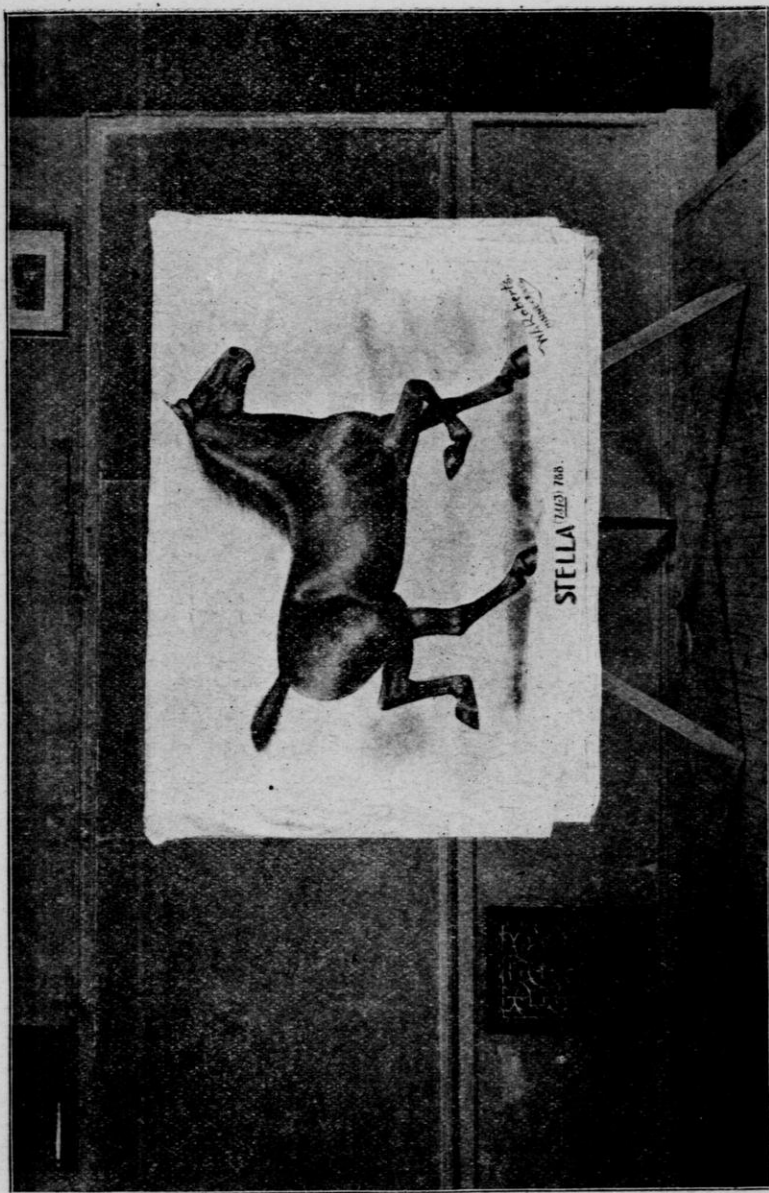
Special Science Course, antecedent to
Medicine.

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, twenty-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.



SAMPLE OF CHARTS AND RACKS USED IN INSTITUTE WORK. PRIZE WINNING HACKNEY.

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

Adequate accommodations are provided for the woman's gymnastics by the construction of an addition to 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.

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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, 46,000 volumes; of the State Historical Society, 195,000 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 275,000 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.*



SUMMER FARMERS' INSTITUTE AT WOOD LAKE TOWN HALL, BUR-
NETT CO.

UNIVERSITY OF WISCONSIN.

COLLEGE OF AGRICULTURE.

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Hon. Frank Challoner, . . .	Oshkosh.
Hon. Ogden H. Fethers, . . .	Janesville.
Hon. John R. Riess, . . .	Sheboygan.
Hon. J. E. Morgan, . . .	Spring Green.

Officers and Instructors.

THE PRESIDENT OF THE UNIVERSITY.

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H. L. RUSSELL,	Bacteriologist.
E. H. FARRINGTON,	Asst. Professor of Dairy Husbandry.
J. A. JEFFERY,	Assistant Agricultural Physicist.
J. W. DECKER,	Cheese Instructor.
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ALFRED VIVIAN,	Assistant Chemist.
L. H. ADAMS,	Farm Superintendent.
IDA HERFURTH,	Clerk and Stenographer.
EFFIE M. CLOSE,	Librarian.

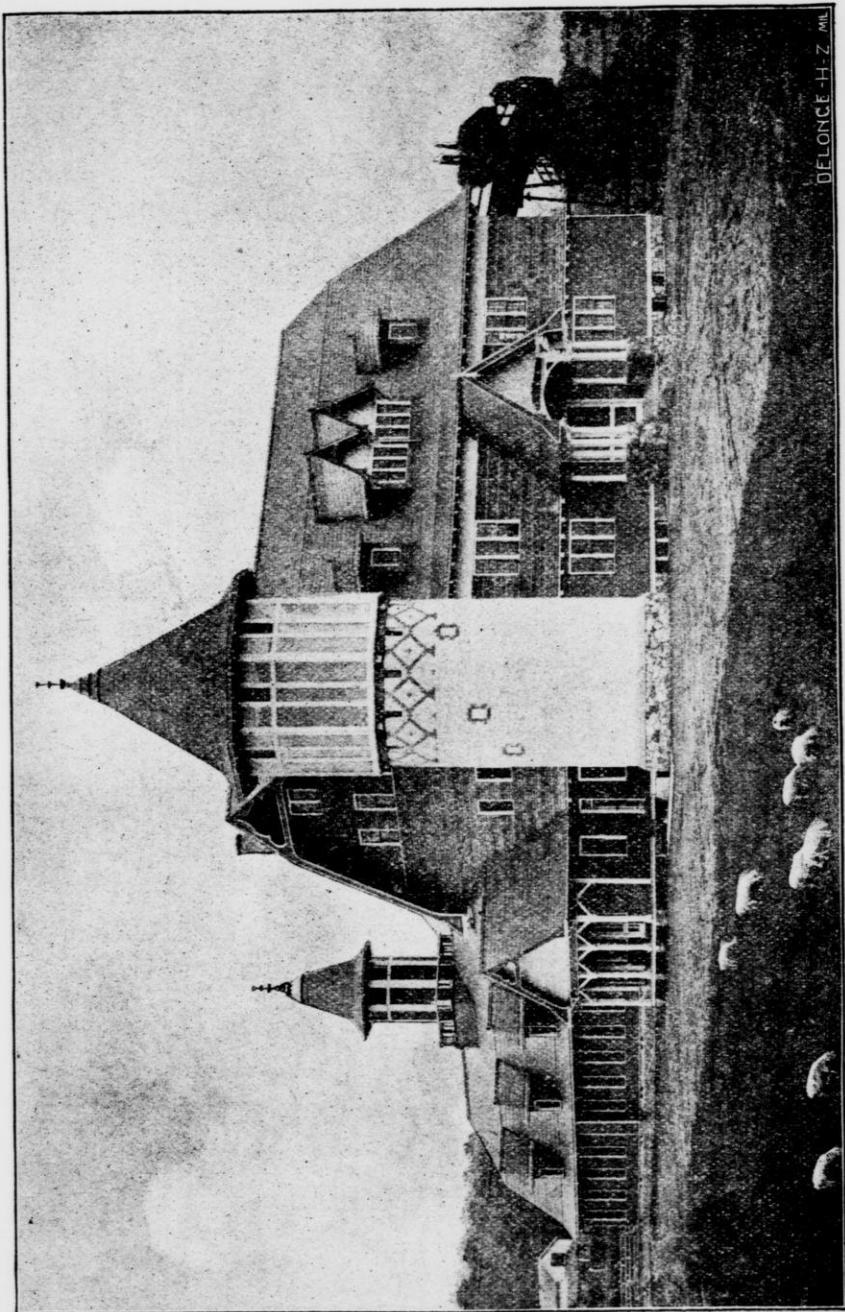
Farmers' Institutes.

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.*



DELONCE - H. Z. MIL

THE NEW DAIRY BARN AND STOCK JUDGING BUILDING, UNIVERSITY OF WISCONSIN.

WISCONSIN FARMERS' INSTITUTES FOR 1898-9.

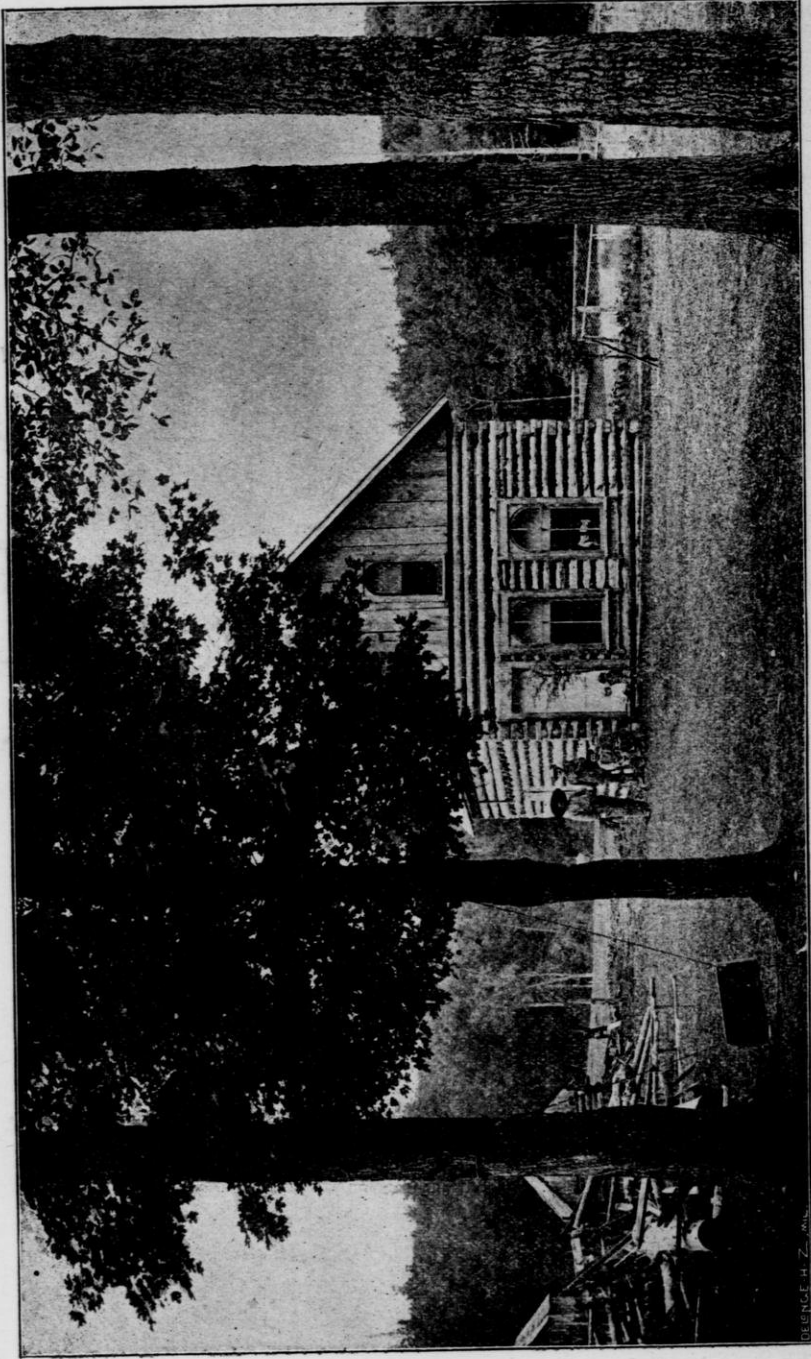
Date.	Thos. Convey, Conductor.	H. A. Briggs, Conductor.	A. A. Arnold, Conductor.	George C. Hill, Conductor.	Charles Thorp, Conductor.
December.					
6-7	Bonduel	Forestville	Iola	Tigerton	Lena.
8-9	Peshigo	Casco	Black Creek	Mattoon	Wayside.
13-14	Somerset	Unity	Cushing	Junction City	Prentice.
15-16	Colfax	Town of Cleaveland	Trade Lake	Fairchild	Cameron.
20-21	Brackett	Cottage Grove.	Ellsworth	Dallas	Amery.
22-23	Greenwood	Monticello.	Baldwin		West Denmark.
January.					
3-4	Rock Elm	Augusta	Melrose	Arcadia	Plover.
5-6	Menomonic	Durand	Camp Douglas.	Alma	Hixton.
10-11	Bell Center	North Andover	Livingston	Hub City	Hollandale.
12-13	La Farge	Wauzeka.	Cuba City	Arena	Woodford.
17-18	Oakfield	Kellnersville.	Silver Lake	Beechwood	Allenton.
19-20	Mt. Calvary	St. Wendel	Waterford	Grafton	Town of Algoma.
24-25	Lake Geneva	Neenah	Manawa	Town of Little River	Brillion
26-27	Union Grove	Waupaca.	Oneida	Abrams	Tisch Mills.
February.					
Jan. 31-Feb. 1	Brodhead	Dousman	Whitewater	South Germantown	Rhine.
2-3	Avoca	London	Darlington	Merton	Jericho.
21-22	North Freedom	Sextonville	Poynefte	Evansville	Neosho.
23-24	Footville	Middleton	Briggsville	Sauk City	Koro.
March.					
Feb. 28-Mch. 1	Muskego	Hortonville.	Rio	Hancock	Lodi.
2-3	Eagle	Grand Rapids	White Creek	Wild Rose	Ft. Atkinson.
7-8	Cashton	West Salem	Osseo	Necedah	Morrisonville.
9-10	Cream	Kilbourn City	York	Tomah	Kingston.

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MAP SHOWING WHERE INSTITUTES WILL BE HELD DURING THE WINTER OF 1898-99.

DEL. NOV. 17/98



HOME OF A SETTLER NEAR BUTTERNUT, ASHLAND CO., WIS. THE REWARD OF INDUSTRY AND PERSEVERANCE.

GEORGE H. Z.

PROCEEDINGS
OF THE
TWELFTH ANNUAL
CLOSING FARMERS' INSTITUTE

HELD AT

JANESVILLE, MARCH 8, 9, 10, 1898.

Hon. A. A. Arnold, of Galesville, was called to the chair by Supt. McKerrow.
Prayer by Rev. W. A. Hall, of Janesville.

ROTATION OF CROPS.

GEO. C. HILL, Rosendale, Wis.

Mr. Chairman, Ladies and Gentlemen:—We believe that a system of rotation of crops should be followed by all our farmers. A few of the reasons for this we will attempt to give.

When we talk about the rotation of crops, we do not mean by that a rotation of grain crops, though that might be better than no rotation, because the different kinds of grain would require slightly different fertilizing elements and modes of cul-

ture. But in this case the difference would be so little that it could not be called a good system of rotation.

Bad Effects of No Rotation.

In Wisconsin, in the earlier days of farming, the principal business was the raising of wheat. It was the easiest crop to raise, and it was grown continuously, year after year, perhaps twenty or twenty-five years, when it was discovered that the yield began to be less, and pretty soon the

crop was infested with chinch bugs and other insects that drove us out of the business. Then again we found that our lands were becoming overrun with wild oats, wild buckwheat, wild peas, and other weeds that came up



VIEW IN GEO. C. HILL'S ORCHARD.

and took the place of the grain crop, so that in many places there was not over half a crop of wheat grown. This was the result of continuous cropping of the same grain year after year, so that we were driven out of the business, and we have learned since that it was for our good.

Advantages of Rotation.

Among the reasons why we should adopt a system of rotation of crops perhaps the principal one is the maintenance of fertility on our farms, thereby keeping up the productive powers of our lands. This result will follow the practice of a good system of rotation, which includes livestock, clovers and grasses, and hoed crops. So I think, first of all, in talking about a rotation of crops, that the

Wisconsin farmer should adopt some kind of stock farming as his main object, and then grow his crops with reference to feeding that stock. As to what kind of stock we should keep, that is not for me to say. We cannot lay down any iron clad rules for any one, because of the difference in location, in soil, in markets, and perhaps above all, the difference in tastes. Some of us may like to milk cows early and late, and give our time and attention to this class of animals, which certainly requires the closest attention. Then there are others who like other classes of stock, and whatever we like best I think we will do best with, but having adopted intelligently some system of farm management, I think we should stick to it pretty closely, and not be changing about from one thing to another on account of the high or low prices that may prevail for any particular product. I believe we cannot conduct our farming operations successfully without this system intelligently adopted and followed year after year, unless we become convinced that we are on the wrong track.

What Crops to Grow.

Now, if we have adopted some branch of animal husbandry, the crops we should grow and how to place them will depend somewhat on the kind of stock, but, first of all, I should say that the clovers and the grasses should certainly be in the rotation. I also believe that we should have a corn crop, which is the greatest feeding crop that we grow, and we should have a small grain crop of some kind for the feed, and to have an abundance of straw on the farm. In some portions of the state there are some special crops of which I have not much knowledge, nor have I knowledge as to the best way that they could be introduced into the rotation of crops, such as the potato crop, or the onion, or the tobacco, and I have experience only with the onion, but I do know that these spe-

cial crops are robbers of the soil; they want the best places on the farm, and they rob other portions of the farm of their share of fertility.

One advantage of a rotation of crops is that it distributes the manures made on the farm all over the farm, and does the work evenly. We also distribute the tillage over the farm, and I believe that that is of great importance.

that there is a permanent pasture; therefore, we will divide the remainder of the farm into three portions, one in clover, one in corn, and one in oats. In this way this three-year rotation is first clover, then the manures of the farm put on the clover sod sometime after the hay or seed is off between that and corn planting time; then we follow with corn, and that followed with oats and seeded.



FARM HOME OF GEO. C. HILL.

A Three-Year Rotation.

I will outline two or three systems of rotation, one of which we follow on our own farm. The three-year rotation is considered by many the best plan. This rotation supposes that somewhere on the farm there are some fields that are not tillable, but are used for permanent pasture. Permanent pasture is a very good thing, but it is not as good as a pasture that can be introduced into a rotation, into the tillable portion of the farm; but this three-year rotation supposes

This is a good rotation with one exception. The oats following the corn is not a very good place to seed clover with; that is, on farms where a large amount of stock is kept, as the corn land is too rich for oats and they will often fall down or grow so rank that the clover is smothered. So on our farm we follow a four-year rotation. First clover, not manured, but broken up and sowed with oats, and that manured and planted with corn, then perhaps flax in some places. Of these sowed with either winter or spring

wheat, or barley, if you choose to grow barley. We have always kept wheat in our rotation, not because it has always been a profitable crop to grow, but because we wanted a good place for the clover, and we have found it so.

Other Good Rotations.

In the case of the four-year rotation, we get over the tillable portion of the farm once in four years with the manure, and once in four years with tillage; we get two grain crops, but they do not come together. I think we never should put two crops of the same kind together, especially grain crops, but we may put two cultivated crops together without doing any harm.

In some portions of the state that we have visited this winter they tell us they want more than a third or a fourth of the farm in corn. In such a case as that I would suggest that when we have had the clover and the oats, that the oat field be manured and planted with corn and followed with corn the next year, and that followed with wheat or barley. This would be a five-year rotation. On the farm of John Gould, in Ohio, there is a little piece of land upon which he has experimented in growing corn year after year. Last summer he had his eleventh crop of corn on that piece of land, and it looked about as good as his main crop; it was perfectly clean, thoroughly cultivated, and he told me that he dressed that piece of land with manure once in two or three years lightly, but I do not think we could follow any other grain crop ten or eleven years and have as good a crop as in a rotation.

DISCUSSION.

Mr. Hughes—Would it be advisable to substitute rye for wheat?

Mr. Hill—Yes, so far as the seeding is concerned, but we do not consider it a very valuable crop to grow, at least on some farms.

Mr. Hughes—I think there is great

danger of land washing considerably if you put corn on two years in succession, in a section of the country like this, where there is a great deal of rough land.

Mr. van Loon—Are you always sure of a clover catch?

Mr. Hill—We never had but one failure, but we have no sand on our farm; ours is a clay and burr oak soil.

Mr. van Loon—Do you raise spring or winter wheat?

Mr. Hill—Both. You may like to know how we grow winter wheat after corn. The largest portion of our corn is put into the silo about the first of September, and that land is usually planted immediately to winter wheat and the balance with spring wheat.

Mr. Hoxie—How do you seed your clover on your winter wheat?

Mr. Hill—We sow the clover seed in the spring, usually in March, but sometimes later, when the land becomes firm, then we drag the seed in; this plan gives the best results.

The Chairman—When you put the manure on your land once in four years, what crop does it go on?

Mr. Hill—On the oat stubble, and follow with corn.

The Chairman—Why don't you put it on the wheat and drag it, fertilize it?

Mr. Hill—Our manure is very coarse, drawn from the stables, and we don't think we could work it that way.

Mr. Whitely—What objection would you have to this rotation: Start with clover and pasture the first year, then in the fall manure it and let it lay one year; then put in corn two years, then oats two years, and seed the second year; that is, taking it on land that does not wash too badly.

Mr. Hill—On our farm the objection to that rotation would be that the oats follow the corn. The strength of the manure after the second year might be taken out so we might be able to do it.

Mr. Sayre—You say you put the manure on the oat stubble and then plow it in. How would it be to put it on clover and plow it in?

Mr. Hill—I admit there is no place on the farm that is as good as a clover or grass field to spread manure. In our oat crop we always sow clover seed and we undertake to get the ground covered with clover and very often we do, but not always. This past season we had a splendid catch on the oat field and that makes a good place to spread the manure. It keeps it from washing away, is taken up by the clover plants and kept until it is needed.

Mr. Everett—I have been disputing with Mr. Hill a good many years. I believe that most of our farmers present, in Rock county, would favor Mr. Sayre's method; that is, to spread the manure on the grass land, and in my case it has always been clover. I would not object to the plan of the gentleman who says that he pastures the clover first and then follows two years with corn and two with oats. I believe the better system of rotation is to plow in the manure on the clover, evenly and lightly, cover over the whole field, if it is a four-year rotation, harrow lightly in the spring, then take off a crop of clover hay, and if it must be pastured, pasture after that because that gives a good chance for the strong grass roots; then follow that clover with corn, and it is in the best possible condition for corn, for the soil is warm and full of humus. We understand that clover robs the soil of phosphoric acid and potash, while it puts into it nitrogen. By using it in that way we get a good distribution.

Mr. Whitely—We quite frequently get a full catch of clover and there is more or less foxtail and other weeds in it, and yet there is enough clover to justify us in leaving it. To cut it for grass, there will be a large amount of stuff that is of little use, but by turning on the stock, espe-

cially sheep, they will keep down this foul matter and make use of what grass there is, and I find that we get a very heavy crop the next year. The land seems to wear longer and to produce two good crops of corn. Then, after the second crop of corn, a crop of oats. The seed seems to catch better, and I have had very good results in that rotation.

Mr. Everett—I think a six-year rotation is too long,—it does not carry the clover and manure crop over the farm often enough.

Mr. Scott—I would certainly object to following corn with corn. There would be a loss of ten or fifteen per cent. in the second crop.

The Chairman—I have a five-year rotation. I sow clover seed in winter wheat, putting pulverized manure on top of the ground, and dragging it in with the wheat, and I never fail of having a good catch of clover. The next year have a crop of clover. The first year I have a crop of wheat, next a crop of clover, which I mow for hay and the second crop for seed. The third year I have a crop of hay; I sow with Alsike, red clover and timothy, a little of each, and get a good crop of hay. Then the corn comes, then a crop of oats and winter wheat again. That makes a five-year rotation with good results, depending chiefly, I think, on the fact that I put the manure on the clover just where it is most needed, and get the benefit of it. Of course the main object of this rotation is rest to the soil—an opportunity for nature to recuperate and to disintegrate the particles and put them in such shape as the plants need. Another thing, we say the corn crop is an easy crop. The reason it is easy is because the ground is covered during the extremely dry season that is ordinarily bare when you take off a crop of small grain. You must keep some sort of a shade or mulch in there to maintain fertility. I maintain that cultivation tends to sterility unless

we keep up nature's conditions, keep the ground shaded. Then again, in feeding crops, it is like feeding stock. A fibrous crop like flax takes a great deal of the elements of fertility from the soil, much more so than a root crop, for instance, just as in the animal growth where we want to raise bone and muscle takes the most expensive feed every time, because that is an expensive product. For cheap

products you may give a cheap feed, and it is just so with the soil.

Mr. Convey—One cultivated crop is all right, but where you have two cultivated crops in succession, it gets the land out of condition in a measure; it causes the land to wash and besides it has not the capacity to absorb moisture. I would not approve of a rotation in which there are two cultivated crops in succession.

CLOVERS.

Supt. GEO. McKERROW, Madison, Wis.

Mr. Chairman, Ladies and Gentlemen:—I heartily agree in the statement which has been made here this morning that clover is the most important crop that we can raise on our farms. I know of no other crop than clover or plants of the same family, the legumes, that will yield so valuable a crop in feeding value, in dollars and cents, and at the same time, practically leave the land better than it found it. To be sure it is more valuable upon some soils than others. In a discussion on any subject we cannot lay down an iron-clad rule that applies alike to all kinds of soils, and all methods of farming, but we can discuss a rule that, as a rule, applies under more varied conditions than will the exception. In the discussion just closed the rotation of crops presented by Mr. Hill is no doubt the best for his farm; that rotation followed closely might not be the best for some other gentleman's farm, but the principle that makes it the best for Mr. Hill's farm will come very near making it best for everybody's farm. We have to apply all these things with good judgment.

Work of the Clover Plant.

We have many different clovers, Mammoth, Medium or June clover, Alsike and White, that we Wisconsin farmers are fairly well acquainted with. They all do the same kind of work; they all furnish a protein or muscle-building food; they all have a good, mechanical effect upon nearly, if not upon all soils; they all furnish a very valuable, high-priced element of fertility in the portions that are turned back and rotted in the soil; they all furnish a very valuable humus, or vegetable matter, which, to a certain extent, is needed in all soils for the preservation and holding of moisture, aeration, and the successful growing of crops.

Clover as a Drainage Plant.

The clover plant, as I have already said, has a mechanical effect upon the soil. Soils that have been cropped for some time become compact and heavy; soils that have a hard clay subsoil coming near the surface, naturally have very poor drainage. Drainage will be talked about as a separate subject, but right here I will say that one of the most beneficial ef-

fects of clover is that it acts as a drainage plant. It has strong and long roots, and the larger varieties especially find their way down through that hard subsoil, and when they rot, they leave pores down through which the water flows and back through which the water comes.

Nitrogen in Clover.

Had we our charts here, you would

has been fed to the stock, presuming that the stock take twenty-five per cent. out of it, the manurial value is still five dollars a ton. A fair crop of clover should yield in its two crops, at least two and a half to three tons, we will say two tons, fourteen dollars worth of fertility. Then the roots and the roughage left after taking off that crop, will be equal to the weight of the crop, two tons more, worth four-



RESIDENCE OF GEO. MCKERROW, SUSSEX, WIS.

notice upon the feeding chart and upon the fertilizing chart, a statement that nitrogen, as a fertilizer sells in the eastern markets, where they have to buy commercial fertilizers, at 12 cts. a pound. You would notice upon another chart that clover contains a very large amount of this nitrogen, that a ton of clover hay figured upon the basis of the selling price of commercial fertilizers is worth something over seven dollars for the fertility it has in it; that after this clover hay

teen dollars more in fertilizing value if the whole is put back into the soil; that means twenty-eight dollars at those prices, which are eastern prices, not Wisconsin prices. Fertility is not worth as much in Wisconsin as it is in the eastern states, and presumably it is worth less on the rich prairies of Minnesota than it is in Wisconsin, but the principle is the same, and the clover is very valuable in these fertilizing elements. We might cut it in two, and say it is worth fourteen dol-

lars, or we might cut it in two again and say it is worth seven dollars, and still it is worth more in proportion than any other class of crops.

Where Does It Come From?

Now, where does this clover get all this fertility? Does it bring it out of the soil? The scientist tells us not. The scientist has analyzed soil before and after growing clovers and analyzed the clovers, and he says it is very evident that the clover does not get all of its nitrogen from the soil, but the scientists, especially the Germans, have decided that clover and all the legumes have little nodules or knots growing upon their fine roots, containing bacterial life, microbe life, that has the quality of drinking in nitrogen from the air in the soil, and feeding it into that land from the air. There is plenty of nitrogen in the air if we only have some way of grasping it and getting it into the soil. We need not pay twelve cents a pound for it.

A Valuable Plant.

So you see why it is worth while for the Wisconsin farmer to study carefully this clover question. To be sure we are not buying much commercial fertilizer in the state of Wisconsin; we none of us buy very much nitrogen at twelve cents a pound, but it is nevertheless true that if clover will gather in this twelve cents a pound nitrogen, it is certainly a valuable plant, and some of us who have had experience will agree that it does this. I have had the misfortune to be poor, and am yet; I have had to buy poor, worn-out land at a low price, and clover has done more to bring up these soils than anything else I know of. Fields that were considered practically useless in the days of wheat growing, because they had been cropped with wheat year after year until the yield went down to seven and even five bushels an acre, were sold very cheap. These fields treated with clover and stock to consume that clover, have been brought back to fer-

tility, until today they will bring \$100 an acre, and I am here to say that clover will do it, clover will furnish plenty of nitrogen; but there are other elements needed in the plant's growth besides nitrogen.

A Good Catch.

If the clover crop is so valuable, how can we get it? Why, we get it by sowing clover seed, but we don't always get it. To get a good catch of clover we have to take advantage of the season and of the growing time and of the moisture. We have found that by seeding to clover in the late winter or very early spring, just as the snow is going off, on our clay soils, by sowing that clover right on the surface, it will sprout with the first warm weather, and will begin to send its roots down while we have some moisture in the early spring, so the plant will get considerable root and will be well fixed to stand the dry weather of the later summer. We find even when growing a nurse crop, that if we get it off early in the season and give the clover the benefit of the moisture in the soil, that it will withstand droughts much better. So, in our experience, in seeding to clover, we have found it best to sow very early in the spring upon winter grains, which are cut early, giving the clover a better chance, and it is very seldom that we have a failure of clover grown with winter grain.

How to Sow.

I believe just as good a plan has been to sow the clover alone, or with a few oats. In the fall of the year plow the land, harrow it down just the same as if we were going to put in winter grain, and then very early in the spring sow our clover seed at the rate of four quarts to the acre, and from a peck to a half bushel of oats per acre with it; then when the oats are between the milk and dough stage, put in the mower and mow down whatever is there. There will be quite a fair crop of oats, because when sown

thus early they stool wonderfully, and yet they are not so close together as to choke the clover. To some extent the oats help to keep back the weeds, and when you mow them you get something of a hay crop, and oats make fairly good hay. Then your clover goes on, and we never have had a piece sown in this way that failed. We sometimes sow clover alone where the land is free from weeds, with fairly good results, although I would prefer to sow some oats every time. A few peas sown with oats are not objectionable; they come into condition for hay about the same time as the oats, and can be cut early. We sow a great deal of clover with oats, and



SWEEPSTAKES OXFORD DOWN RAM
OWNED BY GEO. MCKERROW &
SONS, FED MAINLY ON CLOVER.

with barley, and we find the barley better than the oats, because it is taken off early and doesn't draw as heavily on the soil for moisture.

Moisture for Plants.

Prof. King carried on some experiments that interested me very much, as a farmer. They were to determine, if possible, how many pounds of moisture it took to grow a pound of dry matter in the various farm crops. I cannot give the figures exactly, but they are something like this: It took about three hundred pounds of water to grow a pound of dry matter in the ripened corn crop, something like four hundred pounds in the barley crop, and something like five hundred

pounds to grow a pound of dry matter in the ripened oat crop. We can readily see how it is in a dry season. If we have an oat crop that has taken five hundred pounds to develop every pound of dry matter, when it is fully ripened, your clover doesn't get much of a show, the oat roots are all around there pumping the water out of the soil.

There are many other things I would like to say about the clover plant, because it has been a great friend to me, as a farmer, but I will stop talking and ask you to open the discussion with plenty of questions.

DISCUSSION.

Mr. Everett—Mr. McKerrow made a statement that I don't exactly understand. He said that the decayed clover roots offered an opportunity for drainage; at the same time he says that in a dry time the same roots or the spaces left by their decaying gave an opportunity for the raising of moisture. Did he mean that moisture will come up through a hole in the ground?

Supt. McKerrow—If the hole is small enough it will. Where very fine roots go down in the ground the moisture will climb up. You take a piece of loaf sugar and touch it to the top of your coffee and the moisture will very soon go through that sugar, but you take granulated sugar and it won't do it. The particles must be close enough so that the moisture will climb, on the same principle that we can climb a well if it is small enough so we can put our hands on one side and our backs against the other.

Mr. Goodrich—You say that in seeding clover you put in a peck or a half bushel of oats. It seems to me that is spreading the oats pretty thin, and I think you will have lots of weeds. I would prefer to put on oats at the rate of two bushels to the acre and cut them off when they are just in blossom, and get a good, fair crop of hay. We have done that for a good many

years and have never failed to have a good catch of clover. I want to ask Prof. King at what stage do the oats take out the most of this five hundred pounds of moisture? Isn't it after the fine oats are headed out and while they are maturing?

Prof. King—Just at the time that the plant is beginning to shoot, and from there on to the dough stage.

Supt. McKerrow—I want to explain why I do not sow two bushels of oats. It comes from my experience with a certain piece of land, a hillside facing south, that has been in small grain crops for forty years. It was heavy clay and had washed a good deal, so there was but very little surface soil. I first seeded that to clover with a crop of barley, but it dried out. The next season I sowed two bushels of oats to the acre with clover seed, and to give this clover a chance I cut those oats early, for hay, but still the clover died out. The next year we plowed it, and it was a much dryer season than the former. We sowed a peck of oats to the acre and there was a good growth in proportion to the two bushels, enough to keep back the weeds to a considerable extent. We got a very good catch of clover, and from my experience with that land I feel like advising to sow oats very thin.

Mr. Bemis—I had twenty-five acres of land right here near Janesville that I wanted to get seeded to clover last year. It was very poor land. I commenced plowing it just as soon as my oat crop was taken off, and I plowed about one-third of it; then it became very dry and it got dryer, so I stopped plowing until late in the fall. Then I fitted the rest of it and sowed it to rye. The rye was very poor and made practically no stand. In the spring I went on very early and commenced to drill with a shoe drill and sowed clover, letting the seed run right in the drill hole. I sowed about three acres in that way. A little later, as the ground got ready to work, I

sowed about two and a half acres with oats, about half a bushel to the acre, and I top-worked that some. On this piece, as a result I had to mow it, cut it off when the oats were just in the head, and the early fall plowing that I did right after harvest there, I found the clover all in bloom, a very perfect stand. My next best clover was where I had thin oats, it was a good stand, but not in bloom. Then where I plowed late I had a very heavy crop of ragweed, and the clover was about the same as where I had the good stand of oats. To sum it up, if I was sure that I could keep down the weeds as I did that year by plowing very early, before the weeds seeded, I believe I should like that plan best, and sowing in the thin oats next best.

A Member—What system of manuring or cultivating is most likely to keep clover standing, in the freezing and thawing of spring?

Supt. McKerrow—In the first place, if you wish a real good catch of clover, it is well to have plenty of manure in your soil, but the trouble with me always has been where I needed clover the worst there was the least manure. I have aimed to top-dress this clover in the fall after it was sown in the spring, with a light top-dressing, anything I had on hand, manuring along through the winter. The plant needs the most encouragement just when it is young, and for the purposes of that encouragement we want salt and land plaster. We would sow manure, if we had it. We can buy salt and land plaster cheaper than commercial fertilizers. This last season we sowed about fifty pounds of land plaster and two hundred pounds of salt to the acre on our soil, mixing them together. I know that land plaster does not work the same on all soils; on many prairie soils it doesn't seem to have a good effect, but on land that has a little sand in it, it adds to it. We have some burr oak openings where the land plaster seems to have a good effect.

Mr. Marsh—Will Prof. King tell us something about land-plaster?

Prof. King—The action of land plaster is not known, although there are some effects of which we know. It has a tendency to liberate some of the potash in the soil and make that more available. Where lime is helpful, of course it acts as a plant food. In soils that are at all subject to alkalies, it has a positive effect of neutralizing the alkali, but in black, marshy soil, it would have little of that effect.

While I am on my feet, I would like to say a word about some other things that have been discussed here, and the fundamental questions which underlie these things.

We need to understand first of all that the nitrogen of our soil does not come from the rocks, as the phosphorous does, and the potash and the magnesium. The nitrogen of the soil must come from the air, and the only way we have of getting that from the air is through the family of plants to which the clover belongs. Nature's method has always been to withdraw it from the air through the clover plant, through the locust trees, or through some other form of leguminous plant. That is the way in which the nitrogen is kept supplied. Now, when we cut off nature's methods of supplying nitrogens to the soil, we cut off the nitrogen. If you will recall the wild condition of the prairie or the wild condition of the woods, you will remember very well that, mixed with the other herbage, there are always wild peas, or willow, or some other leguminous plant growing. In other words, while nature does not adopt a rotation of crops such as we talk about, she does not adopt a succession of cropping; she has a mixture of forms, and these leguminous plants are always among the rest. But when we clear everything off the ground and put just one thing upon it, wheat, oats, barley, and do that year after year, you can see very plainly that the nitrogen of the soil must become ex-

hausted, because when you take off the wheat-crop you take nitrogen with it, and there has been nothing in that wheat crop to put nitrogen back. We need to fix in our minds, once for all, that the clover crop or the bean crop, or the pea crop, something of that character, is the crop that restores to our soil the nitrogen that we take away from it in the other crops.

When you cultivate a field that you have a crop on, you are putting that field under conditions which favor the change of the humus, or the organic matter of the soil, the manure and the humus, into nitrates, and, if you do not take that nitrate off in the form of a crop, nature takes it away from it by drainage, so that when you carry a crop of corn or wheat, or anything on a piece of ground continuously, and you put a crop upon the ground that does not take nitrogen from the air, you are robbing the soil of nitrogen.

Everyone in the western countries knows that our soils suffer sooner from nitrogen exhaustion than from potash or phosphoric acid exhaustion, or lime or magnesium exhaustion. You must understand the fact that the nitrogen has to come from the air, it must come from above as it always has, but it is always leaching away and going to the sea, which makes it necessary for this location to make provision against such exhaustion. We have done this to a certain extent, without understanding why.

There is also another principle underlying this matter of rotation which we do not understand. Laws and Gilbert, in their experiments, tried to show how continuously they could grow a given crop on a given piece of ground, and they started out with the intention of growing clover continuously, but they very soon found out that they could not do it. They said, in the language of the old country, that the land became "clover sick." As far as I have been able to learn, no one knows what is meant by "clover sick" land. If a man has had the

smallpox once we say that his system is smallpox sick, that is, smallpox does not grow on that soil again for a long time. If a boy has the measles thoroughly once his system is in some way fixed so that it is not a good soil for measles any more. The measles crop is not widely different from the wheat crop, that is, it is a little thing that grows in the system and flourishes there some time, but in some way the system becomes ill adapted to it. Whether a "clover sick" field is one that has had clover upon it so long that something has been introduced into the soil that is injurious to the clover, I do not know, but it acts like it. We have the same thing in our experience, as far as eating is concerned. You don't want bread and butter for breakfast, dinner and supper, right along for two months in succession. You don't want beefsteak for breakfast and for dinner right along, six months in succession. The system be-

comes set against it. It is not because the beefsteak is not good, but it must be that there is some condition in the system that interferes with the proper action, and we can see how the same conditions repeated and repeated, in a given soil, might put that soil in condition so that it is not responsive to that one thing, just as one thing in our food becomes distasteful to us, simply because our system is out of order with reference to it. This exchange, or rotation of crops, comes partly on that basis; that a crop may possibly leave something in the soil or some condition that is removed when a new kind of crop comes on the ground. So down at the bottom of this question of rotation lies the absolute necessity of growing clovers or something that is their equivalent in order to bring the nitrogen. Somehow that nitrogen has got to be gotten from the air; there is no alternative.

DRAINAGE.

E. O. KULL, Genoa Junction, Wis.



E. O. KULL.

Mr. Chairman, Ladies and Gentlemen:—It pleases me to meet here today so large a number of our most practical farmers, and those interested in agriculture, and to take part with you in the closing exercises of the most instructive term of Institute work ever held within our state. I am not here representing myself as one of the Institute workers, or as one presuming to be capable of instructing you all on the subject of drainage, but hoping that I may be able to say something which will provoke a discussion, and thereby bring forth valuable thoughts upon this subject from these more scientific gentlemen.

Over four thousand years ago there was issued to man this command: "From the sweat of thy brow shalt thou earn thy bread." I have often

thought this command was more forcibly directed to the farmer than to those of different occupations. Nevertheless we were given the intelligence to discern those things upon which we could concentrate our energies and obtain the best results.

Tile Drainage.

Perfect as is the natural drainage of our country, still there is vast room for improvement, and thousands of acres of land now almost worthless could be converted into farms of vast fertility and beneficent results, realized not only from a monetary, but also from a sanitary standpoint. Although various methods have been employed to remove surplus water with very good results, I wish to call your attention more particularly to that system known as tile drainage, which I believe is the most practicable that can be used in southern Wisconsin.

The question has often been asked as to what lands require tile drainage. Horace Greeley attempted to answer the question by saying that "all lands will pay to tile." This is a great mistake, and leads us to believe that if this eminent writer ever farmed he must have carried it on through the medium of the pen, or by proxy, for his hands could not have come in contact with the plow. There are hundreds of farms over the state, of which the natural conditions of the soil are such as to render artificial drainage unnecessary, being so constructed as to remove all surplus water before damage could result to crop growth.

Capillary Water.

There are two different kinds of water which affect plant growth; one is a necessity and the other often

proves a detriment. The first is known as capillary water, which, in tile-drained land or lands naturally under-drained, is forced from beneath the soil and sub-soil up through small pores in the earth called capillaries, by capillary attraction. Capillary attraction is the force of adhesion between liquids and solids which causes water to rise in these pores to or near the surface, to give moisture for the germination of seeds, and promote crop growth. The principle showing the force of adhesion in these fine capillaries of the soil may be shown by taking a number of small glass tubes open at both ends, and of different sizes, with one end set in water. It will be seen that the water will rise highest in those having the smallest diameter, and those of considerable size will not force the water above the level of the water in the vessel. In under-drained soils these larger pores act as air cells to allow air to penetrate about the roots of plants, and during heavy rainfalls to conduct the surplus water to a lower stratum by which they are carried off by under surface drainage.

Hydrostatic Water.

The other water affecting plant growth, known as hydrostatic water or water of complete saturation, which is the result of heavy rainfall or melting snow, may be seen accumulating on low clayey lands which have a subsoil impervious to water, filling every depression and converting the soil into mud. The object of under-surface drainage by the use of tile is to rid these lands of surplus water and fit them for crop rotation. Water should be removed down through the soil instead of over it, opposite as is shown by the open ditch system which in itself is an obstruction as well as being continually obstructed. Water should be removed down through the soil instead of over it so as to retain all fertilizing properties found in surface wash, which otherwise would be carried off the land to enrich other

farms further down the stream. There are also valuable fertilizing properties in the form of nitrogen found in rainfall after heavy thunder. By removing surface water down through the soil into tile in winter and early spring the crop season is lengthened. By leaving the soil porous and sufficiently dry for the early sowing of seed, it will soon germinate and you get a better length of root before the dry months of July and August. Wheat and corn in well under-drained tiled land will reach a depth equal to the depth to which the tile is laid. By removing surplus water down through the soil into tile drain we remove all stagnant water, so full of malaria and disease.

Necessity of Tiling.

Again, it will be seen that crops are more liable to winter-kill on those lands that in winter hold an over-abundance of ice caused by hydrostatic water. The causes which are made apparent and lead to the destruction of crops, are these: On warm days in early spring the heat of the sun thaws the ice in the soil; capillary action then takes place and pumps or forces the water to the surface, and the force which pumps it, holds it. There are two agents that can remove it, one is warm air and the other is hoar frost. During the following cold nights this capillary water will be frozen into thin layers of ice which attaches itself to plants. It keeps on freezing thin layers, one under another, continually lifting those above by precisely its own thickness, and by morning there may be one or more inches of hoar frost or stool ice. The sun of the coming days will thaw this ice and leave the roots of plants exposed. Several such days and nights will suffice to destroy the crop. The danger of winter killing will be largely, if not entirely, overcome on tile drained lands, because the point of complete saturation will be lowered to the depth of the tile, and only the smallest capillaries can force the water

anywhere near the surface, and only in small quantities, not sufficient to do damage.

How to Tile Drain.

I have attempted to tell of some of the benefits derived from tile drainage. The next question in order will be how to extend our drainage system on lands which require it. As no two fields present the same conditions one must draw largely on his own judgment in this matter.

After having determined the natural water course (which will be very easily shown in the early spring, as the soil has become thoroughly saturated with water and all the depressions filled, the surplus will be seen flowing down the natural water course, which may sometimes be very irregular and crooked) begin at the outlet, ditch up through the ravine or water course, keeping in a straight line as nearly as possible. If you are somewhat sceptical as to the amount of fall you have, there not being sufficient water in the ditch to determine the true incline, obtain the services of a capable drainage engineer to determine the amount of fall you have from the upper end to the outlet. This fall should be divided up by setting stakes every hundred feet, showing exact depth of ditch at that point. If the banks are of sand and gravel in some places, you will be obliged to lay your tile as fast as you dig, as the banks are liable to flake off and fall in the ditch. At the extreme outlet place a box composed of plank eight or ten feet in length, with a screen over the outer end to prevent small animals from entering and obstructing the drain.

Size of Tiles.

The size of the tiles should be determined by the amount of water they are required to carry. We will suppose you have a ten acre field with several depressions, one extending above the other, and in a wet season the larger part of the field is affected by surplus water in the soil, also receiving water from adjoining fields.

Starting up from the outlet with nothing less than a six inch tile, as you work, passing some of the depressions, you can reduce the size according to the amount of water to be carried, but never put in less than a three inch, for when we take into consideration the cost of digging and covering, and the fact that more or less silt is apt to work in, it will be poor economy to do so. As to branches or laterals their size and closeness should be determined by the conditions of the soil. After connecting with the main you can reduce in size as before.

Depth of Tiles.

As various opinions have been advanced concerning the depth to which tile should be laid, I would say, where you have sufficient fall—three and one-half feet is better than less—the deeper they are laid the less liable they are to be disturbed by the action of frost, and are also capable of drawing water from a greater distance. In abrupt depressions we are sometimes unable to get them down, but after a few cultivations these depressions will be filled and the tile receive better covering. It is a very good plan, before earth is thrown on the tile, to cover them lightly with slough hay or place over each joint a piece of building paper to prevent the fine silt from entering the tiles; after this fine earth to the depth of one foot should be carefully placed around the tile and well stamped down. Much hard work can then be saved in covering, by using a common two-horse plow, to which is attached an evener long enough to reach across the ditch. Better work can be done by using three horses, one across the ditch and two ahead of the plow. Two good men and three horses will cover all the ditch you have in one day. I think better results will be realized to tile in the late summer, then follow by thorough cultivation, plow the ground well and deep, leave the furrows exposed to the action of the frost, and in spring thoroughly pulverize by using

a disc harrow. I have had good results by sowing millet for the first crop.

Cost of Tiling.

Now, as to cost of tiling such a field of ten acres as I have described. It is supposed that this land does not require what is termed a thorough under-drainage system which would be a main sufficiently large to drain a swamp, and laterals every two rods, but we will say it would need branches every four rods apart and main through the center, making the following:

440 rods of digging at 25 cts..	\$110 00
30 rods main tile, 6 in., \$28 per	
M. or 16 pieces to the rod...	13 44
10 rods main, 5 in., \$20 per M.	6 40
400 rods laterals, 3 in., \$10 per	
M.	64 00
For filling, say.....	10 00
	\$203 84
Average cost per acre.....	\$20 38

DISCUSSION.

Mr. Goodrich—Do you think it pays the owner of the land to be around where the work is going on?

Mr. Kull—I certainly do, no matter how honest the men are.

Mr. Wilson—Do you make your last ditch just the size of the tile?

Mr. Kull—I should have it a little larger. There is nothing gained in making it so very narrow. Loose earth should be tamped about the tiles to the depth of a foot, care being taken to keep them in line.

Mr. Goodrich—What fall would you consider the lowest possible in putting in your tile?

Mr. Kull—One inch fall to the rod is very good. Sometimes you will find that you have more fall above than you have in some other parts as you go along, and then it will be almost on a level. In such a case, if you have a fall of one inch to four rods, with perfectly laid tile you will be all right, but I would rather have an inch fall to the rod. I would not put in any

laterals less than three inches—it depends on how much water you have—the main should be six inches.

Mr. Hoxie—Suppose the field that you wish to drain is on a level, how can you get an inch fall without going deeper than three and a quarter or four feet?

Mr. Kull—The men at the tile factory said they knew of no machine that would invent a fall. If you are not positive that you have fall enough to carry away the water, it would be poor policy to attempt to drain the field. It was in Illinois, around about Chicago, that I first saw tiling. All who did any tiling were willing to do more of it. I remember going past a field, the soil of which was inclined to be peaty, and after it had been thoroughly drained that soil became perfectly barren, nothing grew on it, and the farmers around said that the man had ruined his field by drainage, and I thought so myself. I know of a man in our section of the country who put down tile through a swamp of peat. He laid it down about six feet deep, and went through a forty acre tract of land that was perfectly valueless. It looked as dry and loose as a burned up manure pile, but he went on and experimented. He drew onto that land a great quantity of sand and gravel and pulverized it with a disc harrow. He tells me now that he is growing grasses of various kinds, and he gets more than two and a half tons to the acre of fine hay on those sloughs that were worth nothing.

Judge Phelps—There are large tracts of peat lands in this part of the state, from two to four feet deep, resting upon an impervious subsoil filled with water. A great deal of this land is covered every year with a growth of what we call good marsh hay. Now, when this land is drained this marsh hay dies out, and nothing but weeds come in its place—no crop will grow. Now, what is the matter? When plowed up and cultivated, the roots of even the marsh hay die out. You

plant corn, and it will grow up a little and die, and in a dry season you will see that the ground is covered with alkali. Is it the alkali that kills the vegetation, and if so, what will remove it so as to make it worth something, which it was before it was drained?

Prof. King—The question is an unsolved one. We have great areas in the state which, when they are first drained, were productive, producing heavy crops of grass, but after three or four years it has been impossible to get any crops of grass. The Experiment Station is working upon that problem. Upon some land we have at the Station the soil shows the same kind of alkali, but whether that is sufficient to account for what we find there is an unsolved question. It has been found, however, that these lands respond very promptly and thoroughly to the use of manure. We know that there is nitrogen enough in the form of nitrates in the soil. Land plaster is used in the west to neutralize the black alkali.

Mr. Hill—How would kanite work on such soils?

Prof. King—It had no effect.

Supt. McKerrow—How about the question of putting these tiles below the frost line?

Prof. King—You cannot always do it, and I don't think it is always necessary, but I would prefer it.

Mr. Bennett—If they were filled with water in winter, wouldn't they freeze up?

Mr. Kull—They would not be filled with water if they were properly laid. The water would be running off all the time, and they receiving more water. We must remember that after this tiling is done we have changed the nature of the soil. We have run against the established rule of nature and we must cultivate those soils in order to get them to respond properly. Plow and let it remain for the action of the frost through the winter after you have laid your tile in the fall, as I like to do; then go on in the

spring with a good, sharp disc pulverizer, and work it up. I would prefer sowing millet for the first year, and we will find that the soil is quite loose on top for the coming year. I wouldn't try to plow it the next year, but put on a disc pulverizer and you can work that ground easier than the first year. Then the third year you can go on and handle it just as you want it.

A Member—In tiling some of us have been greatly troubled with wire worms below the soil. Is there any way of getting rid of them?

Prof. King—There is no way of getting rid of them, but they are not the primary cause of the trouble. They kill some of the corn, but they are not the primary cause of the killing of the corn; there is something in the soil that is against the corn, where they are. I don't know of any way of getting them out.

Mr. Goodrich—Ten or twelve years ago I did some tile draining, and some of the land was like that spoken of by Judge Phelps. There were some spots that for some reason things did not grow in. Where we put on a good application of manure the corn grew just as large as you could ask corn to grow, and for two or three years it did well, then it wants to be manured again. I have seen a good many of these fields, partly covered with this white substance like alkali, but manure seems to be an antidote to the poison that is in the lime, or whatever it is, and a good application of horse manure will do more good than anything else.

The Chairman—That is because it has more nitrogen in it. We have done considerable draining of peat marshes in our section, and we find the best results can be obtained by putting on sand.

Prof. King—One of the great troubles with such soil is that it dries out so badly that the crop actually suffers from drought, and the working in that soil changes the texture so that the capillary waters are brought up.

That is the chief value that comes with the sand, except that the sand hastens the rotting of the peat. It does not come so much from the fertility of the sand as from the physical effects that the sand has. It makes the ground more compact, therefore the capillary tubes can operate.

Mr. Whitely—Why do sand and barnyard manure have the same effect?

The Chairman—It needs both. Farmers make a great mistake in thinking land is rich because it is black. Some of the black land needs more manuring than anything else.

Prof. King—Those black soils do not respond well to potash, or phosphoric acid, or kanite, or any of those things, but they do respond to barnyard manure. They will respond to even dry cut straw, working in the soil, and it is common experience that the first crop that is taken off from a piece of land after it is tile-drained, is often the best crop, and the only way that I can explain it now is the physical effect of the plowing up. There is something there that we do not understand yet, which in some way this barnyard manure and the coarse litter neutralizes.

The Chairman—Isn't there a superfluity of phosphoric acid in that soil?

Prof. King—There is an abundance of it, but not enough to do any damage.

Mr. Wheeler—If we have a piece of land that is inclined to be peaty, that will grow a good crop of marsh hay under ordinary circumstances, are we to consider that it is not best to tile this land at all, but to leave it as it is, and have the surplus water carried off by a small ditch? Is that for the best interests of the farmer?

The Chairman—I would say that if a man wants a certain amount of marsh hay and he has a valuable marsh he had better leave it alone; but if he has a piece of land that is not productive, that is not marsh, he had better get it in such shape that

he can farm it. There are plenty of marshes that are not valuable, that by draining, in five years would be made very productive.

A Member—What is the matter with burning this peat off after you get it drained.

The Chairman—We don't know whether the peat is at the bottom of the mischief.

Judge Phelps—I had some ground broken up and planted to corn and there was a small piece of it that I had occasion to cut off; I put a fence through on one side of the field, and I had the ground planted and tilled, but it didn't grow. On the other side, the same kind of land, a man took a drill and drilled in the seed, and on that piece of ground where he drilled it in, the corn came up, and grew up thick. Now, I account for that in this way, that the alkali comes to the surface when the weather is dry, but if there is a good deal of rainfall it keeps the alkali down, keeps it in solution, and it does not come to the surface to injure the roots of the crop. Where this corn was sown so thick it shaded the ground and kept the water from evaporating, and the alkali did not kill the roots for that reason. I think there is something in that that you want to get your soil covered early in the season with a crop, but if it comes late, and dry weather comes, the water is evaporated and the alkali comes to the top, and you cannot get your crop.

Prof. King—The reasoning is all right, if the trouble is the alkali, but we do not know that yet. We have some of that soil which we have been experimenting on this winter; we have leached it with a view of leaching out the alkali, and we have a crop of corn growing on this ground, but I have to acknowledge that the lower leafage of the corn is today dying out. We don't know much about it yet.

The Chairman—I understand Mr. Kull to recommend this tile draining

to drain land where there are sink holes. We all know that around these sink holes there is a lot of land that a man cannot use in the spring. We cannot afford to cultivate irregular spots in Wisconsin.

Mr. Sayre—My farm lies where there are spots where there are eighteen inches of peat, and below that is what you might call marl or shells. Now, so far as pasture is concerned, these spots are the best part of my farm during half the year, and if I drain it, I will drive out this natural grass, and I am going to lose rather than make anything.

Prof. King—Of course, it should be understood that it is not wise to drain all such land, but there is a great deal of land in Wisconsin that could be much improved by draining.

Mr. Whitely—This land that Judge

Phelps speaks of is not sink holes—it would be prairie land if it was tilled, good tillable land.

Prof. King—All that can be said with reference to this, is that at the present time some of those lands that have been drained for two or three years are producing excellent crops, some of them marvelous crops, but you may say again, that it is not the best quality of hay. That grass has been plowed under and corn has been grown on the ground, and oats have been grown on the ground. I know of one piece at my brother's place, where he has tried for three years to get a reseeding catch, and he cannot do it. What the trouble is we do not know, but that is a fact that we have to face.

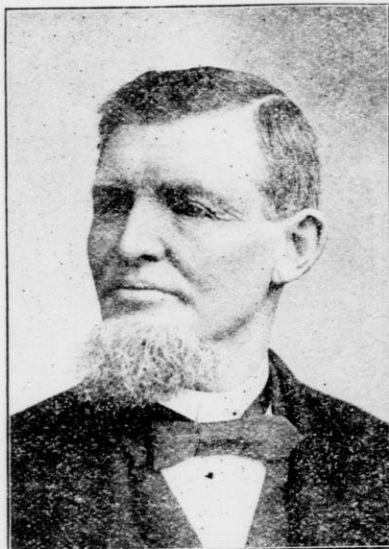
The Institute adjourned until 1:30 P. M.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. Mr. Convey in the chair.

MY EXPERIENCE WITH COMMERCIAL FERTILIZERS.

L. E. VAN LOON, Tomah, Wis.



L. E. VAN LOON.

This is an age of fertilizer farming. Some of the leading minds of the country practice and advocate the use of commercial fertilizers. To the progressive farmer it ought to be one of the leading subjects for investigation if the rapid improvement of the soil is the object, and it should be with all thinking farmers, for to struggle aimlessly is deeply discouraging.

The Necessity of Fertilizing.

We find that farming, in the problems it presents for solution, is a call-

ing that challenges the best ability and the best culture to be found among men. The farmer's campaign will be well begun and well fought when he has armed the soil to fight the battle for him. The farmer needs to know, not how little manure he can make out with, but how much he can use at a profit. What we want to know above all things is how to make our land rich in the shortest possible time, and at the same time make it yield profitable crops as we go along.

Our general way to bring about the desired results is to use the mineral fertilizers in connection with stable manure, and clover, that renovating, nitrogen-gathering plant, thus forming in the soil a complete fertilizer ready-mixed, evenly-spread, and available, adapted to the use of every farmer, whether his money crop be grain, potatoes or tobacco, milk, butter, fat cattle, or hogs. When we have thus fertilized clover, the plants will be stimulated to wonderful growth, and when we have abundant crops of clover in short rotation we can grow anything else we wish, with ease.

An Experiment with Commercial Fertilizers.

Permit me to state my experiment, in one instance, with acid phosphate, muriate of potash and medium red clover: In the fall of 1895 I seeded to rye three acres of very sandy and exhausted land, the young rye making

only a feeble growth that season. In March, 1896, the field was seeded to six quarts of clover seed per acre, and immediately dressed with 430 pounds of acid phosphate and muriate of potash per acre. The rye was clipped the middle of May and again in June, leaving the clippings for protecting the dense growth of the young clover. August 25th we harvested six large two-horse loads of clover hay. In March, 1897, the field was dressed with 150 pounds acid phosphate and potash per acre. The weather being cold and unfavorable, we harvested half a crop of hay the middle of June. In September the crop was cut and threshed, yielding 670 pounds of fine clover seed.

The aggregate cost of the two applications of fertilizers, including freight was, for 1,500 pounds of acid phosphate, \$18.00; for 250 pounds of muriate potash, \$6.50, and for hauling and applying the same, \$2.50, making a total of \$27.00. Then, harvesting six tons of clover hay, \$7.50; harvesting, threshing, etc., of seed cost \$14.00, a total of \$21.50, which with the \$27.00 for fertilizer, makes a total of \$48.50, the cost of producing the crop.

The value of six ton of clover hay was \$36.00; eleven bushel clover seed, at \$3.60 per bushel, was \$39.60, a total of \$75.60, the value of the crop, which leaves a balance of \$27.10, or \$4.50 per acre, during each of the two years in use.

Importance of Clover.

Bag manuring the clover has come to stay on our farm. The poorest soil may be reclaimed at a profit. The result of this and other experiments and observations leads me to these conclusions. First, the field lacked available plant food to grow clover or any other crop. Second, the acid phosphate and potash nourished the clover. Third, commercial fertilizers enable the farmer to cultivate much larger areas. Fourth, they virtually bring outlying fields nearer to the farm.

Fifth, hardly a more severe test of the value of fertilizers could be made. Sixth, they transform a leachy waste to a productive soil. Seventh, they assist in easier and cleaner farming.

A personal study has confirmed me in my belief that the true scientific method of fertilization is to look to clover or other legumes as the key to the situation, and to fertilize more as an aid to develop the clover than as a chief means of making the soil productive.

This transaction seems to be as simple as it is inexpensive, and the farmer who most relies on clover fed with the cheap mineral plant foods, will be the one who secures the biggest returns for his outlay in buying plant foods.

DISCUSSION.

Mr. Arnold—I suppose that you are aware that there is more potash in clover hay than in anything that we feed on our farms—there is a greater proportion per ton. If you put on this potash so that the clover can grow, the clover grows and introduces nitrogen into the soil, and makes it productive. I think you must take off more potash than you put on.

Supt. McKerrow—Evidently he did, with a good crop of clover, but Mr. Arnold is a stock man and would not attempt to feed his calf on hay when it was one or two days old. The young clover plant needs digestible food; Mr. van Loon put on food that was just right for the young plant, and as it grew older it was able to get the less available potash in that soil, and it did not wither and die because it had the proper food to live on when it was young, until it got strong enough to gather in the potash that was not quite as available.

Mr. Wilson—if you hadn't gone to all that trouble, would you not have realized as much for your labor out of that land?

Mr. van Loon—It is possible I would, but what kind of land would I have had?

Mr. Wilson—If I understand your figures, you realized \$17.

Mr. van Loon—No, I realized \$27, and I can raise most anything on that land after I have gotten through.

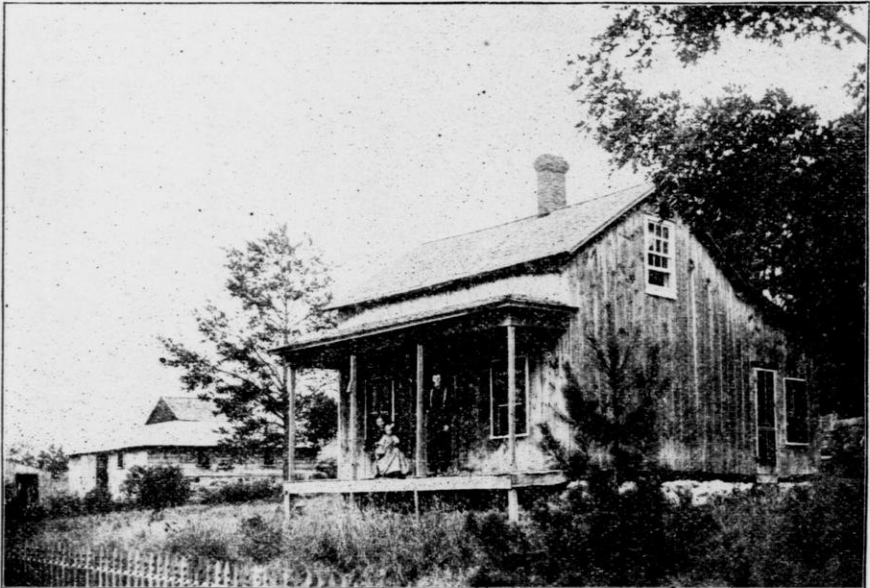
Supt. McKerrow—The succeeding crops have been very good, I understand.

Mr. Ames—How long ago was this experiment?

Mr. van Loon—1895.

Wisconsin. It may sound strange to you Rock county farmers, but this Bulletin goes all over the state. There may also be a point for us who live on what has been rich land but is now exhausted. We may be very glad to find some cheap fertilizer that will help us to secure clover, even on our exhausted clay soils.

Mr. Wilson—In what way was this spread?



FARM HOME OF L. E. VAN LOON.

Mr. Ames—What was the nature of the land before the experiment?

Mr. van Loon—Very sandy soil that was not at all productive up to that time—pretty nearly white sand, poor soil, exhausted.

Mr. Arnold—It seems to me that Mr. van Loon's experiment is of great advantage to farmers in Wisconsin who have sandy soil. If they can get a good crop of clover they are all right; that is what they want.

Supt. McKerrow—This talk is very valuable for all the sandy districts of

Mr. van Loon—Dry and broadcast; you could not use it in any other way. It was applied separately and not mixed, although we can easily mix it. We take six parts of the acid phosphate and one part of potash to grow clover, and sow it separately or mixed, just as you like. We sowed it by hand.

Mr. Bigelow—What is the cost of this material?

Mr. van Loon—With us it would cost about \$16 a ton, laid down.

Mr. Arnold—Who gave you this prescription for this sick land?

Mr. van Loon—Prof. W. F. Massey, of the North Carolina Experiment Station. We applied it two years.

Mr. Ames—What have you been doing with the land since 1895?

Mr. van Loon—I made an application in March, 1896, and again in March, 1897, and have raised clover both years. This year it goes over to potatoes or corn.

Mr. Wilson—Has that land ever been cultivated, or was it virgin soil?

Mr. van Loon—They tell me it has been cultivated for seventeen years, but it never grew a successful crop since I have had it, seven years.

Mr. Goodrich—Have you ever tried applying commercial fertilizers to any of this drained out peat land that they have been talking about?

Mr. van Loon—No, I haven't any of that kind of land. I have used it for special crops, such as onions, parsnips, etc., with success. I believe that the effects of commercial fertilizer on almost any land that is not too poor, in addition to clover, will show a greater effect than on heavier soil, because the land is hungry and takes it up quick.

Mr. Wheeler—Do you think that on our land, where we grow such heavy crops of oats, where we seed clover with oats and the oats grow so heavy that they lodge in places, that commercial fertilizer will be a benefit in helping us to get a catch of clover.

Mr. van Loon—I believe if a proper fertilizer was applied to that land it would stiffen the straw and give you a better crop of oats, and insure a better catch of clover.

Mr. Wells—Cannot clover be raised just as well without your artificial commercial fertilizers?

Mr. van Loon—You can raise it, providing your soil contains the ingredients that clover must feed on, but in my case I have tried clover and could not raise it. I had to put the proper kind of food into the land.

Mr. Wells—I have had land so poor

that I couldn't raise wheat, and I did raise clover.

Supt. McKerrow—It wasn't white sand?

Mr. Wells—No, it was good clay land.

Mr. van Loon—As a rule where clover prospers wheat will grow also, however, in Mr. Wells case, his soil probably needs a complete fertilizer to grow a paying crop of wheat.

Mr. West—Would you recommend commercial fertilizers on a soil that is not exhausted, prairie soil, oak opening, good subsoil?

Mr. van Loon—No, sir. A soil that is not exhausted and the proper fertilizing ingredients are available in sufficient quantities to grow maximum and paying crops, does not need fertilizer.

Mr. Arnold—If you will put your manure on the clover when you first sow the seed, and it is on good land, it will always catch. I never have failed in twenty-five years, and I believe it is because I put well-rotted manure on my clover and drag it in on top.

Supt. McKerrow—Mr. van Loon's experience was first drawn out by his neighbors at an Institute at Tomah, and I said to myself then: "Here is a man who has tried a certain class of commercial fertilizers, and by using those two, phosphoric acid and potash, on land that refused to grow clover or anything else, he has gotten some to grow, and has furnished the other high-priced ingredient that he must have, which is worth twelve cents a pound." I said to myself at that time: "Now, some of these fellows that are living on rich lands will take this discussion right away from what it applies to and will criticise it because it does not apply to the lands they live on." Mr. van Loon is not here to advise farmers on the rich lands of southern Wisconsin to go out and buy expensive commercial fertilizers, he is here to give his own experience with

fertilizers upon land that would not grow anything that is profitable. Most all of you may have a few knolls on your farm, and I have seen places in southern Wisconsin that I thought would be improved by the use of some class of commercial fertilizers, per-

haps the very same that Mr. van Loon has used. We could thus bring those spots up to something that is valuable, instead of being waste places. This talk was put in here to start us thinking, not to prescribe for the prairie soils of southern Wisconsin.

THE PLANTING AND CULTIVATION OF POTATOES.

D. T. MOSELEY, Warrens, Wis.

Mr. Chairman, Ladies and Gentlemen:—There are a number of things to be considered before venturing out into potato raising as a livelihood. If you are raising for your family use it does not matter so much, but if you are to make potato growing your business, you should scan the horizon, look your irrigation carefully over, and then ask yourself these questions: Am I well located, being near to station or market (as distance in hauling to market cuts a big figure)? Have I suitable land for the production of a first class crop, and if I do my duty will I be able to meet in successful competition, not only the potato growers of my own town, county, and state, but of the whole potato world in general? If you can answer these questions fairly, then all right.

Modern Methods.

To be successful in this line in these days, a man must be progressive and up-to-date. It will require his best thoughts and efforts along this line. He must not be traveling in the ruts of his forefathers. He must have improved seed that is up-to-date and standard, that under favorable conditions will prove strong growers, good producers, and good lookers. He can no longer plant with a hoe and dig with the same, as his father used to, nor can he plant the kind his father

raised when he was a boy. They were in the front rank then, but they are back numbers now. As this is a world of progression, the man who doesn't keep up with the times, no matter what his calling, will have to side track for those that are up-to-date.

My experience in potato growing on a large scale, or in car lots, dates back to the season of 1886, the year following the Farmers' Institute which was held in Sparta, the winter of 1885 and 1886, in which T. B. Terry took part. It was there I first conceived the idea of raising potatoes in car lots.

One Failure I Made.

Mr. Terry advocated the one-eye plan of cutting the seed, which I at once adopted, and which I have followed with fair success. I have scored many victories in the production of the crop, and have never met with but one failure, and then I did not have one plant come up on a tract of eight acres. This was in the season of 1887, and I attributed it to the way the seed was planted. In the first place, the ground was furrowed out with the hiller by taking off the wings. The furrow became dry, the seed was cut to the one eye piece and it was dry, the seed was covered with dry earth by going bias across the rows with a boater or leveller, and the weather following was dry. The result was that not a plant came up,

whereas, if the weather had been favorable, the result would have been satisfactory, or if the seed had been planted whole, the result would have been satisfactory. Whole or uncut seed will stand the test in either extreme wet or extreme dry weather, but with the aid of the Aspinwall planter you can plant whole or cut seed and have the result satisfactory.

Planting time is the most critical period in the life of the crop, for if you conduct the seed cutting and planting other than the right way, you will have a poor stand, and with a poor stand you are no better off than a renter, you only get a share.

In fitting the ground and preparing the seed, do it for all there is in it. Do not be content with half a crop, for when you get a poor stand you lose all interest, and do the best you can, you have only a share. Once a good or perfect stand is secured, the battle is half won, and with proper care and favorable weather a good crop is certain.

Land for Potatoes.

The land I have been raising potatoes on is the heaviest kind of white oak and hazel brush land. You that have raised potatoes know that when land is new it contains properties that it does not contain when it gets to be old, and when new it will produce a superior tuber to what it will when old. To get the best results you should restore it to its normal condition as nearly as possible, and to do this I have resorted to clover as first agent, and timothy as second, for they both contain fiber and give life to the land, which is necessary to the growth of the plants and tubers. Clover sod may be turned down in the spring and worked with a disc harrow; timothy sod should be turned down in the fall before planting in the spring, as this gives it time to rot. Then work it up in the spring, the same as with clover. Be very thorough in fitting. As the hot rays of the sun and a drought is the greatest fear we have in the pro-

duction of a crop, I plant my crop in rows, in one way only, thereby saving the hill from the rays of the sun on two sides, as planting in rows close together makes a solid row and the earth around the tubers is protected from the hot rays of the sun on two sides.

As to potatoes following potatoes, I have never obtained good results by planting potatoes upon land where potatoes were grown the season before, as the tubers are mostly undersized and scabby, and I did not know what to attribute it to, unless the fiber was worked out of the land, to a great extent, and the surroundings were not favorable for the production of a good, first class crop.

Plant in Rows.

Distance apart of the rows, and distance in the row varies as to varieties. Early Rose, Hebrons, Ohio, or any of this family might be planted on my soil, with rows three feet apart, and in the row twelve to fourteen inches. The late varieties, like Green Mountain, Rural New Yorker, and others of that family should have the rows three and a half feet apart and from sixteen to twenty inches in the row.

Planting Time.

As to the time of planting, Mr. Terry advocated late planting, that is, the last week in May or the first week in June. I have followed his time of planting, as near as convenient, with good results. The early planted potatoes receive the most attention from the bugs and that is not necessary at this time, and the late planted potatoes escape the drought which so often comes about setting time, and a drought at this time is detrimental to the growth of the crop. Late varieties planted at the time mentioned will, under favorable conditions, begin setting about the 10th to the 20th of July, and then the drought, if there is one, is generally broken by rains that begin coming about this time. The object in having them set at this time

is to have them make a steady growth from setting time to maturity, that one may get perfect shaped tubers, of good size, and lots of them.

My Treatment for Bugs.

I have never lost a crop on account of bugs. When I have to fight them, I have generally used a ten quart sprinkler filled with water to which is added one teaspoonful of Paris green. If this is honestly applied when the bugs begin to hatch, forty-eight hours ahead of a rain storm, it has always been sufficient with me, but oftener I have not had to make a fight at all.

The Potato Planter.

A potato raiser who has not an Aspinwall planter ought to have one, as the cost is within reach of all, and it is almost a necessity in his business. Potatoes planted with a planter can be tended with half the labor, to say nothing of what it saves in planting. The reverse arms on the planter leave the row, or where the planter are to come up, high shaped, like two furrows thrown close together, or high like what we term a "back furrow," the rows being like this all through the field. When the plants begin to break through the ridge or row, then take your level drag, slant the teeth back, and go crosswise of the rows by lapping half. By so doing the land is dragged twice over. At this time the little weeds have been making their appearance, and by double dragging on a favorable day, their little roots are exposed to the hot rays of the sun by being torn from between and around the potatoes, leaving the row free from little weeds, and death to the weeds at this time is sure. This being done, the work of finishing the balance of the weeds is easy. The work of dragging should be crowded along at this time, as the time to kill weeds is when the sun shines, and if you have a large tract or field, you should double your force and drag it twice over on that day, for fear of rain.

DISCUSSION.

Mr. Wheeler—Do your potatoes get ripe when planted so late?

Mr. Moseley—Part of my crop was lost by freezing, in 1896, because of not getting ripe so that I could start my digger sooner, but to guard against another loss I began planting May 13, in 1897, and on the 27th day of September they were all ripe, and I began digging on that day. Should frost come before potatoes are fairly ripe or skin tight, the appearance will be greatly improved by standing a few days.

Mr. Culbertson—Are potatoes ripened after the frost, as good quality as those ripened naturally?

Mr. Moseley—They look just as well.

Mr. Wheeler—My experience has been that in some soils potatoes will be of just as good quality if they ripen after the frost kills the vines, as when they ripened naturally. My experience is that if we plant our potatoes early the hot sun spoils the vines and spoils the crop, and then the bugs bother us. I plant late and I haven't used two pounds of Paris green in five years; I plant about the first of June, and usually the late potatoes are caught by the frost, and they are good quality, too.

Mr. Arnold—How do you keep your potatoes from sprouting as late as the fore part of June?

Mr. Moseley—We have a storage place, and the late potatoes are always the last ones to sprout. We sometimes have sprouts, especially if we keep the door closed and if it is extremely close when the warm weather comes. I never have done anything but to keep them ventilated.

Mr. Culbertson—What is your idea of preventing the earth flake or rust?

Mr. Moseley—That is a thing I cannot answer, nor do I believe there is a man in America that can answer it.

Mr. Scott—Why do you advocate the use of land plaster on the cut seed?

Mr. Moseley—The land plaster will

adhere to the freshly cut potatoes and keep them solid. If you are going to plant tomorrow or next day, it won't make any difference, but if you are going on and cutting two or three hundred bushels, they need something of that kind. I generally spread mine out upon the barn floor and sprinkle land plaster over them, turning them over two or three times with a shovel so that it may adhere to all sides, and then if they have to stay a week or ten days after they are cut, it won't hurt them. I got this idea from Dr. Kyle, in Tomah, whom I noticed had good results, and I have thought that I had better results since.

Mr. Scott—The experiments at Madison show conclusively that there is no benefit from the use of land plaster. How do you cut your seed?

Mr. Moseley—I would rather have a small potato and plant it whole, because I think that the whole potato will stand either extreme wet or dry weather and germinate all right.

Mr. West—I have used air slacked lime in place of land plaster with good success.

Mr. Scott—Mr. Terry has recommended cutting down to one eye, and Mr. Moseley recommends using whole potatoes; now, why not use the happy

medium and cut to one or two strong eyes in a piece?

Mr. Moseley—The biggest crop of potatoes I ever raised was by cutting down to one eye, but the next spring I hadn't a potato in eight acres, and I believe I should have had if I had used whole potatoes.

Mr. Scott—What depth was that seed planted?

Mr. Moseley—About three inches.

Mr. Scott—What has been your experience with deeper planting?

Mr. Moseley—My experience in deeper planting is that you might not have to hill so much.

Mr. Scott—So far as the roughness of the potato is concerned, what was it?

Mr. Moseley—It never cut any figure with me; that is, if I have an irregularly shaped potato I do not leave it for seed. Some varieties will give more irregular shapes than others. Such potatoes as the Iron-clad will have more knobs than oblong potatoes.

Mr. Scott—How often have you changed your seed?

Mr. Moseley—Every two or three years it becomes necessary in potato growing, as well as in everything else; though I hate to turn away old friends, I have to do it.

HARVESTING AND MARKETING POTATOES.

KENNEDY SCOTT, Rio, Wis.

Mr. Chairman, Ladies and Gentlemen:—This harvesting of potatoes can only be done on two plans, that is, either with an ordinary potato fork or with a potato digger. It will never pay the farmer who raises only two to five acres to purchase an expensive digger, as the interest on the investment, and the care and housing same, will be too expensive for

the returns that can be gotten from the same. Then the best thing for such a farmer to do is to dig with the fork, while the farmer who has a large acreage, can afford to purchase a good potato digger, and will be well paid for his investment.

How We Harvest.

We prefer using a digger and picking up the potatoes in boxes made of

lath and boards, the inside dimensions of which are $16\frac{1}{4}$ inches in length and 12 inches in depth and 14 inches wide. We usually put the boxes on a stone boat drawn by a gentle horse, sorting them as we pick them up, and when the boxes are full, we set them on the ground in rows, so that they can be picked up by driving along and the boxes loaded onto a truck or wide tire wagon,

Peerless, or round kind, and it is a good plan for the general farmer to try to raise a carload, as by this means the local dealer can pay more for the crop than he could otherwise, especially if they are well sorted, and if not, he can ship to the general market himself, getting all there is in them, and sometimes getting a little wholesome experience that will be beneficial, if not profitable.



HOME OF KENNEDY SCOTT.

which has just planks on it, and this saves quite an amount of heavy lifting, which is quite an object. They are then hauled to the cellar, or to market, if that is not too far away, and prices are suitable. By this process time is saved and the potatoes are in the best condition, not being marred from handling.

Varieties.

A word of caution as to varieties, and the keeping of them separately. We prefer to keep two varieties, one of the Burbank family and one of the

When to Market.

As to the time of selling, whether in the fall or keeping until spring, circumstances must govern this, but we should always take into consideration the shrinkage and extra amount of work in handling them over, putting them into the cellar first and then taking them out.

There are more potatoes handled during the winter now than ever before by putting them into a refrigerator car, with an extra bottom of boards, making an air space below,

then covering with building paper and putting the same on the side of the car, warming well with ordinary stove during loading time, and if weather is extremely cold, sending a man in charge of the car, or one man in charge of several cars.

DISCUSSION.

Mr. Moseley—What Peerless varieties do you recommend?

Mr. Scott—I have confined myself to the Rural New Yorker No. 2, and the World's Fair.

A Member—How deep do you plant?

Mr. Scott—From four to five inches.

A Member—Level cultivation?

Mr. Scott—No, sir, I cultivate with a five tooth cultivator, until I come to the hilling, and I put the sides on this Planet Junior cultivator and just hill them a little. That gives them nearly level cultivation. I put on these little mold boards that come with the Planet Junior, and plant them in rows, two feet eight inches each way.

A Member—What do you do for the scab?

Mr. Scott—The corrosive sublimate treatment is all right. Soak your seed from forty to eighty minutes and let it dry before cutting.

Mr. Kull—Do you store your potatoes in crates in the cellar?

Mr. Scott—No, sir, it takes too much room. I like to keep part of my seed in those crates.

Mr. Moseley—Wouldn't those crates be better with solid sides. Don't they ever get what we call "jack-knifed?"

Mr. Scott—No, as they would be too heavy. I have handled them ten years and they were all right. They are light and easily handled. The ends are made of common dimension boards, and lath, tobacco lath, and I prefer not to have them dressed, as they are stronger. When they are empty I put one into the other so that three can be packed in one bunch.

Mr. Chadwick—What do you do with the small potatoes?

Mr. Scott—Boil them and feed them to the hogs, but if you raise Rural New Yorker No. 2, you won't have many small ones. I plant medium small potatoes.

Mr. Culbertson—Isn't there danger of those potatoes growing too large?

Mr. Scott—Oh, yes, once in a while, but I have never been troubled with overgrown potatoes. I plant my potatoes two feet eight inches in the row. I have raised them five or six years.

Mr. Culbertson—What time do you plant?

Mr. Scott—I aim to plant them the last week in May or the first week in June.

Mr. Ames—Do you find the Rural New Yorker a strictly good, marketable potato?

Mr. Scott—I find it a good, average, marketable potato, and for spring and summer use, above the average.

Mr. Kellogg—Do you find any complaint on account of lack of quality in that potato?

Mr. Scott—I have sold probably twenty thousand bushels this fall, and I haven't had any trouble. Where they are raised on sandy loam soil, you will get as good potatoes as the average.

Mr. Kellogg—Do you know anything about what the fellows who eat your potatoes think about them?

Mr. Scott—You just send a carload off to Milwaukee, and if they are not all right, you will find it out. They know me up in Columbia county, and I am responsible for what I recommend.

The Chairman—What kind of a digger do you use?

Mr. Scott—I bought a Hoy potato digger twelve years ago. If I were going to buy another, I would buy a Dowden. The Hoover is a good digger, it does good work, but it has more machinery to it than I like about a tool, and wears out quickly.

Mr. Lawson—Why don't you use the Aspinwall potato planter?

Mr. Scott—Because I want my potatoes rowed both ways, for the reason that I can get better results than to drill them in.

Mr. Lawson—Do you mean better results in the yield?

Mr. Scott—Yes, for the amount of labor I put on.

Mr. Moseley—What was your yield this last summer?

Mr. Scott—I had about eight acres in Rural New Yorkers that yielded me a little better than 250 bushels to the acre on land that had been run forty years. From a thousand bushels of those that I put in my barn I sorted forty-seven bushels, and that is all.

Mr. Briggs—Have you ever tried raising Carmen No. 1, and how do you like them?

Mr. Scott—Yes, and Carmen No. 1 is a good potato.

Mr. Moseley—Don't you think if we had such a potato as the Green Mountain, planted one way, that we would get as good results?

Mr. Scott—I know I would not. There wasn't a man that raised them within ten miles of me, that got anywhere near what I did.

Mr. Everett—Does the market discriminate between the dark skin and the white skin?

Mr. Scott—The market discriminates between the red and the white potato, from two to three cents a bushel, in favor of the white.

Mr. Arnold—There are some markets that give more for the red.

Mr. Scott—I never found it, and I never found any man that had.

Mr. Moseley—I think the gentleman refers to the call for early seed to go south at the present time, in carloads, for the southern market.

A Member—Do you cut your potato seed?

Mr. Scott—Yes, I cut to two eyes as

near as I can, and I cut with the Aspinwall seed cutter.

Mr. Whitely—Are there any conditions of the soil that the digger don't work well in?

Mr. Scott—If the soil is too wet or if it is sort of sticky, it doesn't work well. Of course, sandy soil never gets sticky.

Mr. Kellogg—Can you tell us what your potatoes cost you a bushel, this year?

Mr. Scott—Yes, there was another fellow got after me about that a while ago, and I kept an actual account of the work put out on that twelve acres of land, and the digging and putting into my barn and cellar cost me \$154 for twenty-four hundred bushels. I figured on my own work and every body else's, figured all the work at a dollar a day.

Mr. Jones—Do you plow in the fall or in the spring, and how deep?

Mr. Scott—I don't care whether you plow in the fall or in the spring. If you plow in the fall, you must use the disc harrow, and double disc it, pulverize it, put it in thoroughly good shape. I prefer, however, to plow in the spring, from six to eight inches deep.

Mr. Moseley—Have you ever had any great damage from bugs?

Mr. Scott—No, sir, I don't let them damage my crops. I never had to fight potato bugs so hard in my life as I did this year. I finished planting the 4th day of June. This is the only year I have had any trouble since I planted late.

Mr. Moseley—Are not some varieties more apt to grow out of the ground and get sunburned, than others? Do you allow anything for that?

Mr. Scott—Yes, but I plant them from four to five inches deep, and have but little trouble.

Mr. Moseley—Do you count sunburned potatoes worthless?

Mr. Scott—I do for anything but seed. They are all right for seed.

VENTILATION OF FARM BUILDINGS.

PROF. F. H. KING, Experiment Station, Madison.

Mr. Chairman:—I wish to speak briefly upon the ventilation of the dairy barn, confining my remarks to that because there is more need of ventilation in those structures than in any others, at the present time, and because, when the principles underlying the proper ventilation of the dairy barn are understood, they are readily applicable to any other form of building.

subject of ventilation receives careful consideration.

In order that you may understand the necessity for plenty of fresh air in the stable, I want to give you a few figures for comparison. A thousand pound cow will eat, of dry feed, on an average hay and grain, or meal, in the neighborhood of thirty pounds per day; she will take about seventy pounds of water, or about a

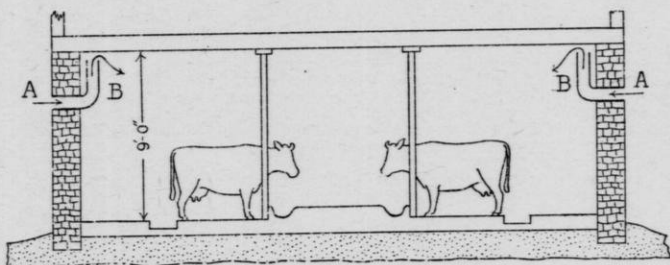


FIG. 1.—Shows simplest method of taking air into stone or basement stable. A B and A B show where the air enters. These flues may be made out of ordinary 5 or 6 inch stove pipe with elbow, or galvanized iron conductor pipe, or the pipe through wall may be ordinary 5 inch drain tile, with stove pipe and elbow on inside, or the flue may be made of 6 inch fencing.

Necessity of Ventilation.

There is much more need of paying attention to this question of the ventilation of dairy barns than there used to be, and for two reasons: The first is, that we are bringing together larger numbers of animals, and the second is, that we are building tighter and closer buildings than we used to build. When the barn or stable was made from an oak frame covered with green oak boards twelve inches wide, that shrunk to ten inches there was ventilation enough, and we did not need to pay attention to it, but we are building very different structures now, and so it becomes more and more important that the

hundred pounds weight of feed and water per day; but, in order that she may use that feed and water properly, it is necessary for her to use 192 pounds of air, nearly double the weight that she uses of feed and water. If you want to run an engine, you put coal into the firebox, you put water into the boiler, but you do not expect to get your power out of that engine until you have introduced into the firebox with the coal, under the proper conditions of temperature, a sufficient quantity of air. The fact that we can get the air without paying for it and without going after it, leads us to pay no special attention to it when we come to the construc-

tion of farm buildings. No engineer would think for a moment of setting up in the space occupied by the ordinary cow stable that houses forty cows, a forty horse power engine, and have the smoke stack terminate beneath the ceiling of the stable, and make no provision for the waste products to go out of the room, and the

lungs over 2,500 cubic feet of air in twenty-four hours. Multiply that by forty and you will see that there must be ample provision for air in that stable.

Fresh Air.

In a visit to Canada and the East, this summer, we had occasion to visit a feeding stable in Canada, where a

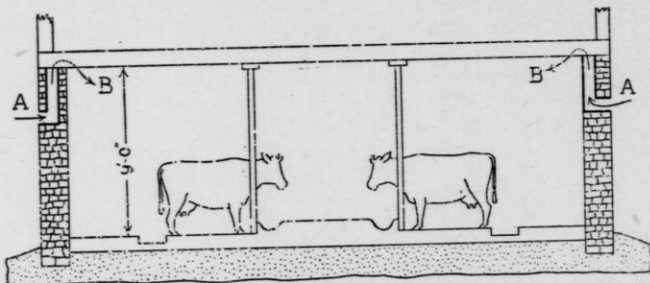


FIG. 2.—Shows a modification of Fig. 1 where on the right a notch is left in the wall when building, so that the flue rises flush with the inside of the wall. While on the left side the flue is shown built in the wall. This may be done by building around 5 inch drain tile or around a box made of fencing.

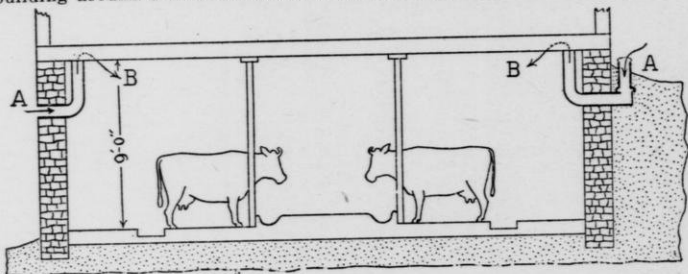


FIG. 3.—Shows a method of taking air into a bank barn on the up-hill or bank side. The air flue is made in the same way as described in Figs. 1 and 2, but on the outside has its end covered as represented at A on the left with a length of 6 or 8 inch sewer tile with its top covered with a cap of coarse wire screen. Drain tile would not answer for the outside exposure at the surface of the ground as frost would cause it to crumble. Wood could be used and replaced after rotting has occurred.

fresh air to come in. But we put forty cows into a tight stable on a cold night, and keep it warm, making no provision whatever for taking air into the stable or taking out the wastes.

Now, in order that one cow may get the 192 pounds of air, it is necessary for her to breathe, if you put it in figures, 2,513 cubic feet of air. She must take into and put out of her

man had brought together forty head of steers in one big room. His plan was to feed and water them without letting them out and he had it so arranged that the mangers could be raised as the manure and the bedding accumulated. He proposed to feed and water them without taking them out until he put them on the market. In Canada they have cold winters. He had closed that structure up as well

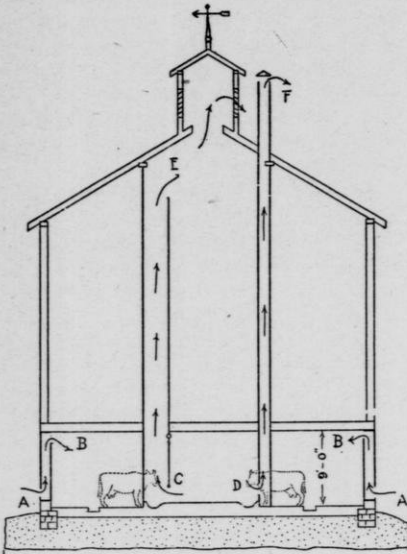


Fig. 4.

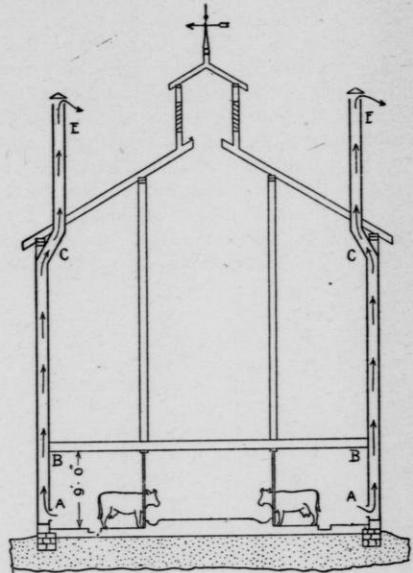


Fig. 5.

FIG. 4.—Shows two methods of ventilating a dairy barn. On the left the ventilating flue D F rises straight from the floor, passing out through the roof and rising above the ridge. One, two, or three of these would be used according to number of cattle. The flues should be to one or the other side of the cupola rather than behind it. On the left C E represents how a hay shoot may be used also for ventilating flue. In each of these cases the ventilating flue would take the place of one cow. This method would give the best ventilation but has the objection of occupying valuable space. C, in the feed shoot, is a door which swings out when hay is being thrown down, but is closed when used as a ventilator, the door not reaching quite to the floor. To take air into this stable if it is built of wood with studding, openings would be left at A about 4x12 inches every twelve to sixteen feet, and the air would enter and rise between the sheeting of the inside and the siding on the outside, entering at B as represented by the arrows. If the barn is a basement or stone structure the air intakes could be such as described in figures 1, 2, and 3.

FIG. 5.—Shows the second best method of ventilating an ordinary barn. The air comes in as described in the other figures, and passes out through one or more ventilators rising against the side of the barn and passing out through the roof, as represented at A C E. To make these flues if the barn is a balloon frame, the best method would be to secure the lightest galvanized iron in eight or ten foot lengths, and place the studding where the flues are to be, the right distance apart, so that a width of a metal covers the space between two studs. Sheets of this metal nailed on opposite faces of the stud would make an air-tight flue. On the outside, this metal would be covered with the siding. On the inside in the stable, with the sheeting, but in the barn above nothing would be needed except perhaps an occasional shield to prevent the hay from crushing it in. If it is not desired to carry the flues through the roof, they may end just below the plate, and the air pass out through the cupola. The method represented, however, would give the strongest draft. The width of studding used for the flue would vary with the number of animals to be provided for.

as he could, and there came one of those intensely cold periods when the breath from the animals froze upon the walls and the ceiling of the barn and practically sealed that barn up, the cracks were closed up by the moisture, freezing over the openings, and the result was that the man who was attending the cattle began to notice trouble, and he had to hurry down to the village where the proprietor of the stock was, to get him up there in time to save his stock

sphere in which you wish to risk yourself or your cattle. In this case the lungs have taken the oxygen out of the air and put carbonic acid in its place. This same experiment will illustrate another point, and that is, that the air that is breathed out tends to settle down at the bottom of the stable.

We hear a great deal said in regard to the cow stable having so many cubic feet of space for each cow, or a hospital having so many cubic feet

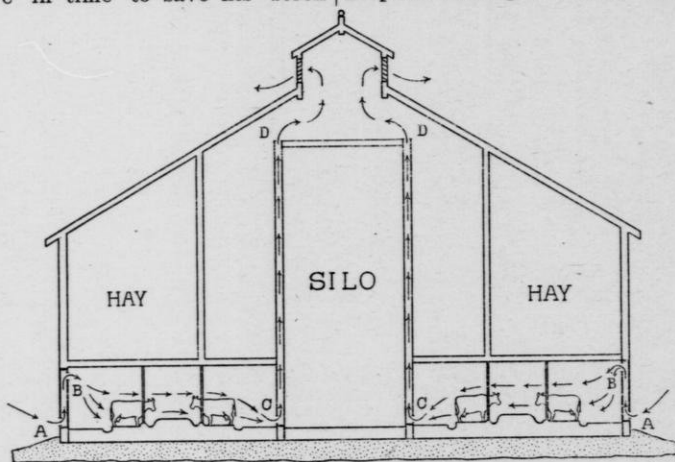


FIG. 6.—Represents the method of ventilating a barn where a silo or granary occupies the central portion. The air enters at A B and the ventilating flues are the spaces between the studding which form the walls of the silo, or other structure. The air entering at C in openings left all around the silo, and passing out at D at the top.

from suffocation. He was in danger of losing all of his stock from the closeness of the structure. Now, air once breathed is not suitable to breathe again unless it is diluted with fresh air. I can show you this in a way which I think will be convincing, by taking an ordinary wide-mouth bottle, into which I will allow a lighted taper to descend. The candle will burn all right in that jar in the air, but let me replace the air in the jar with air from my lungs and you see the candle goes out. An atmosphere in which a candle will not burn is not the kind of atmo-

of space for each inmate. It is not the cubic feet of space that is necessary, but the cubic feet of air. This idea has led to the construction in the East of some very extravagant buildings, with very high ceilings and windows put in on both sides so that the sunlight shall come in in both directions, and they have succeeded in getting a stable in which cattle are too cold in winter and they have been forced to ceil up in some cases the space above in order to keep the temperature up to a proper point. We have heard people say that they would not have a cement floor in the

stable, because it draws the moisture. Now, is that true? No. The fact is the stable was simply too cold and improperly ventilated. Being shut up closely with all those cattle, moisture was produced and the temperature of the cement being low, it condenses the moisture on the floor. The very presence of that moisture should have been an indication that that stable was not properly ventilated, and that is always the trouble where you see moisture in large quantities settling on the walls of a stable. You should have ventilation enough to keep the walls of the stable dry, otherwise there is not enough air passing through the room.

I have shown you that large quantities of air are necessary and that that air should be fresh. Now, what is the right quantity of air?

In order to get the proper degree of freshness of air, twenty cows will require a ventilating flue two feet square, through which the air is passing at the rate of three miles per hour, and that is independent of how many cubic feet of space you have in your stable. You want the air in the room changed at about that rate. Forty cows would require a ventilating flue of twice that capacity, and so on.

Ventilating Flues.

Now, what are the essential features of a ventilating flue? I answer by asking, what are the essential features of a good chimney? Is that a good chimney that runs up through the first floor and through the second floor, and ends in the attic? Would you expect it to be a good chimney as far as the draft is concerned? You would not expect it to be the best chimney, certainly, and so a ventilating flue that ends above the hay mow is not the best ventilating flue, but rather one which rises straight above the highest part of the roof. Air travels easier through a straight course than a crooked one, and you know from your own experience that

a chimney on a leanto if it ends below the main ridge of the roof, is liable to smoke at some time; and so a ventilating flue of the best kind is one built like the chimney, running straight through the barn, and ending above the highest part of the roof. Like a good chimney also, it should have no cracks in it, no openings, ex-

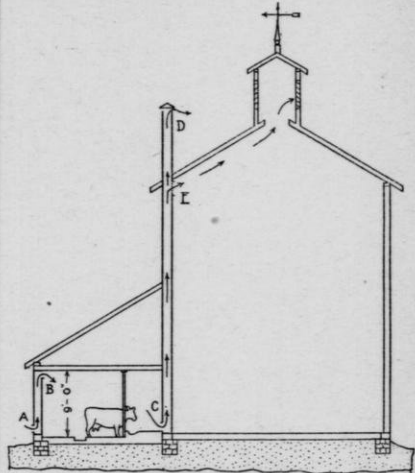


FIG. 7.—Shows one method of ventilating a lean-to stable. The air enters as represented by the arrows at A B and passes out through a flue built on the inside of the upright or main barn. This flue may raise directly through the roof, or it may end at E as shown in the figure, the air passing through a cupola. If the upright barn has a balloon frame, then the space between the studding could be used as ventilating flues in the same manner as described in Fig. 6. These flues could be made tighter by covering inside and out on the studding, with the lightest galvanized iron.

cept where you wish the air to enter. It is necessary that it should be tight.

Where should that ventilating flue begin? Near the floor of the stable. The experiment with the bottle answers that question. The impure air tends to accumulate in the bottom of the room. We are built with our noses to turn down, and not up—most of us, and that throws the breathed air to the floor, out of the way, so that we shall not necessarily breathe it over again, and all our do-

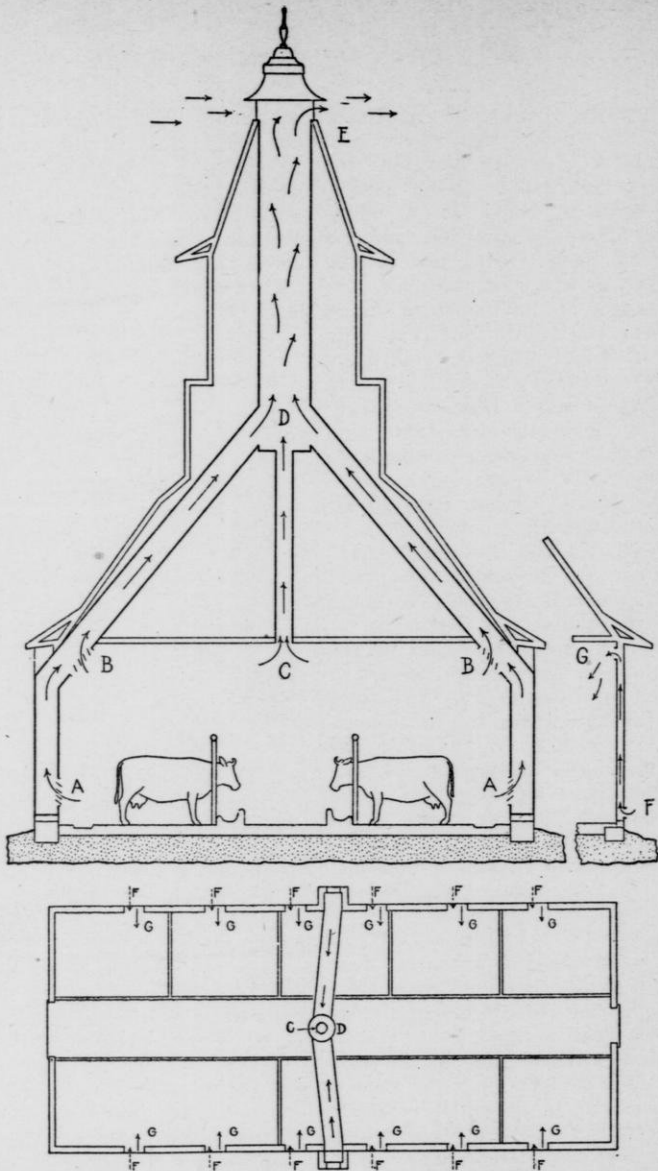


FIG. 8.—Is a section of the cow stable of the new dairy barn at the Experiment Station. A single ventilating flue D E rises above the roof of the main barn, and is divided below the roof into two arms A B D, which terminate at near the level of the stable floor at A A. These openings are provided with ordinary registers, with valves, to be opened and closed when desired. Two other ventilators are placed at D B, to be used when the stable is too warm, but are provided with valves to be closed at other times. C is a direct 12 inch ventilator leading into the main shaft, and opening from the ceiling, so as to admit a current of warm air at all times to the main shaft to help force the draft. This ventilating shaft is made of galvanized iron, the upper portion being 3 ft. in diameter. The covering on the outside is simply for architectural effect. The air enters the stable at various points as shown in the plan at F G, and in the vertical section by arrows at F G.

mestic animals are constructed on the same principle. But we must remember that when our animals lie down they are close to the floor. At the same time, we want the stable warm, and the coldest air, and the most impure air, is at the floor. If you make the opening up at the ceiling, you are

But, in order to take the air out of a room, you must make provision for fresh air to come into the room, you cannot get the air to go out of the room, unless you make provision for an equal quantity of air to follow it in, just as in filling a jug with water the air must go out as fast as the

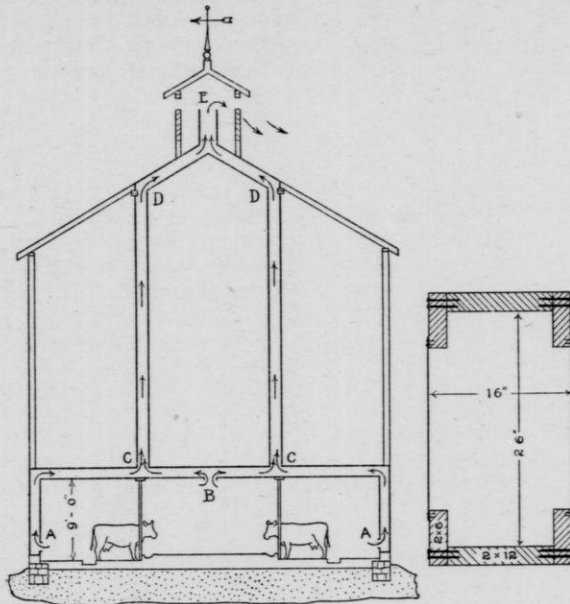


FIG. 9.—Shows method of ventilating an ordinary barn, where the air is taken out of the stable through flues built between the studding and between the joist of the ceiling. The air then rising, through ventilating shafts, made against or as a part of one or more of the purline posts. The air enters at A A and B, following the arrows and passing out along the lines C D E. These ventilators, if desired, can be carried out straight through the roof, or may be terminated inside under the purline plate, or as represented in the figure. The cross section at the right shows how 2x12's and 2x6's may be nailed together and placed so as to constitute a purline post, and at the same time a ventilating flue. The two sides of the purline post or ventilating flue are represented closed with sheets of galvanized iron. They may also be closed with well seasoned matched flooring. The number of bends necessary in this plan is an objection, as they interfere with the draft more or less.

taking out of the room the warmest and the purest air, and leaving the air you want to get rid of, both on account of its being low in temperature and on account of its being impure in the lower part of the room. So the ventilating flue ought to terminate not farther away from the floor than twelve to eighteen inches.

water enters. So you must make provision, not only for the air to go out, but for it to come in.

Where should the air enter. The best way to introduce air into an ordinary cow stable, everything considered, is to introduce it at a large number of points, from near the ceiling of the stable. Why? Because the

outside air is cold in winter and you want it warmed. The warm air of the stable has collected next to the ceiling, and the cold air, coming in there, mixes with it, and has its tem-

perature raised somewhat before it comes in contact with the animals. I say introduce it at a number of places rather than one place, because you want to mingle it with the warm air, and because you want to avoid a draft

anywhere upon your animals. So introduce the air from as many points as you can next to the ceiling and from all sides, because the wind changes from one side to the other and you catch it, whichever side it is. But, you say, to make openings around the ceiling is the same thing as to make openings in the ceiling, and so it would be, if you make the openings direct. There must be an indirect way of making those open-

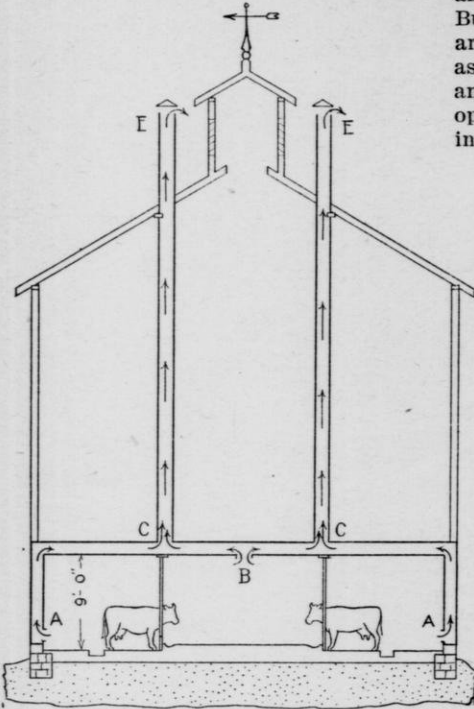


Fig. 10.

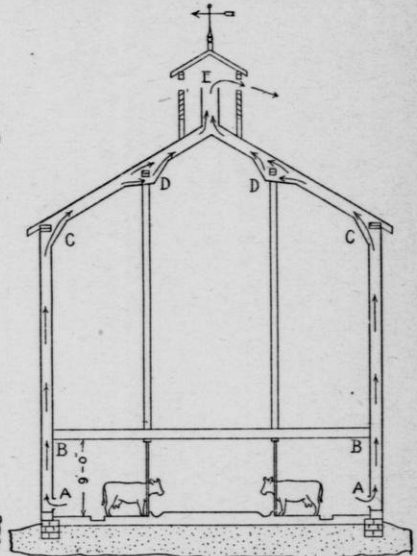


Fig. 11.

FIG. 10.—Shows a modification of Fig. 9, where the air passes straight out through the roof, instead of being carried in and out through the ridge of the roof. This method would give a stronger current than Fig. 9, unless Fig. 9 were modified so that the ventilator passes straight down to the floor between the cows, as represented in Fig. 4.

FIG. 11.—Represents a method of carrying the flues up the sides and then along under the roof between the rafters, so as to reach the ridge either under the cupola, or at other places on either side. Such a flue could be made very tight, by nailing the light galvanized on the outside and inside of studding, and rafters, having a sufficient width to give the proper capacity for the ventilating flues, and such a system of ventilation would work fairly well but could not be expected to do as effective service as the methods shown in Figs. 4, 5, 6, and 7.

perature raised somewhat before it comes in contact with the animals. I say introduce it at a number of places rather than one place, because you want to mingle it with the warm air, and because you want to avoid a draft

ings into the room, and the proper way is to make openings at the bottom on the outside of your double construction between the studding, and let the air come in at the ceiling on the inside.

Basement Stables.

Now, in regard to the basement stable. A great deal has been said against them, and the reason is this, that the basement stable is one in which it is possible to construct a tighter room than can ordinarily be constructed above ground, and, consequently, the ventilation has been poorer. The only serious objection to a basement stable is that it is not as easily lighted as other stables, and without any special provision for ventilation, it is not ventilated as well as another sort of structure. As to drawing moisture, this simply means that the moisture that is produced in the stable is condensed on the walls for lack of sufficient ventilation. You can ventilate a basement stable just as well as any other, and they may be constructed so as to be sufficiently lighted; and there is really no sound reason for abandoning them while there are many advantages in the construction of a barn in utilizing the side hill when it is available.

DISCUSSION.

Mr. Goodrich—Is it possible to have a stable warm in cold weather, and at the same time well ventilated, without artificial heat?

Prof. King—Yes, sir. Twenty cows in a stable of proper dimensions for them, and constructed warm, can be ventilated amply, and be kept warm enough by the heat of those cows, in our climate. I call a stable in which the manure does not freeze, in which the temperature ranges from forty degrees up to sixty degrees, fairly warm, and I think we have a great many stables that will answer these conditions.

Mr. Chadwick—How many ventilating pipes would you suggest for a sheep barn sixty feet long, twenty-four feet wide, and eight feet high, containing one hundred sheep?

Prof. King—The amount of air that the sheep would require for a thousand

and pounds of weight would be nearly the same as a thousand pound cow would require. The horse takes 2,550 cubic feet, in twenty-four hours, a little more than a cow.

Mr. Hughes—How many ventilating flues would you say should be in a cow barn one hundred feet long and twenty feet wide, containing fifty head of cattle?

Prof. King—You would need the equivalent of two flues, about two feet square.

Mr. Hughes—And how many intakes?

Prof. King—That would depend a little on the size of the pipes, but with pipes, say four inches in diameter, you would want to put them in about every ten feet around the sides.

Mr. Taylor—Many of our old-fashioned barns are built in the shape of a leanto, to an upright barn. This opens only one side to the atmosphere. How can we get the air in from all sides to such a cow barn?

Prof. King—The simplest way would be to get an elbow stove pipe and put it through under the eaves, or just under the ceiling, and let the length of the stove pipe descend downward, and those would be arranged in rows sufficiently close together to furnish the amount of air. I should prefer the ordinary galvanized iron gutter pipe.

Mr. Briggs—Wouldn't it be necessary to have some kind of a damper in there? Wouldn't the wind blow in too hard sometimes?

Prof. King—The better place for the damper is in the ventilating flue.

Mr. Ames—It seems to me that the Professor has explained about the inlet of air, but I have failed to catch the exit flue.

Prof. King—There should be a perpendicular shaft, coming down to within a foot of the floor.

Mr. Scott—Is there sufficient warmth in the stable to create a satisfactory draft?

Prof. King—The draft does not depend upon the warmth in the flue. You get up and build a fire in the morning and you find a draft in the stove immediately, and the stronger the wind is, the stronger that draft is. The movement of air across the top of the chimney produces a suction, and it is the same with a ventilating flue.

Mr. Scott—Would there be any advantage in using a hood, or top, to those shafts, by which the air passing through would create a current?

Prof. King—Where the current is down and tends to make a down draft as might be the case on a leanto where the top of the shaft does not rise above the side, the hood may be an advantage. Anything that tends to increase the passage of the air across the top of the chimney, tends to increase the draft. The best place to bring down the ventilating flue is in the interior of the structure, and of course, as near the center of the stable as possible, in order that the air may pass in all directions towards it. If you set it over against the wall, the air tends to cool down and you lose more heat and this lessens the draft in that ventilator. Ordinarily however you are forced to put it one side or the end, and then you have to make it enough larger.

Mr. Arnold—The great trouble is to make the current going out. We find that in our houses; while we have plenty of air coming in, there is no current out.

Mr. Scott—Isn't it a fact that we have types of hoods that the air blowing through will create a current?

Prof. King—We have various types of hoods that tend to strengthen the current of air across the top, but the majority of chimneys have the draft in them very much increased by the wind velocities that pass over them. Certainly we have enough draft as a rule, without any special provision for that.

Mr. Hughes—It is very plain from the Professor's illustration that the bad air is at the bottom, but why is it that in an audience room the air above is very hard to breathe, in the gallery, for instance?

Prof. King—In those cases the draft of air is usually toward the ceiling, and at the same time the air is coming in through some door, or windows, below, and is sweeping along the floor, tending to force the other air with its moisture up.

A Member—Then it is not simply because the air in the upper part of the room is impure, but it is warmer.

Prof. King—Of course, we all know that a long ventilating tube will create more draft than a short one.

Mr. Goodrich—Because it gets in a rarer atmosphere.

Prof. King—The longer the column is, especially if the air is warm, the stronger will be the current.

Mr. Marsh—There is a difference, too, between the specific gravity of warm and cold air; cold air sinks and warm air rises.

Prof. King—But it is also true that impure air that is taken from the lungs may be even heavier than the surrounding air of the room.

Mr. Ames—If the temperature is the same at the top and the bottom of this ventilating flue, as it is in some still winter nights will there be ventilating motion in that shaft?

Mr. Goodrich—I think there will, most assuredly, and it would be up. With this ventilating shaft, a great deal higher up than the intake, there would be motion constantly going out, because of the rarer atmosphere reached by the higher flue. The elasticity of air has not been spoken of at all. When the pressure is taken off the air, it will commence to expand at the top of the shaft, and that will naturally create a vacuum into which the air will hurry.

A Member—There is always atmospheric pressure, which must be less at the top, so that it is impossi-

ble to assume conditions where there is no pressure.

A Member—What we call dead air is simply that the air is saturated with a solution of water, and the air itself is not as dense. The moisture and the smoke will cohere so that the smoke does not rise.

The Chairman—In that case there would be no ventilation through the shaft. The farmers of Wisconsin are becoming pretty well posted, but when they criticise Prof. King I think they are getting a little too scientific.

Mr. Goodrich—I think the farmer has a right to think and use his reason, if he has any.

Prof. King—He has, and no professor will question his right to think.

Mr. Scott—Under those conditions, what ventilation would you suggest?

Prof. King—The only provision that you can make under those conditions would be some method of forcing the ventilation. The fact is that those conditions very rarely occur.

Mr. Culbertson—I think there are a good many farmers who own stock, who are neglectful of this ventilation simply because they cannot adopt these scientific ways, when really they could do some things that would help very much. I know of lots of farmers' stables, where, when the door is open, a great steam comes out that is almost suffocating. I do not know anything about scientific

methods, but I took some foot boards and made boxes extending from the sill over the roof, something like thirty feet high, running above the ridge of the barn outside. This has done away with all the steam and a large portion of the bad odors that were in that stable, and the cost was simply nothing. There is no excuse for a man to let his stable remain in that condition because he has not the means of adopting the scientific principles.

Prof. King—You did adopt the scientific principle that time, my friend.

Mr. Culbertson—I have seen the steam going out of those ventilators just as smoke does in the winter time from the chimney.

Mr. Foster—What do you have for an intake?

Mr. Culbertson—I calculate to have the window open on one side of the barn.

Mr. Foster—Is not the stable colder under these shafts?

Mr. Culbertson—Just a little colder, not much.

The Chairman—In passing around the state we have had a great deal of complaint about diseases among young stock, dysentery among calves and lambs. If you will do as the Professor has suggested and have purer atmosphere, you will have less of those diseases than you have now.

The meeting adjourned to 7:30 p. m.

EVENING SESSION.

The Institute met at 7:30 p. m. C. H. Everett in the chair.
Mandolin solo—Mr. William Bowman.

CARE OF HOUSE PLANTS.

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

Mr. Chairman, Ladies and Gentlemen:—Sometimes public-spirited men lay out and plant parks—plant them with beautiful flowers where the public can go and see them—where people who do not have the opportunities of having flowers in their own grounds or their own yards, may go and see the beautiful things of nature. Again, people sometimes build large greenhouses for the purpose of growing flowers; we may go to these greenhouses and purchase flowers for our friends and for ourselves. But what to me is of a great deal more importance, and the subject we are to consider for a few minutes this evening, is the care of house plants for the home. It is of more value to us, because there we may see them every day of the year, because we can put care into them, and enjoy them very much more than we can if any other hand is caring for them. Then, again, if we have flowers in our own homes, you know there are many, many times when we can take a basket or a bouquet of flowers to our friends on joyful or on sad occasions, and such flowers carry with them much more meaning than the flowers that we purchase, because we have put our care, our attention, and our love into them; so for a few minutes we will consider this subject of flowers for the home, and how best to care for them. I wish I knew my-

self how best to care for them, but there are a few points that may possibly help some to have a little better success with their house plants.

The Best Soil.

The first thing to be considered is the soil. You know the farmer, when he wants to grow a good crop, wants his soil in the right condition, not only to contain a good deal of fertility, but in the right mechanical condition. In putting out their houseplants, many people never think of this part, but will go into the garden or anywhere to get the soil for their house plants. To get the best results we must have a porous soil. We know that with some kinds of soil, the more it is cultivated and worked, the more compact it becomes, and garden soil is very apt to be of that kind. If we live near a piece of timber, we may go in there and get what is called leaf mould, which is made by decaying vegetable matter. This soil is full of plant food, and it is in the right mechanical condition, as well. If we cannot get that, we may, to a certain extent, make the soil. Now, how shall we get at it? Suppose we make a compost, one-third good, clean, sharp sand, one-third good garden soil, and one-third from the compost heap. This gives us a fertile soil, with the elements of growth in it, and a porous soil, as well.

Watering Our House Plants.

The next subject that has the most difficulty in it is the subject of watering our plants. We must remember that they are in artificial circumstances, we must remember that some of these plants grow naturally in cold climates, and some in tropical climates. It is manifest that if we put them all in one window and give them all the same treatment, that some of them will fail. We must remember too, that in the winter time, when we want the house plants to grow and blossom, that it is the time they really need the least water, because in the months of December and January, and particularly when the days are short and the nights are long and we are very likely to have cloudy weather, of course, there is not so great an amount of evaporation, and we should be a little careful about overwatering our plants, or the soil will become water-logged, and you cannot expect good results. Now, how can we tell about that? Well, that is another hard thing to answer, but I suppose that most of you have noticed that in handling your flower pots they sometimes feel very heavy, and if you happen to strike them, you receive back a dull thud or sound. If you do that, stop and think a moment, and you will realize that there is too much water present in that soil, but, when, by striking the flower pot, there is a sort of ring, then you know that the soil is drying out, and should have a little more water. But we should always study the conditions of our plants, and some plants require a good deal more water than others, but a thoroughly water soaked soil is not good for our plants to grow in and they will not long thrive under such conditions.

Sunshine and Light.

Sometimes people say they cannot grow house plants because they have no sunny window. I am sometimes almost inclined to think that the people who have not the sunny windows

have the best success. Of course, there are certain classes of plants that must have sunshine, all plants must have light, but a good many plants will grow without bright sunshine, and a good many will do better without it. Suppose, for instance, you expect to grow some of the bulbs, hyacinths, narcissus, crocuses, tulips. We must remember that these plants naturally grow and blossom early in the spring, during cool weather, and when we naturally have a good deal of rain. Let us give them just these same conditions. Of course, they must have some preparation. We must grow the roots in flower pots before they are brought to the light, and then we may put them in a north window where they will never see the sunshine, and still they will blossom and give us lots of flowers.

The Chrysanthemum.

There is another class of plants that we may grow without sunshine, that naturally blossom when the weather is cool and we have a good deal of rain and not much sunshine, only it is at the other end of the season, in the fall, and that is the queen of autumn, the chrysanthemum. In order to get a good many blossoms, they should be planted out of doors, in good, rich garden soil in the spring. Let them grow and take good care of them, and along about the middle of July, pinch off the ends of the new growth, so as to make them grow stocky. Then when the buds begin to form in the fall, take them up and pot them; put them on the north side of a building where they are in the shade, and water them, and if you will watch, it won't take long to discover that the chrysanthemum is a thirsty fellow and likes water. A good, healthy chrysanthemum plant will take a quart of water every day, and must have it to do its very best. Now, when they become well established and growing well, the buds begin to swell and they want something more. If you have

watched them closely, you have perhaps discovered that your plants need a little fertilizer, and they will take more and care for it, and pay for it too, than any plant that I know anything about.

Primroses.

There is another plant that will grow well in the east window, or the west window, or the north window, and give us blossoms all winter long. I refer to the primrose. They do not need sunshine. I have seen very much finer ones grown in north windows than in south windows, but remember they must have light and plenty of water, and they will give you plenty of flowers.

DISCUSSION.

Mr. Arnold—Would you advise putting some crockery or something, in the bottom of the pot, and would you have a hole in the bottom of the pot?

Mr. Coe—Of course, I would advise having a hole in the bottom of the pot, but I could never see any good in putting in crockery, or anything of that sort.

Mr. Hill—I found that my chrysanthemums were subject to little lice, last summer.

Mr. Coe—Yes, the chrysanthemum has one insect, the black Aphis. When you get a chrysanthemum from the green house, you usually find a few of those fellows on it, and they increase very rapidly. It is very wise to find out whether they have them before you put the plants in the house. The best way I know to get rid of them is to put a sugar barrel over the plant and put in a pan with some coals and smoke them out with tobacco smoke. The same treatment will kill these common, little green lice that are often found on house plants.

Mr. Briggs—Is there any danger of getting too much tobacco smoke?

Mr. Coe—I don't think so. Of course, you can ruin the plants by getting too much fire.

Mr. Briggs—How would it do to smoke a cigar in the house, or in the room where they are?

Mr. Coe—That would be all right, if you get under the barrel.

Mr. Convey—How do you cultivate house plants?

Mr. Coe—Usually with a fork, a common table fork will do all right, anything to stir it up so the surface will dry out quickly and put it in good condition.

Mr. Hoxie—When you have these lice on the chrysanthemum, it is a good plan to wet your plants with tobacco water and then as a last resort, smoke the plants—that will surely kill them. How do you keep your chrysanthemums through the winter?

Mr. Coe—I simply put them in a cellar with some light, and water them about once a month. I cut the tops off when I put them in the cellar. In the spring set them out and take care of them like any other plant. The pot will be full of sprouts; take them out and divide them; put one in a place, and by fall they will be great, bushy plants.

Mr. Hoxie—Do you have any success in making slips along in June?

Mr. Coe—That is a little bit late. I should prefer to put them out early in May.

Mr. Hoxie—I mean slips, not roots.

Mr. Coe—Oh, yes, you can do that, but that is rather a short season.

Mr. Kellogg—What treatment would you recommend for house roses?

Mr. Coe—I never had much experience with them. I know this much, that in an ordinary living room the temperature is too high and too dry. All plants require a good deal of moisture in the air, and one great trouble with house plants, particularly where the room is heated with coal, is that the air is too dry. There should be water standing on the stove to evaporate and give the plants moisture.

RESPONSIBILITY OF FARMERS' SONS AND DAUGHTERS.

MRS. J. G. CARR, Milton Junction, Wis.



MRS. J. G. CARR.

There is at present a wide-spread feeling of apprehension among those living in the rural districts, who have given the subject any considerable thought, because of the tendency of the young people to leave the farm.

They Leave the Farm.

It is not strange then, that the cry of alarm has gone out from these homes of intelligent and well-to-do farmers whose sons and daughters are becoming so fascinated with the exciting influences that center around large cities, that they thoughtlessly surrender those broad fields and rich acres and let the fire go out forever on the hearthstone of so many ancestral homes. That this is true, we have only to notice the many substantial farm homes throughout the

country that are now owned or occupied by our foreign population who, with thrift and economy are individually reaping the benefits attained by our ancestors only after long years of hardship and privation, and which ought to be appreciated by their posterity as a legacy worthy of preservation. Those to the "manor born" carelessly fling away their birth-right to seek some more exalted profession, or join the vast horde of drifting, idle young men who throng the cities in search of something he considers more remunerative, more genteel, or more agreeable, but which too often ends in disappointment and failure. Our daughters, too, grow discontented and repine at the dullness and monotony of country life, and await anxiously a favorable opportunity to find a home in the city, as an aspiration to social advantages or intellectual culture.

Advantages of Farm Life.

While this ambition for wider limitations is commendable, and to an earnest, progressive spirit is not an unnatural desire, yet to those who cherish a deep love for the farm and prefer its retirement and independence to the depleting and exciting life of city, such an ambition may not be entirely satisfactory.

While we do not expect or desire that all our boys remain upon the farm, we would have them realize that the advantages of country life are far superior to that of the majority of those who live in large cities or villages. Their chances for true happiness are better because they can spend what they can afford to with greater advantage, without regard to social strife or individual extravagance.

But we so often look upon life from a wrong standpoint, and see the brightness and glitter of success without appreciating our present opportunities. We believe, however, that great possibilities await the country, and the time is not far distant when, to become a land holder in this fair domain, will be one of the chief objects of man's ambition.

A Nation's Generosity.

Strange, that as we write these lines we catch the echo of our German "helper," who, busy with her work is singing in her clear voice, that old familiar refrain we used to sing in our girlhood, years ago:

"Then come along, come along and
make no delay,
Come from every nation, come from
every way.
Our lands are broad enough, don't
be alarmed,
For Uncle Sam is rich enough to give
us all a farm."

As we listen we cannot hold in disfavor the extreme generosity that the people of the United States have accorded to other nations, who wish a home within her borders, yet we would do well to remember the scriptural lesson wherein we are taught to first provide for the members of our own household before we extend unlimited generosity to others. There are thousands of unoccupied acres that await the coming of sturdy men to open up their rich resources, that are vastly more accessible to cultivation than were these, our present homes, to the early pioneers. Let those who seek our shores be willing to commence at the lower round in the ladder, and sheltered beneath the banner of stripes and stars, learn through the English language, and in the public schools, the requirements and principles essential to good citizenship, before they assume to cast the ballot for the ruling of the people of our government.

Dignity of Farming.

One of the primary causes that makes farm life so distasteful to the young, is the lack of appreciation of farming as a business among those who are engaged in its pursuits. Popular opinion has long prevailed among some classes that farming ranked among the lowest of industries, and that no one followed it as a vocation who was capable of gaining a livelihood elsewhere, or pursued it only as a stepping stone to some other position, and so predominate has this idea become fixed in some instances that farmers themselves underestimate their true significance, and drift along contentedly in their old ways and methods, uneducated and unprepared to meet other industries at least half way. Dr. Johnson has well said that "He who feels his business below him will surely fall below it."

Numberless inventions in labor saving machinery have taken away much of the old-time drudgery of farm life. Books, agricultural papers, Farmers' Institutes, and Experiment Stations have all lent their valuable aid, and today there is no valid reason why the farmer should not be the equal of any class, if he educates himself properly and improves the many avenues open to his advancement. But he who reads but little and isolates himself and family from all social, political or religious gatherings, is sure to develop morbid sensibilities and dwarf the best feelings of his nature.

Today the business world fully realizes that "Upon the prosperity of agriculture depends the success and support of all other industries," and the progressive farmer is held in high esteem, for skillful, intelligent labor has placed the seal of dignity upon it, and its future possibilities are such that if rightly used shall crown the farmer "The true monarch of the world, the fairest type of man's achievement."

Our Great Men.

The world owes much to the farm aside from its material prosperity, of which it will always and ever continue to be the guaranty. Fully three-fourths of the great men whose names adorn the pages of history, were not only poor boys, but were farmers' sons, and learned their first best lessons of life and the world, around the rude fireside of the humble farm home, and devoted their boyhood and

industry, decision of character, and dignity of soul, he arose in the full strength of mature manhood, to occupy the highest position in the power of the people of this government to bestow, and the intense earnestness of his life, so cruelly sacrificed, bore at the feet of the Master, the broken shackles of three million slaves.

Our own Washington was always a farmer at heart, for, declining a third



FARM HOME OF MR. AND MRS. J. G. CARR.

young manhood to farm labor. True in after years their genius, philanthropy, or learning had led them into other channels of usefulness, but most of them have been free to acknowledge that the most pleasant recollections of their lives or the period of greatest benefit to them in the way of shaping their character and mode of thought, were associated with the farm.

The life of our immortal Lincoln furnishes an inspiring illustration. He came from a most humble and obscure origin, yet by his persistent in-

term as president, he retired to his home at Mt. Vernon and enjoyed the pleasures of rural life. It may have been at this time that he wrote "The life of a husbandman is of all others the most delightful. It is honorable, it is amusing, and with judicious management it is profitable."

The World's Progress.

What wonderful advancement of mankind has taken place since these words were written more than a century ago!

We are living in an age teeming with new inventions and advanced

ideas—an age of steam and electricity. The marvelous progress in modern science has penetrated the hidden mysteries of the universe as never before in the history of the world, and revolutionized the sphere of every human activity. The steam engine, the electric telegraph, the telephone, the phonograph, photography, X rays, and the sewing machine, are the transforming genii of this wonderful age; even the restless waves of old ocean are being harnessed and will soon furnish the motive power for the manufacturing industries of the world.

Universities and colleges have opened wide their doors for the admittance of both sexes. "Cast out the bond-woman, she shall be free," is sounded throughout the land, and generous minded men bow their heads in approval. Cities are stretching out toward the country, and the country is taking on the refinement and conveniences of the city; innumerable subtle cords reach out and bind the two together with a thousand varied but inseparable interests.

The End is Not Yet.

These and many equally marvelous things in science and evolution mark the present century as one of phenomenal progress, yet science has not exhausted its researches or gained the acme of life's prophetic dream. The closing years of the nineteenth century bears along with its increased intelligence, intricate problems and far-reaching questions, that none but candid, cultured minds can hope to grapple. Never in the history of our national affairs was there a more imperative call for high-minded, self-reliant Christian men and women than now, and we would voice the prayer of Dr. Holland, when he said:

"Oh! give us men; a time like this demands
Great hearts, strong minds, true faith
and ready hands.

Men whom the lust of office cannot
kill;
Men whom the lust of office cannot
buy;
Men who love honor; men who will
not lie;
Men who can stand before a demagogue
And dam his treacherous flatteries
without winking;
Strong men, sun-crowned, to live
above the fog
In public duty and in private thinking;
For when the rabble in their time-worn creeds,
Their large profession and their little deeds,
Mingle in worldly strife, lo! freedom weeps,
Wrong rules the world, and waiting justice sleeps."

Where shall we hope to find such men as these if not in our country homes, where good influences predominate, where air and sunlight untrammelled, give strength and vigor to the body, and that sweetness and serenity of the mind which comes to us in our highest moments, and which are best obtained beneath a clear sky amid the simplicity and quietness of nature, and from thence we must chiefly recruit the energies of a race that is rapidly exhausting its strength and vitality amid the rush and excitement of smoky cities.

Our Boys and Girls.

We discuss in our farmers' meetings, "Unjust taxation" and other economic questions, with becoming tenacity. We rehearse the oft-repeated lesson of "Balanced Rations for Cows," "Care and Exercise of Breeding Animals," but how we shall best equip our boys and girls that they may meet effectually the great responsibilities that must shortly rest upon them is only a secondary matter. Permit me to use the words of our lamented Professor Blaisdell, who once said in a very valuable address

before the Wisconsin Agricultural Society:—"Yes, farmers of the commonwealth, we need a splendid breed of farmers to enrich with the valuable contributions of their distinguishing qualities, the citizenship of our beloved State, and it is more needful that you look to this in your annual gatherings, than to the methods by which you may have a splendid breed of horses, or improve the stock of Jersey cattle." A recent statistician informs us that in New York City, for example, of the recognized successful men, including bankers, railroad presidents, large manufacturers, vessel owners, doctors, ministers, etc., ninety-six out of every one hundred spent the first twenty years of their life on farms or in small villages.

The Country Boy.

It would seem by this that country boys with their habits of industry and frugality are the controlling power in the majority of successful enterprises of the world today. This should furnish encouragement for the four millions of young in our country at the present time, who ought to possess a strong desire to win a prize in the battle of life. Never was there a more golden opportunity or so equal a chance to gain the highest round in the ladder of success as now, for the poorest boy may become the richest man, or win the highest honors. Young men, there are indeed grand opportunities before you, but he who hopes to win a prize must prepare himself for the race and not enter handicapped, for knowledge, perseverance and concentrated effort is what counts in the world today.

Do we as parents think seriously and with the earnestness that the thought demands, that the destiny of the whole world must soon be given over to the youth and little children of the present, and they become the great and learned men and women of the future, on whom shall rest the

burden of the nation's life for weal or woe? We fear that few of us realize how important and great a work there is to do, to mould and shape their characters that they become strong, self-reliant men and women, able to perform well their part in life's great unplayed drama.

Benefits of Education.

Education is the golden key which unlocks the portals of the intellectual store house, and this alone must solve the problem of their future usefulness or greatness, for, said Webster, "Education is that series of instruction and discipline which is intended to enlighten the understanding, correct the temper, and the manner and the habits of youth, and fit them for usefulness in their future station." Such a training as this cannot fail to give noble aims and a high sense of personal honor, keen perception, strong brain, and sinewy muscles—all of which must be gotten by some stern process of discipline other than that gained in places of vice where men do congregate, or by loitering on the village streets watching the vast procession going by.

What Shall We Teach.

Whether this essential education can be best obtained at the university, agricultural or common school, must depend largely upon the ability or choice of pursuit. But this problem we do not attempt to discuss; however the following advertisement which is said to have appeared in the London Times may furnish some suggestions: "Education. Wanted by a father, a school where his son may receive an education to fit him for a manly and useful life without any humbug as to notions dead and buried thousands of years ago. Address, A., stating terms, etc." In the education of the period no different curriculum is required for girls; they need the same strong elements of character, they enjoy the same advantages of the class-room,

and have an equal chance with manhood. But to this should also be added a thorough and practical training in the science of housekeeping that will make her as successful in the kitchen as in the school room, or learned profession. She should know how to cook properly and scientifically, how to do the family marketing profitably, how to sweep, dust, wash and iron, and be taught and expected to share in the responsibilities of home making, for in whatever path of life she may choose to enter, the home sentiment will be the strongest and home-making the prime object of her life.

"Home and Mother."

The value of a good, well directed home is inestimable, and the refining influences that center around the inmates give strength and tenor to the character just as decisive strokes or soft delicate shadings of the artist's brush give tone and expression to a beautiful picture. The nation's welfare rests with the mothers and daughters of today, for, said Emerson, "The test of civilization is not the size of cities, not the crops, but the kind of men the country turns out, and the kind of men the country turns out will ever depend mainly upon the kind of women the country breeds; for the moral man is formed at the knees of his mother." Therefore, what we need most of all are good homes and good mothers—mothers who are themselves examples of truthfulness, chastity and courage, and have an abiding sense of the great responsibility committed to her care.

"O! wondrous power, how little understood!

Intrusted to a mother's mind alone—
To fashion genius from the soul for good."

Woman's Influence.

Woman has proven herself capable of filling with dignity and honor, all the various positions she has chosen

to occupy, socially, mentally, and physically, but it is in the home where she shall win her highest and noblest achievements. In the present day she is so occupied in outside affairs that she is thought by some to be losing somewhat of the charm of her influence as wife and mother, but once assure her that danger threatens her household and awaken her conscience thoroughly, and she will sacrifice herself if need be, in the defense and protection of her home, and those she loves, and instinctively will say "My every day life, my drudging tasks are important and necessary, and if rightly done are dignified and glorified. I will henceforth put into all my plans and acts the angel-aim and the angel-peace." Then shall the true "new woman" come forth with renewed splendor and power, and devote herself to the training of her children for the use and service of the world which they are born into. She will teach them reverence for the Supreme Being, for no man is truly great that does not recognize a divine power. She shall teach them the love of home and all the Christian virtues that underlie, like the ocean bed, the foundation of every true and noble life. She shall train them early in habits of industry and economy, for they must not be idle or drift, yet they shall know the law of moderation. Honesty, accuracy and punctuality shall be their code of business conduct. They shall owe no man anything except to love one another and bear each others' burdens.

A Happy Result.

Then peace and prosperity shall flow from her dwelling like the waves of a mighty river rolling onward to the ocean whose purifying waters shall cleanse the earth of her infirmities and heal the troubled spirits of the nation; for her sons and her daughters shall go forth with disciplined characters, thoroughly equipped to meet the responsibilities

of their chosen niche in life with the best that God has given them of mind and soul, and fill our empty places as we verge on old age, with integrity and purity, and, with their fresher and stronger intellect, become the controlling authority in our honored government, and a powerful influence for the elevation of mankind.

"O boys and girls of every State,
Be true and noble, strong and great;
Humanity with all its fears,
With all its hopes of future years,
Is hanging breathless on thy fate.
Our hearts, our hopes, our prayers,
our tears,
Our faith triumphant o'er our fears,
Are all with thee, are all with thee."

OUR COMMON SCHOOLS.

PROF. J. T. HEALY, Milton Junction, Wis.



PROF. J. T. HEALY.

With the advancement of man's development and progress in his institutions, new and powerful forces have been very active during the last century in recasting, remodelling, and expanding our American school system. Founded at first for the express purpose of imparting to the young reading, spelling, ciphering and

writing, in a word, the rudiments of knowledge, there was little attention given to education principles, much less to buildings and facilities, and least of all to the character or moral training of the young. Parents gave but little interest to studies, teachers or buildings; children found less attraction and more repulsion in the school building and apparatus; confusion rather than system or grades prevailed; antagonism existed between the teacher and pupil; words rather than things were taught; a feat of memorizing paragraph after paragraph and holding to rigid and mechanical routinism were marked features of our early school; all of which as we now view our educational system were serious defects in a system which aims to attain the truest and most profitable kind of an education for our people.

Horace Mann's Idea.

The evolution from this chaotic condition of things to a now visible school structure still far from perfect, required an educational reformer who dared point out defects, suggest remedies, and adopt plans, despite the bitter opposition of the schoolmaster of the old routinism. Horace Mann became the advocator of the new educational doctrine. Says Os-

car Browning in his Educational Theories:—"To no one is America so much indebted for the advancement made in school education, as to Horace Mann." Through his influence and discussion of education from an elevated standpoint in many States of the Union, an awakened interest manifested itself in the erection of schools better equipped with teachers and apparatus. Normal schools were opened, and the common schools began to take on a system of gradation from the kindergarten through the primary, intermediate, grammar, and high schools. In all these grades the main object now sought is not so much to teach as to develop, not so much to put in as to "draw out," to make the child a doer. The function of the school has been made not to store the memory but to train the spirit of the pupil. The child should grow better, wiser, broader, in a word it should be educated rather than instructed in books. The education given should be that which Roark says "is such a preparation of the individual in physical, intellectual and moral capacities as will enable him to secure the highest enjoyment from their use, both here and hereafter." An education compatible with this definition, which unfolds to the child and student, the importance of civil and religious liberty, the love for books and the better understanding of the duties and principles of citizenship belongs, not to a particular grade, but to all schools, and the common schools especially, beyond which over ninety per cent. of our boys and girls are not schooled, ought to give just such an education.

City vs. Country Schools.

The common schools, and especially the rural schools as distinguished from the city schools, have until very recently been quite neglected. Educators have expended their energies towards the interest of the city schools and their contributions seem

to be directed to the education belonging to adult life. Very true there exists a marked separation between the rural and city life and likewise between rural and city schools; the one is based on the soil which gives rise to a spirit of independence and segregation among the people; the other is founded upon society, which develops a spirit of interdependence and co-operation, and I believe the negligence on the part of educators and also the people of our rural district to provide for the necessary stimulus to accomplish for the rural schools all that the purpose of education aim to bring about in its application to the city schools, has contributed its full share in the mischievous tendency in educating the farmers' youth away from their native environment. This should not be. The intellectual needs of the rural school are no less important and should command more consideration, otherwise you farmers can never expect to compete with the progress in the town, and check the migration of your boys and girls to the cities.

The District School.

Fifty years ago the typical school was the district school, just as much as the people then were country people. The country school then, rather than the city school, gave us men whose names have illumined the pages of our recent history. Rural ideas and rural manners were then the controlling forces of the nation. Country-bred men were, and indeed they are today, our great leaders of thought and action. Hardly can we attribute their condition wholly to the old district school and conclude that the old school gave us better product. The fact that farm life tends toward independence, plain democracy, and the further fact that the old country school with its rude benches, austere teacher, and iron discipline, developed within the child a spirit of self reliance, accounts for the decided influence and special honor of the

farmer boys and girls in our legislative and college halls.

Yet the old school had its defects. Its curriculum was very narrow, its attractions limited, and its facilities meagre. In a word it had not the means to allure and interest the children and turn out scholars. In this respect the city school has excelled the country school. It has made great progress in broadening the curriculum of education to prepare the individual for a profitable and pleasant life in his particular environment. Thus far the country school has done but little to promote such interests. It is not necessary for you farmers to wait for education to come to your rescue, or to await the result of state legislation, at the same time realizing that your children are not receiving instruction comparable to that of well settled communities. Should you secure the means to provide for a better training in scholarship, which, added to the virtues of independence, self-reliance, and true democracy characteristic of rural life, your youth would be less inclined to withdraw from the farm, and the growing complaint of lack of representation in legislatures would cease to be heard.

Keep Abreast of the Times.

It is within your power to accomplish this. You can keep pace with the city schools. The material instruments are at your disposal. You can build school houses which shall provide comfort and healthfulness; you can make use of the newest, most complete, and best text books; you can procure apparatus that present in very distinct form for various studies every phenomenon and every principle known to natural science; you can furnish libraries, the most important aid possible to help you keep your children away from the city; yes, you can obtain good teachers and adopt the best system and methods wrought out by educators.

Will it cost you anything? Certainly it will cost you something.

Who among you, by using farm implements of thirty or forty years ago, can expect to compete with the progressive farmer using modern machinery? Can any of you conceive of taking a young horse which has received no special training and care that calls for the expenditure of money, and hope to enter the trotting field with well developed trotting horses? Unwilling to contribute freely your share for the necessary means to educate your children properly, is false economy. Granting wise supervision and expenditure of money by proper authorities, the results to the community are commensurate with the interest and support given to the public schools. Good buildings, good libraries, and good laboratory facilities, are of the utmost importance, and money judiciously expended for these purposes is money expended for the intellectual growth of your children, and indirectly for the growth of your community. It opens up the channels through which intellectual and spiritual wealth is distributed alike to rich and poor, not as personal benefits, but for self interest and protection. Your community ought not to rest contented with a place in the background, when so many possibilities are within your reach. Eradicate the governing impression that the country, and especially your community, is but a suburb, a sort of purgatory for the paradise of the city, and that the rural school is only a stepping stone for the inexperienced teacher to be promoted to some other profession, if not to teaching in the city. The independent life of your community is as dignified and worthy of high aspirations as any other life, and therefore its education should be organized and conducted in the application of all facts and laws of science, economics and ethics, for its improvement.

Glaring Defects.

But you may say your community or district is poor, and has a very limited enrollment of students. My answer is: Do away with the abominable system of local control. District boundary lines should be entirely wiped out and schools should be consolidated so as to lessen expenses. This will probably be the only salvation for the poor school district having only a few students. Judging from the results of eleven states that have made this change, I believe all districts would be benefited by it. If it is true, as President Salisbury said at the Teachers' Convention in Milwaukee, that tradition and prejudice are at present too strong in Wisconsin to bring about this change, it certainly behooves you who are interested in the education of your children, and which in turn will give your community an educational tone, to remedy several defects of the rural school which cause it to suffer by comparison with the school system of the city. Primary among these defects are qualification of teacher and school officers, the length of school year, frequent change of teachers, lack of completeness or unity in the system and inadequate supply of apparatus and library books.

Incompetent Officials.

Too frequently school directors are chosen without regard to their qualification to make them respectable or useful in the discharge of their official duties, and quite often do we find the teacher, in order to keep her place, subordinating her methods of teaching, course of instruction, school discipline, and even private conduct, to the desire to please such directors. Notwithstanding what may be said to the contrary, I believe men can be found well qualified to act as school directors, if the people of the district will chain their party affiliation and elect men because of their fitness

and not because of their strength in politics.

We hear a great deal about the incompetence of district teachers. It is too true. While district boards will employ those who, by dint of extra exertion are barely able to pass a legal examination in third grade branches, for \$18, \$20, or \$25 a month, to the detriment of competent teachers, and to the detriment of the school, your schools will never as a whole, be successful. Occasionally you may secure a good, cheap teacher, but far oftener she would be dear were she to pay to the school many times her salary for the privilege of teaching. Let the qualifications of your teacher be greater, and pay them reasonable salaries for meeting these requirements. Engage them for a year at least, in order to give them an opportunity to carry out the course of instruction planned for the year. Frequent changes are dangerous and disorganize any school. I don't wonder that young men use the country school as a stepping stone to another profession. The position of teacher is too precarious, and the salary paid is entirely too small for young men of the required ability to remain with you and make teaching a profession. The best intellects seek something more lucrative that they may be compensated for their years of hard study and heavy expense, thus too true, very often leaving with you cheapness and incompetence.

Length of School Year.

Again, many districts limit the school year to an average of six and seven months, and the people of such a district will be very much surprised if the \$18 teacher of third grade does not accomplish in that time, teaching twenty-five and thirty classes a day and provided with books and apparatus commensurate with the stinginess of those people, as much as a teacher in the Janesville schools, supplied with the neces-

sary means and teaching nine months in the year. Your schools cannot help lacking completeness; and without the necessary incentive derived from music, exercises in calisthenics, entertainments and supplementary readings, the pupils pursue their studies listlessly and mechanically.

The School Library.

You can and ought to supply supplementary readings for your children. These are in part supplied by the township library. Since the inauguration of the township library system and the several amendments passed by subsequent legislation, a marked development has been made in our rural schools. The school library although still but a germ, has effected a great change by placing within the reach of the young supplementary material of a wholesome and invigorating character. Too long have our schools adhered to the cold, dry, and unattractive text books, which, although a necessary part of any school, cannot instill in the child a love for books of good literature, but as observation shows, rather tends to repel a love or taste for the best reading, which opens up new worlds of thought and imagination to the mind made hungry by just such literature. Too long has the selection of library books for the rural schools been in the hands of incompetent or disinterested persons. As a result of this, superintendents find in the schools today, books of a weak and worthless nature which degrade the mind rather than inspire it to nobler purposes. Thanks to the township library statute for the rapid move now taking place in supplementing the text books with a variety of books of reference, and in replacing the miscellaneous misfit selections with serviceable books for the greatest economical outlay of money.

However fruitful of good results the township library has been, it seems to me that a few other considerations are important. Our

rural schools may be well supplied with the best books, and unless the students are encouraged to make use of the library books in every possible way by a competent teacher thoroughly familiar with the library contents and methods of its use, the library cannot help but fall far short of its purpose.

The Choice of Books.

In many towns the clerk and superintendent consult the teachers as to the choice of books. This works well in schools that retain the same teachers year after year. These teachers recognize the wants of the school and will aim to procure the required library books at the beginning of the school year; but in schools where there is a change of teacher if not every term a considerable portion of the school term, glides away before the teacher is able to report the wants of the school. Then when the town clerk does send the report to the publishing house, the order does not seem to receive immediate attention, or if it does the house of which the clerk is directed to purchase the books is slow, to say the least. To obviate these delays the town clerk and the superintendent should consult the teacher at the close of the year upon the books most needed and send the order to a reliable house.

The township library system has awakened an interest in most of our rural schools for better literature and more of it. This spirit should be found in all schools. It ought not to wane, but on the contrary district schools should add an additional library fund to the township fund, and build a useful and valuable library. This being done, would it not be better to dispense with the plan of redistribution of library books? Let each school take a pride in owning a library of its own, and more care will be exercised in handling the books. If they are worth one reading the child will be then enabled to use it often as a reference, and the dis-

trict will be more inclined to appropriate money annually to enrich its library. Don't misjudge me. Think not that I am unwilling to recognize the good of rural institutions and note the progress made by many of our rural schools of southern Wisconsin. To these districts my remarks need not apply. In these communities you will find pushers, men and women energetic in the work of education, and who do not begrudge the educational tax, knowing that if it is not expended for their sons and daughters it will at least help to make better citizens of their neighbors' children.

Why I am Interested.

Because I have pointed out the weaknesses and defects of the district school compared with the city schools due to your negligence and lack of

interest and support, don't believe that I have altogether affiliated my interests with the city schools. Why should I? I was born and raised upon a farm. I taught a district school, and now my sympathy for and attachment to the common schools can in no better way be manifested than by using this pleasant opportunity of talking to you of the needs of your schools, and in my simple yet earnest way of arousing more enthusiasm for the cause of the rural school so long neglected.

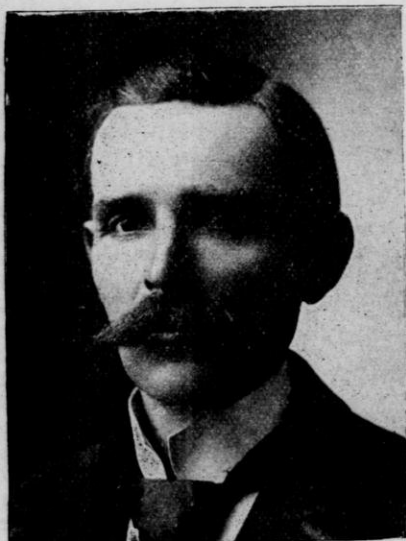
The day for the consideration of the country school problem seems to be dawning and you who are directly concerned should be awake to any potent agency whether it be by individual districts or by a larger unit of organization, to bring about higher efficiency, and greater, wise economy in the rural schools.

SECOND DAY.

The Institute met at 9 o'clock. Mr. Geo. Wylie in the chair.

SMALL FRUITS.

E. J. SCOFIELD, Hanover, Wis.



E. J. SCOFIELD.

Mr. Chairman, Ladies and Gentlemen:—I do not know how many farmers there may be in this audience that are interested in the subject of small fruit, but I dare say you all should be to the extent of producing enough for the use of the family, at any rate.

The Strawberry.

As the strawberry is the first fruit of the season, I will commence my discussion with that. The first thing to look after is our soil and location

of the berry patch. If there is much poultry kept around the farm, it is well enough to put the strawberry plantation far enough from the house so it will not be troubled by the poultry. Any soil that will produce a good crop of corn or potatoes will produce a fair crop of strawberries, but we want to produce more than a fair crop, we want our land in the best possible condition. If it is a black prairie soil, I would plow the ground to a good depth, not less than six inches anyhow. If it is a heavy soil, I would plow not quite so deep, on account of not wanting to turn up the clay from below. Then I would smooth the top, and if I could have my choice of manure I would prefer some old, decomposed manure; there is nothing better than the scrapings of the barnyard. Put it on and have it worked thoroughly into the soil. The disc harrow is good for that purpose—also the smoothing harrow.

It is just here that many make a mistake, they do not get their ground in proper condition before they set their plants. It must be fine to at least four or five inches—then we are ready for our plants. We mark the ground off three and a half feet for the rows, and setting the plants from fifteen to twenty inches apart in the row, depending somewhat upon the variety. Those varieties that are great plant makers should be set farther apart; moderate plant makers closer together.

*Died May 6, 1898.

The Best Plants.

The selection of the plants is very important, to have good, thrifty plants of the previous season's growth. You don't want plants from an old bed that has borne fruit, but from a new plantation that has never borne any fruit. These plants should be trimmed of all old dead leaves and runners, and if it is a little late, the new leaves should be cut back to leave about two leaves and the roots should also be shortened to about three and a half or four inches. Our rule is to take a bunch of plants in the hand, what we can hold handily, say five or six, and even the crowns up in your hand, shut your hand and cut the roots off at the heel of your hand, no matter how long they are. Then the plants are slushed—that is—dipped in water and put in a basket, ready to be taken to the field. In setting the plants, we don't want to go and drop a lot of them along in the row, ahead of the planter; they should not be dropped any faster than they are set. Professional growers generally use a tool, but if your ground is in proper condition you can set with your hands, or you can take an old axe with a short handle and strike it down in the ground, making a wedge-shaped opening. You take the plant, give it a flip to make the roots fly out, and set it so the roots will spread out in a fan shape. Let the plant set no deeper than it set before; if it is set too deep it will rot the heart of the plant, and if it is set too shallow it will dry out.

Further Care.

Shortly after the plants are set, blossoms will appear. These should be cut off. Later, runners will make their appearance. The first of these should also be cut off. Cultivate and hoe thoroughly. We generally make a practice of cultivating less than a week after setting plants, keeping the ground well stirred all the season, and cutting the runners off until the plants are thorough-

ly established. We generally cut the runners off with a hoe, and if it does not need hoeing, we go over them on purpose to cut the runners off. In doing your cultivating, go through the row in the same way, every time. As soon as the ground begins to freeze up nights, cover your plantation and use any material that is free from weed seeds. We use marsh hay. In putting it on, shake it evenly all over the plantation, not only over the plants, but the ground, and put it on just enough to hide the plants.

The Raspberry.

The next fruit of the season is the raspberry. For those we prepare our ground in the same shape as the strawberry,—mark it out three and a half feet one way and three feet the other. In setting a plantation, we set every other row, which leaves the plants seven feet apart by three; set the plant so that the crown of the plant is not over two and a half inches in the ground. This is for the cap varieties. The red varieties can be set somewhat deeper. As soon as the new growth reaches the height of eight to ten inches, the top should be pinched out. That makes the plant incline to form a tree shape—that is, it throws out laterals. These should be let alone until the following spring, no matter how long they grow. Then these laterals should all be cut back to six or eight inches of the main stem. The second year, and the years thereafter, allow the new growth to attain a height of about eighteen inches before it is pinched off. The varieties that do not throw out very many laterals should be left longer and the branches should be cut shorter. The proper place to prune these laterals is about where the laterals bend—cut in that bend. As soon as the fruit is harvested, the old wood can be cut out; it has produced its crop of fruit and will die anyway, but if you do not cut it, it will live through the rest of the sea-

son and take the strength of the root. Then, again, if there is any disease or insects they are apt to be in the old wood.

The raspberry plantation should be kept thoroughly cultivated; as soon as the frost is out in the spring, it should have its first cultivation, and that should be kept up all through the season until the first of August, but cultivate shallow after the first

rant produces its fruit at two years old and over. After the plantation has been set three or four years, they will begin to get too much brush in them. Then you should commence cutting out the old wood that is over two or three years old—thin out the bush to the roots.

The gooseberry is handled very much in the same way as the currant.



STRAWBERRY FIELD UPON THE FARM OF E. J. SCOFIELD.

cultivation, not over two inches deep.

The Blackberry.

The blackberry is handled very much the same as the raspberry, except that they should be allowed to attain a growth of about three feet before they are headed back.

Currants and Gooseberries.

The currant should be planted on very rich ground; you cannot get too much manure onto it, and they should be planted about six feet to the rows and four feet to the plant. The cur-

Grapes.

For the average farmer to grow, I think what we call the stake plant will be about as successful as anything, in the way of grapes, and the old Concord grape is about as successful as any. The vine can be planted either spring or fall. After the vine is planted and is grown the first season, the new cane should be cut back to about three buds. The following fall, after the frost has killed the leaves, it should be cut back to two canes with three to four buds

each, and allowed to grow. In the fall, after the frost has killed the leaves, these vines should be cut back one to three feet and the other to two buds. Leave it on the ground and cover it with enough dirt to hold it there. The following spring, after the frost is out, this three-foot vine should be taken up and tied to a stake, and another stake should be driven alongside of this one. The new canes that start from these two buds should be trained up on the one stake, and the fruiting cane should be fastened to the other stake. When these vines have reached the top of the four-foot stake, they should be pinched off. The following fall this vine that has produced the fruit should be cut off and the other vine should be cut back the same as in the previous year to three buds, while the other is left full length, four feet. Cut the laterals back on this cane to within two buds of the main cane, and lay it down and cover it as in the previous fall.

DISCUSSION.

Mr. Lloyd—Do you mean that you would not trim the gooseberry bush at all until it is three or four years old, and then take out the wood that is two or three years old?

Mr. Scofield—That will depend somewhat on the variety of the gooseberry, whether it is a variety that does not grow very thick. For instance, you take the Downing, it doesn't grow very thick, they could grow longer. The Houghton grows a lot of bush, and that would want to be trimmed sooner.

Mr. Lloyd—Don't you think it is better to trim the grape vine more than four feet high?

Mr. Scofield—No, I don't think it. I think you will get the full strength on the root in the four feet, and I think you will get a more satisfactory yield of fruit than if you have longer cane and more wood.

Mr. Edwards—What is your gen-

eral yield of grapes from a stake like that?

Mr. Scofield—I am not in the grape business as a profession, at all, but the average yield would be fifteen to twenty pounds, depending upon the variety.

Mr. Edwards—I have between seven and eight hundred vines in my nursery at Ft. Atkinson, including the Concord, the Delaware, the Niagara and other varieties—the Brighton is one of the best. Those grapes sell best on our market and they are just as heavy producers. I cut my stakes eight feet, drive them with a sledge, train them as high as the stake is after it is driven, and we get from twenty to forty pounds of grapes from a vine, and those vines at the top of the stakes are just as heavy bearing as they are down two feet from the ground. The Worden is one of the best black grapes I have on my ground. I find that the grapes at the top of those stakes are the finest I raise. I have made a specialty of grapes for the last twenty years, and my experience is, the grape vine never should be trained less than six or seven feet from the ground. The Worden I consider as successful as the Concord, and a week or ten days earlier, and sweeter, although, of course, no one goes back on the old Concord.

Mr. Scofield—How about the keeping qualities of the Worden?

Mr. Edwards—They will crack if you let them stay on the vines too long. You want to market them when they are ready. The Niagara is very successful and we have had the best results from the Brighton.

Mr. Scofield—You wouldn't recommend the Brighton to the farmer, would you?

Mr. Edwards—I would, if he will take care of them. If he isn't going to take care of them, he doesn't want to plant any.

Mr. Scofield—That is why I recom-

mend the Concord. It will stand more abuse than anything else.

A Member—What do you do with your strawberry bed after the fruit is harvested?

Mr. Scofield—We take a mower and mow as close to the ground as we can; then we leave it to dry for two or three days, and then we take the tops for mulching. After we get it raked off, we take the Planet Junior cultivator, put on three large shovels, and go in there and dig the ground up thoroughly. Then we take the smoothing harrow and drag it a dozen times until you would think there wasn't anything left, but after the first shower of rain you will see the plants spring up all along the rows.

Mr. Alsmeyer—Why do you cut off the roots of the strawberry plant?

Mr. Scofield—One reason is we can set the plant a great deal handier. Another reason is the plant will grow a great deal more thrifty and strong.

Mr. Moseley—Why do you drag this strawberry plantation? Is it for the purpose of cutting out the new runners to cover this strip of new land that you have cultivated, or for the sake of the coming crop?

Mr. Scofield—No; the reason we do that is to loosen up the ground and drag through the rows. They are always inclined to get too thick. In dragging through the rows, we destroy a great many plants in the row, and it leaves the ground mellow for the moisture to get into it. I do not depend on any runners that are produced after the fruiting season, to amount to anything for the next year.

Question—How do you start new currant bushes?

Mr. Scofield—That is simply done by cuttings. In the fall, after the leaves have fallen off, you cut a new cane six or eight inches long that can be set that fall, or carried over and set the next spring. We generally set in the fall by getting a piece of land in

good shape and then putting the cuttings in down to one bud, only leaving one bud sticking out, and cover that over with fine horse manure.

Question—Will it do to leave that until spring, and then cut them?

Mr. Scofield—I never did that. If you did do it, it would have to be done very early, before there is any sap started.

Mr. Edwards—What variety of strawberries would you recommend to the farmer?

Mr. Scofield—I don't know of anything that will give him better satisfaction than the old Crescent and the Biederwood.

Mr. Edwards—What sort of raspberries?

Mr. Scofield—Well, for blacks I would recommend the Palmer for early, and I have never found any raspberry that beat the Gregg for late. For red varieties, the Cuthbert and the Turner are about as good as any.

Mr. Sayre—Do I understand you advise me to take two posts, four to six feet high, and run up one stake with the fruiting grapes and another stake for this year and then at the end of the year cut off the fruiting stake?

Mr. Scofield—Cut off the wood that has borne the fruit; you have no more use for that, and the wood that grows this season, leave for the next year. Cut it after the leaves have fallen in the fall.

Mr. van Loon—In strawberries, would you recommend the planting of a staminate variety by itself?

Mr. Scofield—If you plant a pistillate variety with the staminate, you are more likely to get a large crop.

Mr. van Loon—Would you recommend hill culture or the matted row?

Mr. Scofield—Matted row.

Mr. van Loon—Is it necessary for blackberries to be laid down and covered?

Mr. Scofield—It is practiced altogether in the northern part of the

state. Whether it is really necessary in the southern part is a question in dispute.

Question—How about mulching strawberries?

Mr. Scofield—I don't want any mulching in mine, on bush fruit.

Question—Have you ever tried any commercial fertilizers on fruit?

Mr. Scofield—Yes, I have used three or four different varieties, and I have never found anything that was a success.

Question—Is the Brighton grape hardy in this climate?

Mr. Scofield—None of them are hardy without being covered; it would be as hardy as any. The principal thing in covering is to just cover enough to hold them to the ground, depending upon the snow to cover them.

Mr. Powers—When do you prune your currants?

Mr. Scofield—It can be done either in the fall or the spring. The currant is hardy and does not kill back any. The raspberry or blackberry I should not want to prune in the fall.

Mr. Edwards—Have you tried the Kansas raspberry?

Mr. Scofield—Yes, I think I have grown it about as long as any man in the state. The Kansas is a very nice berry. The greatest fault I find with it is that the buds get killed with the frost sometimes. They are like the strawberry buds, very easily damaged.

Mr. Edwards—It is the most successful berry I have on my ground.

Mr. Merrill—How will the Loudon do for the farmer's use?

Mr. Scofield—It will do for anybody's use.

Mr. Merrill—Would you recommend folks in this part of the state to cover their raspberries?

Mr. Scofield—No, I would not.

Mr. Merrill—Not even the Cuthbert?

Mr. Scofield—No, I never lost a crop of Cuthberts yet from winter killing. If you cultivate the raspberry up to the first of August, and the plant has time enough to ripen its wood before the fall, it will be all right, but if it is cultivated later than that, or has been neglected through the season and the wood is green, then it will winter kill.

Mr. Kellogg—I wish to differ with Mr. Scofield in regard to the fact that we have in the past ten years found varieties of strawberries such as Biederwood, Lovett, Splendid and Enhance, which are all perfect in the blossom, that are as vigorous, healthy, and productive as any of the pistillates not excepting Crescent, Warfield, and Haverland, which are best of that class, so there is no necessity of the farmer setting any of the pistillates.

In regard to preparation of ground, I consider it very important to subsoil all ground planted to fruit.

I also consider the Loudon red raspberry the best of all the suckering varieties, and the Columbian the best of the purple red that does not sucker.

POULTRY.

C. E. MATTESON, Pewaukee, Wis.

The first question to be considered before taking up poultry farming, is whether we are going to take it up at all, and if so, are we going to take it up for pleasure or profit. If for pleasure I have no time for such, but if for profit, then I will sit down and talk a while with you.

Winter Eggs.

We will first consider that you are to take up poultry farming in a general way, that is egg farming connected with market poultry, which certainly covers a broad and profitable field, if successfully managed. In speaking of egg farming I will say that he who gets no eggs in winter time makes nothing from his fowls, or in other words, I might say that every egg gathered in winter time is a clean profit. Now, my experience has been that eggs can be obtained in winter only by the use of early hatched pullets, for I think you will all agree with me when I say that old fowls as winter layers are very sluggish.

Breeds—Hatching.

As to the time these pullets should be hatched so as to have them profitable, depends a great deal upon the breed, and right here comes in the question of breeds. For my part I do not consider that there is any best breed. If your choice is the large, beefy breeds, called the Asiatics, you should hatch them out the last half of March; if your selection is from the American class you may hatch them out as late as the 20th or April, or should your choice be the Mediterranean class you may hatch them out as late as the 15th day of May.

Now that we have them hatched let us see that they are kept growing during the summer season so that

they come to laying maturity before cold weather sets in. Keep them laying by good care and good feeding, and good, warm, comfortable housing, for they must be protected from extreme cold in winter time, and fed upon such foods as the different ingredients of the egg is composed of. For instance, it will not do to feed fowls upon corn and wheat alone, not but what these grains contain all the egg materials, but in such small proportions that a fowl would have to eat and digest half her weight in grain daily, in order to produce three eggs a week, but these grains should be supplemented with green succulent food of some kind, such as well cured clover hay, cabbage, or mangel wurzels, when these are combined with wheat, oats, or corn, with a small percentage of animal food, they simply have got to lay.

Keep Them Scratching.

Exercise is a very important point that must not be overlooked in caring for fowls in winter time. This came to my notice more fully than ever before some six years ago, when the snow was nearly two feet deep around the buildings, and my eggs were remarkably fertile, nearly every egg bringing out a strong, vigorous chick. I was living near a lake at that time, where bullheads were caught and dressed in large quantities. I had access to the offal, composed largely of skins attached to the heads, which were fed every other day. The intestines were easily disposed of, but the head with the eight inches of skin attached was another thing. It was very easy for a fowl to sieze a skin by the tail and swallow it down as far as the head, but that was an objection. There was little

time left for effort, for another fowl would sieze the lower jaw of the protruding head and that skin was resurrected in a moment, leaving the astonished and disgusted biped to ruminate upon the mutability of all earthly things, yet not one whit discouraged. The offal, together with the exercise, were the conditions required, not only to insure fertility, but such an egg production I have not seen since.

To obtain this exercise in a different way the farmer has the best of materials. Straw or cut corn stalks placed in their scratching shed, and then burying their morning feed of grain, compelling them to scratch for every particle of their morning feed, stimulates a most cheerful exercise.

Vermin.

Another important point that must not be overlooked in the poultry yard is to keep them free from vermin. To be sure, where the artificial system of hatching and rearing is employed, we do not have as much trouble with these miserable pests as is the case where hens are employed, but nevertheless we must be constantly on our guard against them, and unless we learn to stamp out and keep down these troublesome visitors, the sooner we get out our auction bills the better off we will be financially. There seems to be a prevailing opinion that there is but one kind of vermin, and that one kind of treatment will cure all. This is certainly a sad mistake. There are three kinds of vermin that the poultryman has to contend with.

Red Mites—Body Lice

First I will speak of the little red mites. These are always found on the perches and rests, and they have the same relation to the hen as the bed-bug has to the human family. To exterminate these first clean your whole house thoroughly, then fumigate thoroughly with sulphur, after which whitewash your whole house

thoroughly, perches, nest boxes, and all.

The next vermin is what is called the body louse. These are found on the body of fowl only, especially among the fluffy feathers beneath the vent. They do not prey upon the blood of the fowl as some think, but seem to content themselves with a living from the scales of the fowl's body, and are constantly on the move. To exterminate them nothing can be better than "Lambert's Death to Lice." This is a disinfectant insect powder and will rid your fowl in a very few minutes after the time it is used.

Head Lice.

Last but by no means least is the large black head louse, sometimes called the sucker louse. They have their habitation on the head and neck of the fowl, and reap their harvest in the spring and summer months by playing great havoc among young chicks and young turkeys. The remark is often made that you can raise young turkeys with the turkey hen, but are not as successful with the common hen. This is because there is no place for these head lice to harbor on the turkey hen, for you might as well expect head lice to stay on a bald-headed person. With these pests, as with all others, prevention is better than a cure. By applying equal parts of kerosene oil and sweet oil with a sponge, to the head and neck of the hen when she is entrusted with the eggs, and then again when she is taken from the nest with her brood, you will have no difficulty with these. But where they are already upon the little ones, use "Lambert's Death to Lice" at intervals of about ten days apart.

Prevention of Chicken Cholera.

The question has been asked of me a great many times within the last two years as to what to do for chicken cholera. Now, with all candor I must say that I have not much faith in this chicken cholera cry, for

I am confident that in the majority of cases it is nothing more than indigestion. If plenty of grit in the form of fine, sharp gravel, pounded crockery, broken glass, together with plenty of charcoal, is always accessible, and the Douglas mixture is used in the drinking water, there will be a great deal less cry of chicken cholera.

Douglas Mixture Recipe.

Take one-half pound of common copperas and dissolve in four quarts of luke warm water. After thoroughly dissolved, add one-half ounce of sulphuric acid. Stir violently and bottle for use, corking tightly. Dose—One tablespoonful to one quart of drinking water, two or three times a week.

Market Poultry.

I will now take up market poultry, which with me has been the most profitable part of poultry farming.

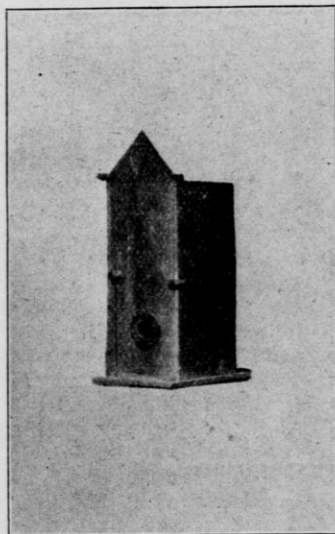
Anyone desirous of growing market poultry had better make up his mind to do it artificially or not at all; for those who ever attempt to grow poultry for market in the natural way must expect to take second place, for he will be constantly pushed to the wall with the artificial product. I will give some of the reasons why.

Try as best you may, when you get your naturally grown product into the market, you will find the artificially grown broilers there ahead of you. They are not only controlling that market, but have been controlling it for weeks and maybe months, and you are sure to meet a falling market. This has fully come to my notice a great many times. Then again, in the artificial practice the expense of labor is reduced to a minimum, for it is just as easy to care for a brooder full of chicks as it is to care for an old hen with a dozen. For instance between the 1st and 23rd days of last February I hatched out and placed some eight hundred chicks in ten brooders that

I had. At ten weeks old, or at the time of marketing, the mortality was less than 4 per cent. and but very few stunted chicks in the lot. Now, does anyone pretend to say that he could have consigned those chicks to the care of fifty or even sixty hens, without going out in the morning and finding more or less of the little things crushed to death under the feet of the ruthless bipeds, that the little heads and bodies of the chicks would not have been covered with vermin, that dysentery, sore eyes, blindness and other attendant evils would not have followed in their train, and that the average mortality would not have reached even 15 per cent. If so his experience has been far better than mine has ever been.

Incubator-Egg Tester.

In the selection of an incubator I would recommend buying a good one or not any, for you will find a bogus



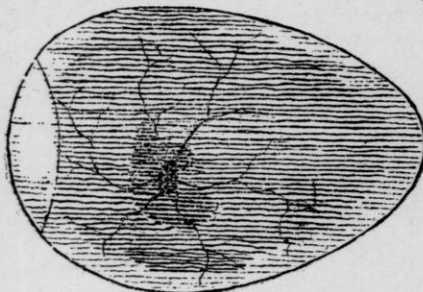
EGG TESTER.

incubator one of the balkiest things you ever undertook to handle. The inventors of these machines may be

honest in their ignorance, but they are not practical. Perhaps they have never hatched or grown a thousand chicks in their life, but have invented a heat regulator, built a box around it, and called it an incubator. Such machines as these always hatch best on paper, and are sure to bring discouragement and depleted pocket books to the beginner. In running an incubator there are a few points I would like to call the attention of the beginner to, and it is best that he should pay particular attention to them, or his success will only be an accident. First is the importance of testing the eggs. I will give my method of doing this by describing a

that stage should show a germ the form of a large spider, and if alive it will always float to the top, just as it lays in the tray. The larger this spider the stronger the germ. The fourteenth day, or second test, is the all important test, from the fact that a great many of these germs will die after the first test, and at that stage of the hatch should your thermometer be resting on one of these addled eggs and record 103, your live eggs would record 106 to 108, according to how far the hatch had advanced, and right there is the cause of a great many failures with incubators.

There is no regular form that a

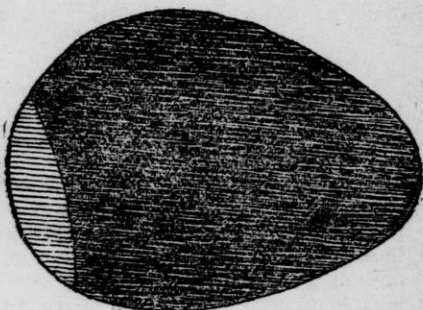


A fertile egg as it should appear on 7th day of incubation.

cheap but very powerful egg tester which can be built by anyone in ten minutes. Make a box, say about ten inches square and eighteen inches high. Bore a hole in the bottom part of one of the sides of this box, two inches in diameter, just opposite the lamp flame. Nail over this hole a piece of an old rubber boot leg with a hole in it a little smaller than an egg. Put your lamp inside this box some evening, and yourself on the outside and hang it up just over your egg tray. You then have the neatest thing out for a tester.

Fertile Eggs.

The first test should be made on the seventh day and nothing but the infertile ones, which are perfectly clear, are removed. A fertile egg at



A fertile egg as it should appear on the 14th day of incubation.

dead germ should show, for the reason that they die at all stages of incubation, and will lay in any position you wish to place them, just as a dead person will if it should be thrown into the water. A live egg on the fourteenth day should show through the egg tester to be nearly opaque, a little light and clear colored in the small end. During the last two years I have received a heavy correspondence asking why chicks die in the shell in an incubator. In the majority of cases it is because too much moisture has been used, or in other words the egg has not been permitted to evaporate as it should, consequently the chick has absorbed all the moisture into its body and has grown so large that it

cannot make the circumference on the inside of the egg, so it must lay and die within its imprisoned walls.

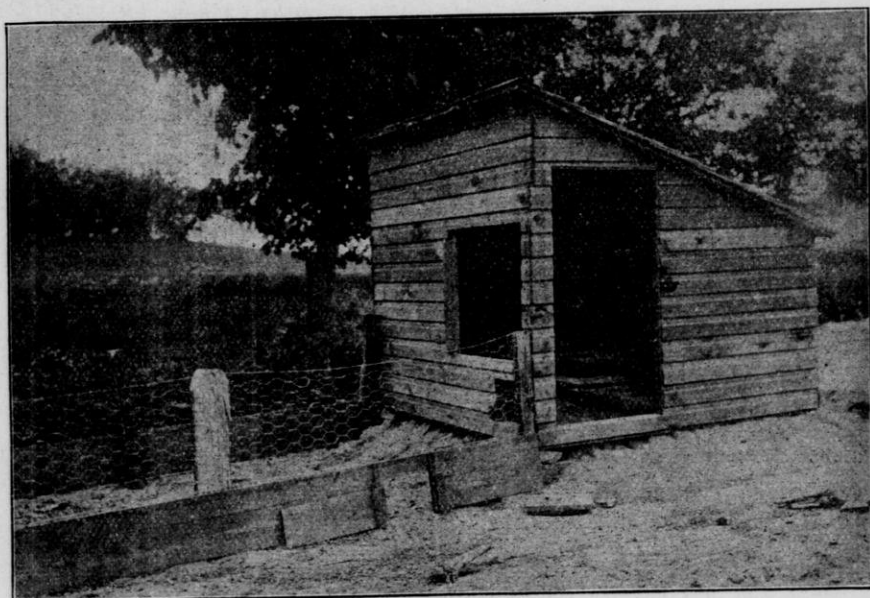
Turning the Eggs.

There are two very important points connected with this turning process. One is that as it turns on the inside it cuts off a portion of the large end of the shell with its beak; another is that as it turns it twists off the umbelical cord in the small

in the same position all through, the contents would separate with the water to the bottom, forming a water line, and when these fibrous veins grow to this water line they would stop growing, which would end the life of the chick.

The Brooder.

As to the selection of a brooder this cannot receive too serious a consideration, for it is more than useless



DETACHED BROODING HOUSE SHOWING BROODER IN INTERIOR.

end. Thus your chick comes to the world healthy and strong.

Is it necessary that eggs should be turned during incubation? I say yes. The reason that we turn them is to keep the contents of the egg well mixed. The reason it is necessary is that after the third day of incubation the embryo chick throws out little fibrous veins so to speak, which is to attach itself to the shell, where the chick is supposed to get its lime to build up its bones with. Should the egg be permitted to lay

to hatch out a brood of downy little fellows only to have them smothered in a worthless, death-trap brooder. It is not only a loss of eggs and still more valuable time, but you lose the whole season and sometimes your courage, as well. I am somewhat against a uniform temperature. Not but what it is all right if brooding temperature can be maintained, but when placed in the hands of a careless and inexperienced operator, it is liable to fall from brooding temperature, and in that case a large

mortality is sure to be the inevitable result.

To satisfy and answer a great many questions as to what it costs to grow broilers for market, and the profits gained thereby, I will publish an itemized account of my broiler product for the season of 1897. This of course is what I received for broilers only.

Profit in Broilers.

2200 lbs. corn meal, 65c per 100.....	\$14 30
1100 " wheat bran, 42½c per 100.....	4 68
800 " cracked corn, 65c.....	5 20
100 " rolled oats.....	2 00
100 " stale bread.....	2 00
100 " steel cut oat meal.....	2 00

\$30 18

Cost per chick for food, not including milk, small potatoes, and mangel wurzels, a little over 4 cents.

104 gals. oil at 9c.....	\$9 36
1000 eggs at 2c.....	20 00
1½ cords wood at \$3 per cord.....	4 50

Total cost of raising chicks..... \$64 04

Chicks sold April 22, 10 doz. at \$6.00.....	\$60 00
" " April 29, 175 at 40c.....	70 00
" " May 6, 200 at 30c.....	60 00
" " May 20, 150 at 30c.....	45 00
" " June 10, 292 lbs. at 15c per lb.....	52 56

\$287 56

64 04

Total amount received for labor..... \$223 52

DISCUSSION.

A Member—How will you regulate your moisture?

Mr. Matteson—If you are running your machine in a very dry atmosphere, you may have to add moisture about the seventh or tenth day, but in the majority of cases, moisture is not needed until the eighteenth or nineteenth day. You can do it by putting moisture pans in the bottom, or just wet sponges in the tray.

Mr. Edwards—What kind of an incubator do you use.

Mr. Matteson—I recommend the Monarch.

Mr. Edwards—What time should your first hatching begin?

Mr. Matteson—For my winter broilers, the machines are set the 10th day of January. This year it was the 12th, I think.

Mr. Briggs—What do you do with your chicks now, with two feet of snow on the ground?

Mr. Matteson—In raising chicks during the winter months we must have a regular brooding house, partitioned off into pens any multiple of five feet in length, with yards on the outside to correspond with pens on the inside.

Mr. Merrell—What brooder do you use?

Mr. Matteson—I build my own.

Mr. Howe—How do you make them?

Mr. Matteson—I first build a box 8½ inches high, inside measurement, and 36 inches square, outside measurement, with two sides and an end. The other end I leave open which we use as a door, for this is what we call our lamp-box. Inside this box, exactly in the center I place a hoop-iron support, so as not to let the sheet iron sag down onto the lamp.

For a lamp board I use a piece of board 8 inches wide, half an inch thick, and 34 inches long, with two pieces of lath tacked on either side so as to guide the lamp board exactly in the center as it is pulled in and out to be taken care of. Place the lamp in the center of the lamp board and fasten by tacking small nails around it.

For a door I use a piece of 1 by 6, 33¾ inches long, just held in its place by lath being tacked on either side so it can be taken out easily and fastened by a wooden button when in position. Now we have our lamp box, the next thing is to cover it.

This is first done with a piece of number 22 sheet iron, 36 inches square, that has already had tacked to one edge of it a piece of 1 by 2, 36 inches long, and when covering the box with this sheet iron put this piece of 1 by 2 over your door which answers as a support. Tack your sheet iron firmly to all sides of the box. Then tack on top of this sheet-iron a furrowing strip all around the

outside. Saw out a one inch cold air draft out of each one of these strips, to the right and to the left, as you face the door. On top of these strips we place our floor. This is composed of 7 pieces of dressed and matched fencing, 36 inches long.

Exactly in the center of this floor I put my heater. This is done by first sawing out a hole 4 inches in diameter. This heater is simply a tin cup made for the purpose, 4 inches in diameter, and 3½ inches high. Now turn this cup bottom side up into this hole, and it should be fastened securely before the floor is nailed in position. After being fastened in position this cup should be perforated thoroughly with ¼ inch holes, all over the top. This is our brooder box, complete.

The next thing is the hover. This is made out of matched fencing two feet in diameter, cleated together firmly on top. Place a leg of some kind under it (I use old broom handles), three inches high. Then tack on a heavy mackinaw curtain so that it will just touch the floor, slashing it up with the scissors four or five times, so as to admit of the ingress and egress of the chicks. Place this hover exactly in the center over the heater and you have a cheap but very successfully working brooder.

If there is anything that is not understood by the reader I will try to make it clear to you if you will write me, enclosing stamp.

Mr. Rice—What temperature do you keep your brooder at?

Mr. Matteson—It depends upon the kind of brooder you use.

Mr. Rice—I always use the hot air brooder.

Mr. Matteson—You can run them a little more carelessly in winter. You should always have them up to a hundred. You must remember that in the winter time you can safely work on the uphill grade, for the reason that the chicks can get away from this

dome, but if you get the brooder too cold they cannot keep warm.

A Member—How many chicks to the brooder?

Mr. Matteson—You never should put more than fifty in any brooder, no matter how it is constructed.

Mrs. Worthington—Do you think there is such a disease as chicken cholera?

Mr. Matteson—Oh, yes.

Mrs. Worthington—Do you raise water fowl?

Mr. Matteson—No, but ducks are very hardy.

Mrs. Worthington—You deprive geese of water and shut them up and you will find they will begin to die. If you had them you would have to provide water, I think. When we don't provide the water for them to paddle in, they climb into their drinking water.

Mr. Matteson—I take issue with Mrs. Worthington on the water question. The best ducks and geese I ever raised in my life had no water except to drink, but the fountain should always be deep enough to get their nostrils in so they can snort, or they will get clogged up and they won't last very long.

Mrs. Worthington—Yes, ours died, but that was not the cause. I don't know what was the matter.

Mr. Matteson—Are you sure they had no vermin?

Mrs. Worthington—No, they had no vermin, unless it was bacteria.

Mr. Matteson—Did you examine for vermin?

Mrs. Worthington—No, I didn't.

Mr. Matteson—Water fowls are very apt to suffer from vermin and when you once get them they are very hard to get rid of.

Mrs. Worthington—Do you mean vermin in the eye?

Mr. Matteson—No, body lice, or head lice.

Mrs. Worthington—There were none of them there. I think you will

all find that chicken cholera is due to a living germ that enters the body from the outside.

Mr. Matteson—Chicken cholera is a germ disease which is taken into the fowl's system with the food or water; it may also be inhaled.

Mr. Edwards—What kind of a poultry house would you recommend for about two hundred hens?

Mr. Matteson—I would recommend a house built upon the scratching shed plan, so that they would be kept very warm at night—in their roosting quarters. Don't put more than fifty in a flock, and have corresponding yards in front.

Mr. Edwards—Would you have it open on the south side?

Mr. Matteson—I would have a door and a window in the scratching shed and in such weather as this, anything above zero, I would open that door and let them work in the yard.

Mr. Edwards—Will tar paper keep the lice out of the chicken house?

Mr. Matteson—I think not. It might, as long as the tar smell lasted, but after that, these red mites will get right in behind it, and live there.

Mr. Edwards—How would you ventilate your chicken house?

Mr. Matteson—I would not ventilate it except through the doors and windows, and have them shut at night. Nothing will bring on roup as soon as top ventilation at night.

Mrs. Worthington—Is there a sure cure for roup?

Mr. Matteson—If you are sure that you have roup in a contagious form, use the hatchet on every one that has it, but I will say that if this roup is thoroughly understood, it is a very easy thing to keep out of your fowls. It is nothing more than a neglected cold. It comes in the form of a swelled head and if you will take all the affected birds by themselves and give them one or two applications of kerosene in their nostrils and a little in the mouth, it will cure them, but do

not put them back in the flock until you are sure it is all gone.

A Member—Where do you get your steel cut oat-meal?

Mr. Matteson—In Milwaukee. It is not as plentiful as it used to be. I have had some difficulty in securing it. All I used it for was as exercise to the broilers in the winter so as to make them scratch in their small quarters, but I found that one would get more than it should sometimes, and I did not use it this winter. Bran and straw was all that I used for exercise this winter.

Question—What do you use for head lice?

Mr. Matteson—Equal parts of kerosene oil and sweet oil, applied with a sponge, not with an oil can. These head lice are always in the feathers and they are hard to find.

Mr. Kellogg—Do you think one farmer in ten or even twenty-five would succeed with the incubator and brooder?

Mr. Matteson—There is no reason why the farmer or anyone else should not succeed. I consider the incubator and brooder just as far ahead of the old hen as the self-binder of today is ahead of the old-time cradle of years ago. If a person will deliberately neglect his business he is bound to lose, no matter what business he is in.

Mrs. Merrell—Can ducks' eggs and hens' eggs be hatched together in the same machine? I have hatched them together under a hen, with good results.

Mr. Matteson—Yes, if your machine is a top and bottom heat, like the Monarch, but it cannot be done in a machine with top heat only, for the reason that the ducks' eggs are larger than the hens' eggs, consequently they lay nearer the tank and every $\frac{1}{2}$ inch that you go nearer the tank makes a difference of one degree. That is the reason that eggs selected for an incubator should be as uniform in size as possible.

Mrs. Thorp—What effect do you find that green food has upon the egg? I always find that it makes them more yellow.

Mr. Matteson—Yes, so it does; it

makes them a lighter yellow and of much better flavor. An egg is largely composed of protein and this green food is very necessary to help make this up.

THE IMPORTANCE AND DEVELOPMENT OF BEE CULTURE.

MISS ADA PICKARD, Richland Center, Wis.

The honey bee, a wonderful insect, has been associated with the history of man through all the ages of the past. From time immemorial honey has been used and highly esteemed as an article of food; and to the ancients, no higher praise could be spoken of any country, than to say it was "A land flowing with milk and honey."

The Honey Bee—Its Work.

Though we live in enlightened communities with intelligence and education on all sides, we find discord and conflict, jealousy and envy, born of ignorance, making trouble all around us, and in some communities the apiarist appears to be a special target for censure. His bees are charged with committing various offenses, such as tearing out and sipping the juice of fruits, depriving the plants they visit of their sweetness, etc. To the former charge, close and intelligent observation fails to give any proof. It is found that bees only visit fruits that are already damaged by birds, wasps, and other insects, as bees are not provided with the proper instrument for tearing the skin of the fruit. They are, therefore, mere scavengers of what would otherwise prove a loss.

No one denies that the bee will gather the sweets of the blossoms; but who, knowing that this nectar is secreted for the express purpose of enticing insects to the blossom and that

which is not taken by them will be evaporated and lost by the plants, would be base enough to deny them that privilege? If the office of the honey bee was generally understood this industrious little insect would be hailed with a welcome into every neighborhood. We cannot afford to dispense with the insect world until we are prepared to do without the vegetable kingdom. Plants are ushered into existence by germination of seeds, thence by vegetation they are enlarged and grow, until the third and most important stage of their existence is reached—that of fructification, or production of fruit and seeds. It is the last act, the act of fructification, in which the honey-bee plays such an important and indispensable part. The most careless observer and shallow reasoner knows that if no blossom appears at the proper seasons, fruits and seeds would not make their appearance.

In the Clover Field.

Charles Darwin, that eminent English naturalist, whose careful experiments have added so much to our knowledge of plant and insect life, states that out of 125 species which he covered with netting when in bloom, more than one-half were entirely sterile. I will relate one experiment which will prove of interest to our farmers, in regard to the importance of bee culture. Several

plants of red clover were protected from insects, from which one hundred heads produced no seed, while adjoining them were unprotected plants, known to be visited with insects. From these were gathered one hundred heads producing 2,270 seeds. As a result of this experiment every intelligent farmer ought to hail welcome to every honey-bee found in the clover field.

but by that wonderful endowment, "instinct."

Bees are not given to new notions or fads. They do things today just as their ancestors did a thousand years ago, and who would succeed in bee-keeping must learn to work in harmony with their natural habits. Any attempt to convert their natural impulse is sure to result in a failure, whether the act be intentional or un-



HOME APIARY OF MISS PICKARD.

Habits of the Honey Bee.

The habits of the honey bee have been carefully studied by many learned and scientific men, in ancient as well as modern times, and there is nothing found in the annals of natural history more interesting and wonderful than may be found in the internal affairs of the bee-hive. There is as much system in the bee-hive as can be found in the best well-regulated government, of the most enlightened and civilized nations; yet bees are not guided by reason, logic, or philosophy,

intentional, the result will be the same, hence there is a necessity for being educated for the business.

No set or fixed rules can be given for the management of bees which can be invariably followed under all circumstances to ensure the desired result. The right thing to do with one colony at a given time, may prove exactly the wrong thing to do with another colony at the same time, owing to the difference in their conditions and surrounding circumstances. The variations of seasons, changes in the

weather, and the conditions of the atmosphere, all having an important bearing upon the secretion of nectar in the flowers, and consequently upon the time and manner as to when and how the bees should be manipulated.

The Bee-Master.

To be a thorough bee-master requires as much intelligence, forethought, and skill, as to be a good lawyer, physician, or any other professional, and with all a clear perception of the relation of cause and effect. Some people are inclined to think that bee-keeping is a pleasant pastime which lazy and incompetent people can take up with success, thinking all that is required is to put them into a hive in some out-of-the-way place, and that they will "work for nothing and board themselves." And so they may, but if the owner desires to obtain any surplus for his own table, or for the market, he must give them further care, and unless he has a heart for the work, so that he finds some degree of pleasure in caring for them, he had better not attempt to keep them at all, as they will only prove a source of annoyance without profit.

To make a successful bee-keeper requires a special gift, or a natural aptness for the business, the faculty of perceiving what needs to be done, and an inclination to do it promptly. The old Spanish adage "Never to do anything today which can be put off until tomorrow," does not apply to bee-keeping, as it savors too much of slothfulness; but the old Anglo-Saxon maxim, "Never leave until tomorrow what can well be done today," will be found more applicable, being much more in harmony with the assiduous activity of the bees.

Progress in Bee-Keeping.

We are living in a progressive age. No other period in the world's history has ever been signalized by such wonderful developments in science and art as have been brought to light this Nineteenth Century. The great

labyrinth of nature's mysteries has seemed to be set open unto men, and forces and principles which have lain dormant since the beginning of the creation, have in our day been brought forth and made subservient to the will of man with astonishing results. And while such unparalleled progress has been made in other directions, bee-keeping has also received its share of attention, and I feel quite safe in saying that more progress has been made in the management of bees, during the latter part of this century, than during all the thousands of years of previous history.

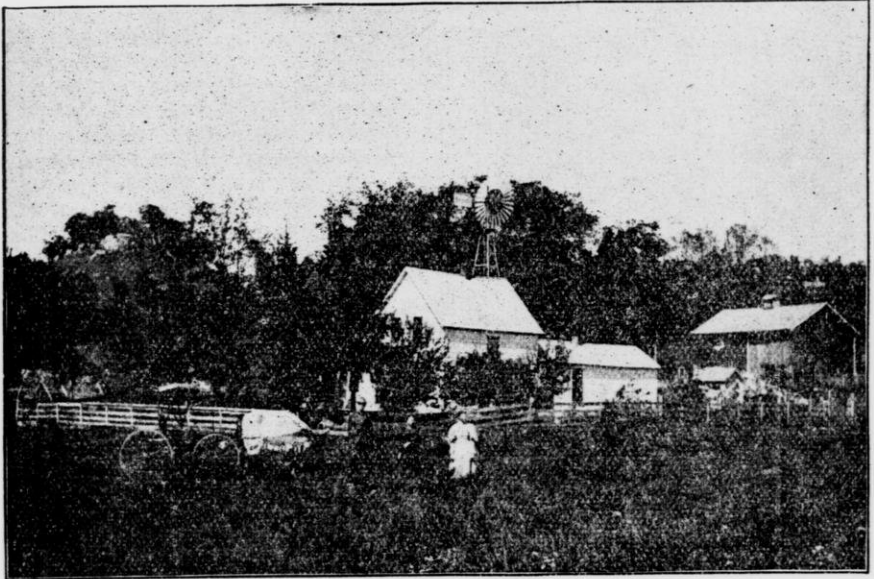
Bee-keeping in its present stage of development is fully entitled to take rank as one of the arts, and were it not for the variability of the season, the changeableness of the weather, and other atmospheric conditions upon which the secretion of nectar in the flowers is so largely dependent, and upon which hinges the turning point of success or failure, all of which are entirely beyond our control,—I say, were it not for these uncertainties, then bee-keeping might properly be classed as a science; but inasmuch as the variations of seasons necessitates a variation in management of the bees, therefore no set rules can be established which will work satisfactorily under all circumstances that may arise; but, the judgment and skill of the apiarist needs to be constantly exercised in order to discover just what needs to be done, and when and how to do it.

The Queen Bee.

Every wide-awake apiarist of these days takes as much interest, and I might say pride, in the rearing of his queen bees, as a good farmer does in raising fine cattle and horses. There are numerous apiarists who do quite an extensive business in rearing queen bees for sale, sending them all over the country to customers, the prices ranging from one to ten dollars, and upwards, for a single queen

bee, according to her pedigree, purity of blood, and whether she is home-bred or imported. With many people a bee is a bee, and they know no difference in the breeds. But with the advanced apiarist it is considered a matter of considerable importance, each having his favorite breed, the

in the fertilization of the blossoms of fruit and seed-bearing trees and plants. Therefore, let the farmer, fruit grower, and bee-keeper, live in harmony and good-will, for that which promotes the interest of one, promotes the interest of all. Give the bees a chance.



HOME OF MISS PICKARD.

same as our stockmen. Years ago the brown German bee was the only kind kept in this country, but of late years we have imported the Italian, Cyprian, Syrian, Holyland, Carnolian, Syro-Albion, and an endless variety of hybrids have arisen by crossing the breeds.

Give Them a Chance.

Although the manipulations of an apiary are widely different from farm work as the practice of medicine is different from the practice of law, yet a few bees in the neighborhood are a real benefit to every farmer or fruit grower, because the bees evidently perform a very important part

DISCUSSION.

A Member—You spoke of an experiment with clover. What kind of clover was it?

Miss Pickard—Red clover.

The Member—Will the honey bee work on common red?

Miss Pickard—It does sometimes. The reason for bees not working on red clover, I understand, is that sometimes the cup of the clover blossom is so deep that they cannot reach the honey, but it is fuller at some times than at others, so that they can work. Then again, I think there is a difference in the breed of the bees. It is claimed that the Italian bee has a

longer tongue and can reach into deeper cups, and they are very frequently found working on red clover when the black bee is not.

Mr. Sayre—What do you consider the safest way of wintering bees?

Miss Pickard—I think that the cellar wintering is the most successful, at least it is with us. A great many winter out of doors, but in that case they must have some protection. We think it is just as economical to put them in the cellar, and safer.

Mr. Kellogg—What temperature is your cellar?

Miss Pickard—About forty-five degrees.

Mr. Culbertson—Is not the dampness of the cellar detrimental to bees?

Miss Pickard—Yes, the cellar should be dry and warm, with plenty of ventilation, and if the cellar is inclined to be damp, this may be prevented by placing unslacked lime in it, and as it slacks, the moisture will be taken up, and you can remove it and replace it with unslacked again.

Question—Do you screen the entrance so they cannot get out?

Miss Pickard—No, sir.

Question—Is your cellar dark?

Miss Pickard—Yes, it is a perfect dungeon, not a ray of light.

Question—What kind of a hive have you?

Miss Pickard—The old Gallup hive.

Question—How much money have you made for one season with one hive?

Miss Pickard—That depends upon the strength of the colony. Our bees average at least one hundred and twenty-five pounds to the colony, the surplus.

Mr. Edwards—What is the cause of some people losing their bees in the cellar?

Miss Pickard—That is rather a broad question. There are different causes. Probably poor honey is one cause, and it might be that the cellar is not properly ventilated or of proper temperature. Bees quite often have

dysentery in the cellar, and that is due to poor honey.

Question—What about Alsike clover?

Miss Pickard—They work very well with Alsike clover.

Question—During the warm spell in March is it advisable to take them out for a while?

Miss Pickard—No, sir, I would not advise removing them at all until they could remain out.

Mr. Moseley—Are they not disturbed sometimes in the cellar by noises overhead?

Miss Pickard—Our cellars are by themselves, and there is not any disturbance at all. I don't think it would be advisable to winter them in the cellar of a house. We have a cellar made into a hill, a stone cellar, and over this is a building which we use for a honey house. That is at the home yard. Then we have a yard about five miles from home, with a cellar made just like a common root house, boarded up on the inside and overhead we have a floor and this covered with sawdust and shavings from two and a half to three feet deep; over this is a shingle roof for protection from the weather. That makes a very good cellar for wintering.

Mr. Patsinger—I have kept bees for twenty-two years, and have put them in the cellar every winter, right under the sitting-room where we lived, and they were never disturbed by the noise, that I could find out; nothing but jarring the hives.

Question—Do your bees leave the hives in the cellar and fly around?

Miss Pickard—No, sir, not unless they are disabled bees that are going to die anyhow, and leave for that purpose.

Question—How do you arrange your hives in the cellar?

Miss Pickard—We have a bench made about two feet from the floor, clear around the outside wall, and we place one hive on top of the other.

The first hive we raise the front about an inch from the bottom board; upon the back of this hive we place an inch strip and then place the next one, tiering them up one on top of another.

Mr. Moseley—About what time in the spring do you bring your bees to the light?

Miss Pickard—That depends upon the season. We leave them in the cellar until we can take them out in the spring and leave them out doors. Our method is to watch the soft maples, and when they commence to bud, we remove the bees.

Mrs. Worthington—How high do you set the bees from the ground?

Miss Pickard—We have just a 2 by 4 that we place under the hive.

Mr. Kull—How do you feed your bees?

Miss Pickard—We have feeders made for that purpose that we place in the hive. If we have honey, we feed honey. If not, we feed sugar syrup.

Mr. van Loon—What is the best book on bees?

Miss Pickard—The "A B C in Bee Culture," Dr. Miller's "Year among the Bees," or Cook's Manual are good.

Mr. Brown—Do you let your bees swarm?

Miss Pickard—Yes, sir, we do.

Mr. Brown—Have you ever practiced clipping the queen's wings?

Miss Pickard—We never would run an apiary without.

Mr. Storrs—What time do you move them from the summer stand?

Miss Pickard—About the last of November.

Mr. Kellogg—You spoke of high-priced queens. What breed is the most expensive, and which the best?

Miss Pickard—That depends upon the person a good deal. I prefer the Italian.

Mrs. Worthington—Isn't the last of November pretty late to move your bees? We often have very severe storms in November.

Miss Pickard—The judgment of the apiarist should be used, but we seldom put them in before the last of November.

Mr. Edwards—Do you let them swarm all they wish?

Miss Pickard—No, sir.

Mr. Edwards—We try various plans. Sometimes we hive them away when they swarm, and tear the colony all to pieces, so they don't know themselves any more.

Mr. Edwards—How many colonies of bees can you successfully keep in one neighborhood?

Miss Pickard—That depends upon the locality a great deal. I think that about one hundred colonies is plenty for any locality although we have more than that.

A Member—I am well acquainted with Miss Pickard's surroundings. I know that she has about three hundred and twenty-five colonies, and that she has them divided between three places. Miss Pickard and her mother are the bee-keepers, as her father follows other business.

IMPROVED METHODS OF BEE KEEPING.

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



BEE-VEIL AND SMOKER USED BY
N. E. FRANCE.

I am thankful indeed that one has been upon this floor who represents bee-keeping and illustrates the fact that this industry does not require heavy labor, but rather skill and management, with good judgment.

The Old Way.

Well may the farmer of today boast of the improved machinery and better farming. As bee-keeping is a branch of agriculture, I wish to call your attention to some of the improved methods and implements of this sweet occupation. Many of you remember only a few years ago, when the majority of farmers had enough bees in either straw hives or else in boxes or

log gums, as they were called, and it was not uncommon for salt barrels to come into like use. The bees, doing as they pleased, were sure to have the crooked combs well interlocked, and if we wanted any honey we would dig a suitable grave, then put on our coat of arms, and at evening carefully set the heaviest hive over some brimstone matches that were put in the pit, and await the soon deathly silence. The best comb honey would be carefully set aside for company, and the dark combs containing some honey with plenty of bee-bread and often some larva bees, were all broken up and put in a cloth sack near the old-fashioned fireplace, where the strained honey, well flavored, would drain out. In those days we knew little about the queen bee and her importance. We kept all hives in low sheds, and expected the bees to feed themselves and us too; if they died, as they often did, it was because some of the family had died or we were out of luck. We were sure to be in luck during swarming season, as they would be sure to cast while we were in the field haying, or while we were at church on Sunday mornings. Our neighbors knew when the bees swarmed by the racket of our bells, tin pans, horns and firing off of the old musket.

Profit in Bees.

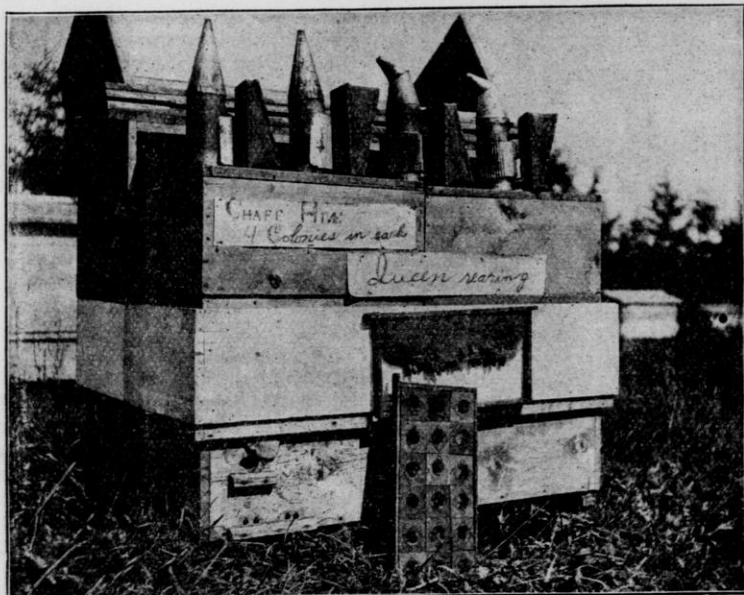
The improved machinery and methods of today finds the progressive bee-keeper with a cheap and comfortable bee-veil which he wears occasionally, handling his bees barehanded, as carefully as any other farm stock. Within twenty-five miles of this room was one of these model bee-keepers, who so handled his 1,000 to 1,400 colonies that the owner soon became one of our wealthy bankers.

Even this past season I met Wisconsin bee-keepers, whose honey harvests amounted to 30,000 to 48,000 lbs. per year. Several of these extensive bee-keepers are ladies, one of whom you have just listened to.

With the present patterns of movable frame hives, where all combs

Proper Management.

Such bee-keepers so manage their bees as to have them very strong at the beginning of the harvest season, having all necessary supplies on hand and ready for use. He also increases his colonies as he wishes, and raises as many queens as needed from se-



Picture taken in home apiary of N. E. France showing Norway spruce hedge wind break that surrounds the apiary. This hive shows 3 stories high of combs as used to produce extracted honey, with one comb standing against hive, having been filled with honey by the bees several times each season, and as many times put into the extractor and honey thrown out, thus saving comb. This comb has been in use for 19 years.

The frame by its side contains 18 queens, as reared from queen cells, cut from a comb as shown in the frame above, where 18 queen cells are shown as raised by a colony of bees in rearing queens.

Four smokers on hive, showing two of the best on the market each with bellows on opposite end up. Entrances of one colony shown by the one large hole and four smaller ones below. These hives winter the bees successfully on the summer stand. We use same hive for production of either comb or extracted honey.

are straight, and by use of comb foundations, the labor of the bee is lessened, and we are now able to put upon the market in neat section boxes or packages of honey, of the very best quality; that produced in this portion of Wisconsin from white clover and basswood is superior to that produced any other place on earth,

lected stock. As each kind of flower produces a different quality and flavor of honey, the various grades are kept separate, and graded and sold according to grade. If the honey has been properly ripened in the hive, and then kept in a dry room, it will keep many years, as I can prove by samples I have kept for 20 years in

the same package, which are a good grade of honey today.

DISCUSSION.

Mr. Kellogg—What hives do you use?

Mr. France—There are so many varieties of the movable frame hive that I don't know. I would advise something of the Landstroth, or the simplicity device, as it is very satisfactory.

Mr. Kellogg—Have you ever had any experience with what they call double chaff hives?

Mr. France—I have used the Watertown hives. We have over four hundred colonies in chaff hives. They are very common in some parts of the state.

Mr. Kellogg—Do you think it is safe to winter them in double chaff hives?

Mr. France—I would if the surroundings were favorable. There is much in location and management.

Mr. van Loon—Which clover do you prefer, Alsike or Red?

Mr. France—I would prefer the Alsike. I think it secretes rather more honey and is fully as good as a hay crop. The white clover is good too. White clover is a friend of Wisconsin, coming in naturally in a good deal of the country. I was surprised while in Washington county this season, to find the farmers harvesting it for seed. I know of one firm that paid \$74,000 for white clover seed out of that county. I have tried to encourage this idea in various parts of the state. In the southern counties and along up the Chippewa valley, the white clover heads were fully equal in seed to those in Washington county, and the amount of seed that has practically been lost, is a good deal.

Mr. van Loon—What do you think of the quality of the Alsike honey compared with the common white?

Mr. France—If anything it is better, it has a little more of the golden color

to it. I will say in behalf of the southern portion of the state, that the white clover and basswood honey produced in this portion of the state, if properly ripened before being taken from the hive, will compete against anything produced anywhere on the face of the earth. I once had the honor of taking the blue ribbon of the world in that contest for Wisconsin.

Mr. Kellogg—Is the European basswood good for honey?

Mr. France—Not quite equal to ours, although it is good.

Mr. Kellogg—Speaking about wintering on the summer stands, do you screen the hives to keep the bees in?

Mr. France—Never screen bees unless you want to kill them. If they find themselves prisoners they will worry themselves, and produce heat and kill themselves. Last Sunday, you will remember, was dry and warm, and they were flying around almost as they do in summer days. If they have double-walled chaff hives, they will remain content until the weather is warm. Of course I want a good background.

Mr. Kellogg—On such days as last Sunday, wouldn't you sustain loss from their getting chilled?

Mr. France—Sometimes they will come out when they ought not, but as a rule, in those thick-walled hives, they will not do that much. When the snow has been very bright from the sun shining on it, I have occasionally sprinkled a little straw on top of the snow, knowing that the sun would induce them to come out. We lose very few.

Mr. van Loon—Don't you think that fruit and bees are good for each other.

Mr. France—The President of the Illinois Horticultural Society made this statement in Madison last winter, and he is an extensive fruit grower. He said, "My fruit was at least \$100 better for having the bees near." And there were several Wisconsin fruit growers there that agreed with him.

Mr. van Loon—Do you know how far a bee will travel for its food?

Mr. France—Much depends upon the condition of the season. In the early days, when we were anxious to gather bees from the woods, I have hived bees six miles from home, but as a rule, where you want to get much of a harvest, you should go near the harvest with your bees. I want to say there are a great variety of smokers in use. I do not defend any one in particular, unless it is not the one that I find in use in a good many places,—an iron kettle with some straw in it. I remember one instance where a man was too economical to buy a smoker. He called on me to look after his foul-brooded apiary, and it was foul in more ways than one. While we were in at dinner his kettle succeeded in burning up one of the hives. But most of the smokers on the market, as a rule are good, cheap, and durable, so that no one who owns over three colonies can afford to be without some kind of a bellows smoker, costing about seventy-five cents.

Question—What do you use for fuel?

Mr. France—You can make the best smoke with cut straw. With these patent smokers, if you fill them with cut straw about four times a day, they will keep running all the time, but ordinary planer shavings will last longer and give you about the same amount of smoke. You must keep it crowded down so that it does not burn too fast.

Question—Did you ever use tobacco?

Mr. France—Yes, but I never will again, though.

Question—What do you think of sweet clover as a honey plant?

Mr. France—It is an excellent honey plant in some sections. Last year, Dr. Miller, just over the state line, harvested 10,000 boxes, all of them filled from one lot of sweet clover, and he thinks it is one of the

finest honey plants. I was delegated to our state legislature to ask our state to take it off the noxious weed list, which they did. Our own state was the only one that put it as a noxious weed. There were lots of farmers who asked the same thing, because they found it was one of the best plants as a fertilizer, equal to red clover or other clovers, and if cropped, it made excellent pasture, or if cut when low, made good hay.

Question—What do you think of the Sweet Alyssum or mignonette as a bee food?

Mr. France—They do not thrive sufficiently well to advise going into it to any extent.

Mr. van Loon—Have you had any experiments with Alsike clover on high ground? I think it will furnish material for bees, as well as seed.

Mr. France—My own place is on upland clay, but I never expect a yield equal to the low or more level ground. Alsike is especially adapted to moist soil, although it will do well on upland.

Question—Is there danger of smoking too much, in opening up the hive?

Mr. France—A gentleman who is a large wholesale buyer of honey told me he found the best quality of honey in the Union, in Wisconsin, with one exception, and that was that the honey was often ruined by smoking the bees too much. It is an important point. There is another point, in rendering out beeswax. Beeswax will command a ready market at a high cash price, but too often we spoil it by discoloring it. If beeswax comes in contact with iron, I will guarantee you will lose two cents a pound, every time, and the more rust there is in the iron the worse you will discolor it. It is best to use copper or tin, but do not use your wife's kitchen boiler; have something yourself and keep it. The Sunshine Extractor is coming into use, and it makes an excellent quality of wax, which is all

melted by the sun. The only objection I have to that is that it is simply a hot bed, as it were. If you happen to have any disease you do not use heat enough to kill the germs of the disease, and the wax, or even the refuse, coming in contact with the bees, is quite likely to spread the disease.

Mr. Kull—How can I hive a swarm that is in a tree twelve feet high?

Mr. France—Where there is a tree near, I would recommend using that one for leverage, to lower it down by a rope. There are various methods of taking them down. Contrive some way to get that portion of the tree that the bees are on down without breaking the combs.

Question—How can I get them into a hive?

Mr. France—With a very little smoke to quiet the bees, they can easily be removed into whatever hive you have. Cut out the pieces of comb and put them into the frames with a little stick on each side, sufficient to hold it.

Question—What will the bees be doing all this time?

Mr. France—They will go into the hives. I believe, as a rule, that bees are better natured than the mass of people who come in contact with them. I have been with them so long that I don't need to think of the bees, though I don't know of any good that I have done to them. We handle them carefully, it is true, but at the same time we take their supplies away from them, we divide them up, as we please, not as they please; this idea of bees knowing you, is all a notion. The bee-keeper, however, knows the habits of the bees; he knows the signs and he recognizes the sound when a bee is enraged, and he can use more care in handling himself. You will never see an experienced bee-keeper pawing the air with both hands around his head.

Question—What will be the effect on your hives if the snow drifts around them pretty heavily?

Mr. France—No effect, whatever. I remember one winter's day, coming home from school through the snow, without seeing them, and I walked over twenty-four large hives. I was a little afraid that they might smother, and rather than lose my bees I lost half a day's time at school, and shoveled the snow from around the entrances of some of them, and the balance I left, and they came out fully as well as the others.

Mr. Kellogg—I find that the honey bee does not work on the blossoms of the strawberry as well as the little Patton bee and other insects.

Mr. France—South of here they work on the strawberry bloom, but not a great deal here.

Mr. Kellogg—How about red clover?

Mr. France—They work upon it some, although I think that some of the breeders of fancy Italian queens have drawn that on paper rather heavier than they can prove by experience.

Mr. Kellogg—Would you think it advisable to let the colonies raise their own queens, or raise your own queens and introduce them into the colony at the time they swarm?

Mr. France—I would by all means in the spring select what in my judgment I considered the best in the yard, and from them produce all the queens I wanted.

Question—What causes this large amount of drone comb that you have there?

Mr. France—This was put in as an experiment, simply to prove some points. I used it in a hive that was queenless. In such a case nearly all the comb would be drone comb.

Question—Why is it that one hive will make a lot of good honey and the next one will not?

Mr. France—I will answer that by asking you what is the reason that in two adjoining farms one is successful and the other is not? I think there is a good deal in the saving of the queen bee.

Question—What becomes of the queenless colony later on?

Mr. France—I give them a queen as soon as I can.

Question—Do you ever put two weak hives together?

Mr. France—Yes, especially in the fall. If they are both with queens, I would remove the queen from at least one of them, and it is better to remove both, keeping this queen bee in the nursery for a short time. Then, as soon as they are all queenless, they are ready to accept one again.

Question—Would not a colony die quickly if you gave them a new queen?

Mr. France—Quite likely. The life of the bee is short, especially during the summer season.

Question—How do you know when a colony is queenless?

Mr. France—Of course, we are frequently investigating the colonies and we notice that the bees are restless and cross. At a certain place in the vicinity of the Wisconsin river there was considerable commotion in the road for several weeks, and a certain lot of bees became so enraged that nobody could pass by with teams. I was called to see about them and it proved that there were four colonies queenless. Queens were introduced and they were soon quiet.

Mr. Edwards—What protection do you put on to keep from being stung?

Mr. France—All that is necessary is a little veil, which I carry in my pocket, and it is in shape to put over an ordinary straw hat, which protects you all that is necessary. The veils that are sold ordinarily for from forty to sixty cents are so poor in material that they will last practically but two or three weeks. Put in a rubber at either end of your veil, one to fit over the rim of the hat and the other around your neck. I have another contrivance that I furnished my hired man; it is simply a hoop with a series of rims, and the veil is put over that, but it is a good thing to pull hair, and a poor thing to keep out bees.

Mr. Scott—Is there such a thing as getting used to bee stings?

Mr. France—Yes, but there is far more in getting used to bees. I would like to ask how many people here have bees and how many take some bee paper. We ought to study these things if we are interested in bees at all. I have several samples of bee papers here, all excellent, and there are various books that would be very useful to any of us who are interested.

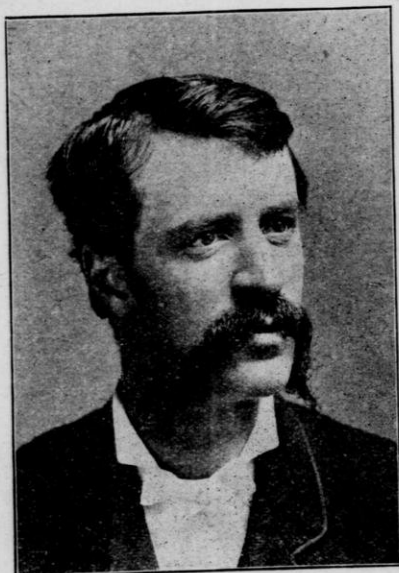
The Institute adjourned to meet at 1:30 p. m.

AFTERNOON SESSION.

The Institute met at 1:30 p. m. Geo. C. Hill in the chair.

SHEEP HUSBANDRY FOR THE FARMER.

T. B. CLOSS, Cambria, Wis.



T. B. CLOSS.

The outlook of the sheep industry at the present time is very encouraging to those who have stood by their sheep during the depression of the few years past, and it is such as should serve as an inducement to those farmers who have any room for sheep as part of the farm stock to invest therein.

Supply and Demand.

A few years ago we had 50,000,000 sheep in the United States; today only

about 32,000,000, about two-thirds of what we have had, and during that time the consumption of mutton has been increasing until at the present time it takes from 12,000,000 to 14,000,000 sheep annually to supply the demand which is still increasing at the rate of fifteen to twenty per cent. Had the foolish scare of the American farmer continued a few years longer we would have been obliged to become buyers of foreign mutton as well as foreign wool.

In looking over the market reports for the last few months we find that the best mutton has been topping the meat market, selling close to six cents, while beef is from five to five and a half cents. Judging from these estimates it does not seem probable that the supply of mutton will exceed the demand for some years at least, and the wool having advanced fully thirty per cent., there is profit in sheep farming at the present time, and in my experience there has been no time when the well-fed, well-bred mutton sheep did not show as much profit as any class of farm stock.

While attending the Institute meetings at different places this winter, I have found the sheep men to be few and far between—in some places they could be counted on the fingers of one hand, and that in sections of the state which in my opinion were as well if not better adapted for sheep raising than any other line of farming.

Our State for Sheep.

Wisconsin has some features which should make sheep raising one of the leading industries. We have, as a natural growth, the very best of grasses for sheep, white clover and blue grass, principally, and we can grow on our soils in addition to our grain crops almost all of the feeds which are made use of in feeding and fattening sheep, such as turnips, rutabagas, sugar beets, rape, velches, etc. We have pure water in abundance. We are almost exempt from many diseases of sheep, which many states and the foreign countries have to contend with, and we are within a few hours' ride of one of the principal markets for both mutton and wool.

Advantages of Feeding Sheep.

It seems to me that the system of diversified farming which is generally practiced in Wisconsin cannot profitably be engaged in without some sheep on the farm. We have probably as good as the average of Wisconsin farms, but still there are portions of the farm which would be almost waste land but for sheep—high rolling prairie land with considerable stone and scattering timber—land which would be inconvenient and unprofitable to crop, and the short, thick native grasses which grow thereon are not enough for cattle grazing, but make a fine pasture for sheep, and the timber land furnishes some pickings for the sheep which other stock will not touch, such as brush, weeds, leaves, etc. While we do not confine our sheep to such places, they make their living in part therefrom, and after harvest the stubble fields can be utilized, and if turnips, rape or clover has been sown with the grain in the spring, there will be considerable cheap feed for fall pasturing. As an investment there is no class of farm stock which will give larger and quicker returns than the sheep will if properly fed and cared for. I have known of several instances where well

bred ewes have been bought in the fall of the year, and a year from that date the sales from them in wool and mutton had returned the money paid for them, and enough more to pay for their keep.

The winter care of sheep takes very little time and can be done at a time which will not interfere with the care of other stock. It might also be said of the sheep that they require but very little grain to finish them for market, as compared with the steer or hog, as their growth and gains are made principally off the pastures, and lastly they are said to have a golden hoof, which means in part that but little fertility will ever be sold from the sheep pastures.

The Breed for Wisconsin.

I have been asked many times this winter what breed of sheep I would recommend for Wisconsin farmers. My answer would invariably be that they should be native ewes crossed with a sire of any of the mutton breeds; native, for the reason that they are the product of Wisconsin conditions, climate, feeds and pastures. They are in a way the "survival of the fittest," and I think the best of our flocks have for the most part been reserved. My experience along this line has been very satisfactory. A number of years ago we had a flock of sheep, from two to three hundred in number, of mixed breeding, a little of everything and not much of anything, but the largest percentage was of merino blood. They were not satisfactory either as mutton or wool producers, and we concluded to change our system and breed for mutton. We culled the flock, reserving about a hundred of the best ewes, selecting as even a flock as we could, seeing that they were healthy, with full mouths, sound udders, and well woolled. Obtaining a sire of one of the mutton breeds, and reserving ewe lambs from that cross, we continued doing so year after year, until at the present time we have a flock of sheep which I think are near-

ly the equal of the pure breeds of that breed for mutton or wool production.

Breed of Sire.

Then comes the question as to what breed should the sire be. This is a matter of fancy to a great extent, but still I think every farmer should study the history of the different breeds, where they originated, under what conditions, and on what feed or pastures they were developed. Then

the bottom lands. I think, if the farmers would pay more attention to this, there would be less complaint about some of the mutton breeds than there is at present.

Selecting the Sire.

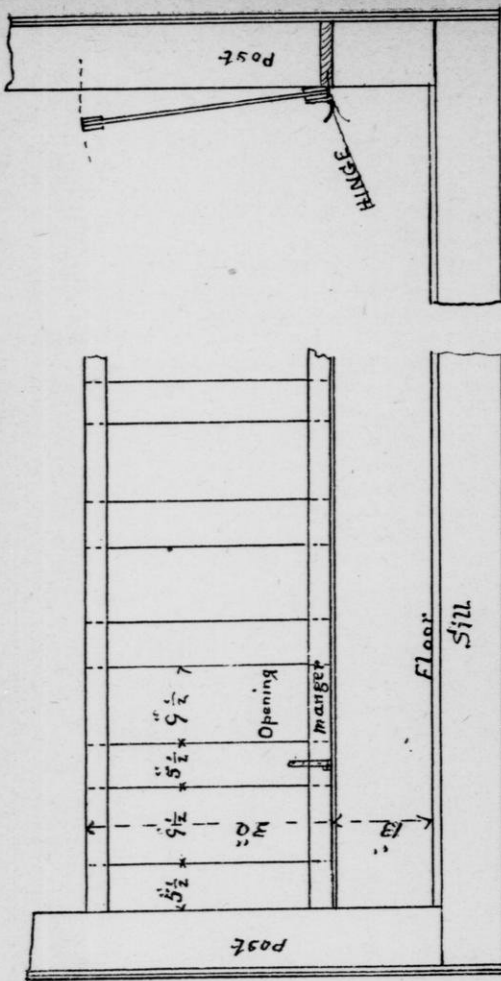
In selecting a ram there are several points we must look for. First, he must be a pure bred, for the reason that the lambs got by a pure bred sire will be alike in form, face and fleece,



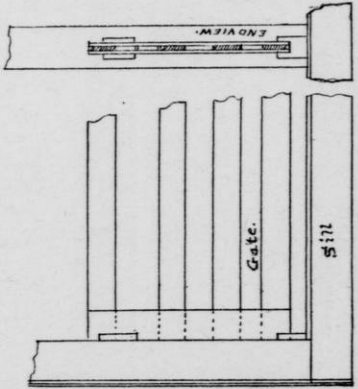
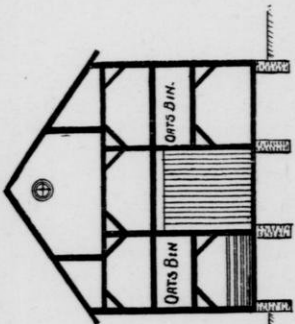
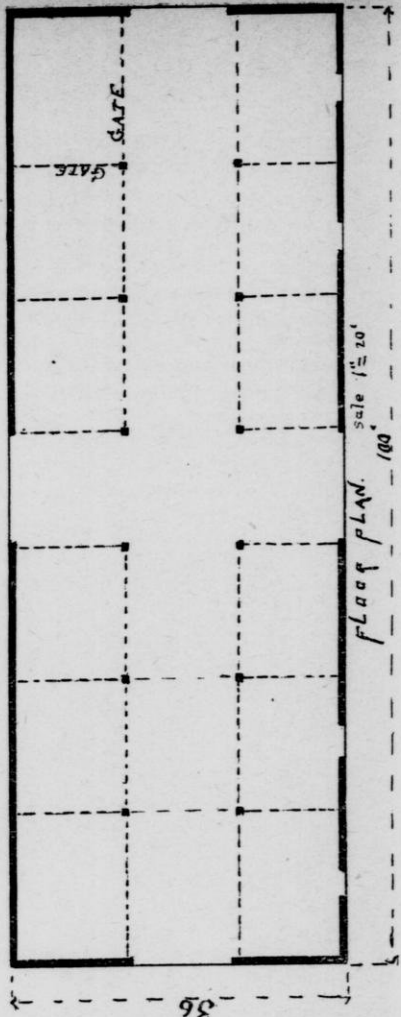
CLOSS BROS.' SHEEP BARN.

he would have an idea as to what breed would be most suitable for his farm, as I think all the breeds to be at their best should as nearly as possible have the same care and feed as they have been accustomed to, and he should not let his fancy fly away with his judgment. What I mean is that he should not buy a Lincoln, Cotswold, or Oxford, and expect them to thrive on the thin short pastures of the hill-sides, or expect the Southdown to do well on the rank, coarse pastures of

and will sell for fifty cents a hundred more than a mixed lot such as the get of a grade ram. I prefer a two year old, for the reason that he has matured at that age, and I know what I am buying; medium sized for the breed, and as even as possible in form. An even excellence is far preferable to size or weight. He should be well covered with wool of an even texture and length. To a certain extent the wool is an indication of the breeding quality. The more



SECTION SHOWING FRONT AND END OF MANGER SCALE 1/2"=1'



PLANS OF CLOSS BROS. SHEEP BARN.

even the wool the more true he is to type. He should be of strong, vigorous constitution. This can be told to a certain extent by the bold, bright, intelligent eye, the proud, springy carriage, and by the handling.

Care of the Flock.

During the summer the flock needs but little care and attention but it is best to take a walk through the pastures every morning, so as to see that everything is all right. There are two things which aside from the pastures I think are indispensable to sheep during the summer, and these are pure water and shade. We furnish them plenty of salt within reach at all times. We formerly used to mix ashes with the salt, but this last summer we have used Sumner's Worm Powders.

About August we wean the lambs, taking them away from the ewes and putting them in pasture that has some green, succulent feed on it. We watch the ewes for a few days to see that they are all right. Then we mark out what we are going to sell, saving for our own use the pick of the flock, putting some label or mark on every individual ewe. After the lambs are weaned, the ewes should be made to gain on fair pasture. This is the best time to have the ewes in good condition, and I think it is as important to have the ewe in strong condition at breeding time, as the ram. After they are bred, we aim to keep them in normal condition; we do not try to make them gain and we do not let them run down. I prefer to do winter feeding in a good sized yard, and I prefer to feed in racks with tight bottoms, so there shall be no waste.

Feeding the Flock.

Now, as to feeds. It is not a question of what to feed as much as how. I have fed almost all kinds of feed that is grown on the farm; I like to feed a variety and to feed in rotation, especially the coarse feeds, and not to feed any two feeds alike, even

during the day. For instance, feed them hay in the morning, corn fodder at noon and a different kind of hay or straw at night. I would never attempt to winter them without some grain, and I use corn as a grain ration for the first two months, then I withhold the corn gradually and feed bran, oats and peas, until the lambing season. During the lambing season they must have constant care.

As I said before, we turn the lambs into a field with some succulent feed on it; we mark out the wether lambs, the ones we are going to sell, and we begin to feed a little grain, oats and peas—very little at first; gradually increasing. I formerly tried feeding winter lambs, but I found it far cheaper to make the gains on the fall pasture, and sell when we consider we have a fair price, which is generally September or October, and I find no trouble in having lambs up to 80 or 90 pounds at this time—spring lambs. There is another point about these lambs. They should be as even as possible as to size and color, before you offer them for sale. If there are any small lambs in the flock, it will be wise to keep them over and sell them to the butcher. I did that this year, culled them, and sold those of the same size as near as I could make them, and I think I obtained from sixty cents to a dollar more than for the mixed lambs that were sold the same day.

We continue to feed the ewe lambs, keeping in view our object, which is to have them come from grass to dry feed gradually, so there will be no set-back, and we continue feeding them some grain during the winter. We want to get as good growth as possible into those lambs, as they are the future flock. We aim to have them matured at a year and a half.

DISCUSSION.

Question—When do you prefer to have your lambs come.

Mr. Closs—In March and April, for

several reasons. First, I like to have the ewes bred on pasture and kept up. It is a great mistake to have the ewes come into the yards in poor condition and then come into breeding in low condition.

Mr. Lovejoy—What is the matter with February lambs?

Mr. Closs—They will be all right if they come in in good condition. I have thought that there was some loss, it was too long a time to feed from February.

Mr. Lovejoy—We had seventy-one lambs dropped last week and they were strong as an April or March lamb.

Mr. Closs—I have found it hard to continue the milk flow for two or three months, beginning as early as February, while, beginning in March or April they are soon put on grass and that helps.

Supt. McKerrow—Mr. Lovejoy lives south of here, while Mr. Closs lives a good many miles north; grass comes a good deal earlier with Mr. Lovejoy than it does a hundred and twenty miles north of there.

A Member—Did you ever trouble yourself to raise a lamb on the bottle?

Mr. Closs—Yes, I do quite often, but it is necessary to mix a little common molasses with the milk, if you are going to do it.

Mr. Sayre—Do I understand you that the October and November price is better than the January price for lambs?

Mr. Closs—No, not always, but I claim I get better results for my feed, by feeding on pastures. Of course, I cannot get quite as much weight but the October and November market does not require very heavy lambs.

Mr. Sayre—What did your lambs average last fall?

Mr. Closs—Eighty-five pounds in the latter part of September. The year before it was ninety-five pounds. I sold them for five cents a pound last fall.

A Member—The gentleman says that he fed oats, peas, and bran. What proportion and how much?

Mr. Closs—Well, I sow about a peck of peas to the acre, to nearly two bushels of oats, and of that I feed about a quart a head, I should say.

The Member—We feed sugar beets and like them very much.

Mr. Convey—Mr. Closs, what do your sheep average per head, those you winter over—the profit on sales?

Mr. Closs—I suppose you want to get the exact figures. My sales through the year amounted to \$600, and I have twenty more ewes and twenty more young lambs than I had a year ago. I think I wintered over 160 sheep, and I have 200 now.

Supt. McKerrow—What are those 40 sheep worth?

Mr. Closs—I wouldn't sell them for \$200.

Supt. McKerrow—That makes about \$800.

Mr. Everett—I wish we might have Mr. Lovejoy's sheep record.

Mr. Lovejoy—I have no sheep record, particularly. I had a sheep down here at the Institute five years ago last October. I had thirty-five grade ewes, worth \$125. I paid \$50 for a ram; that is \$220. Up to this January 1st, I had sold \$973 from that investment and have 150 ewes on hand which are worth five dollars a head today, anywhere. That would make nearly \$1,900 for my feed and care.

Mr. Everett—I thought you were a hog man. What are you doing with sheep?

Mr. Lovejoy—There is no reason because a man is a sheep man that he shouldn't have a little horse sense. I keep them separate.

Mr. Everett—Isn't it a mistake to allow your sheep to run down in condition just in the fall?

Mr. Lovejoy—Yes, that is the time I aim to make them gain.

Mr. Scott—How do you label or mark your lambs, Mr. Closs?

Mr. Closs—I use the Dana ear tag. It has a number and a name on it.

Mr. Scott—When do you shear?

Mr. Closs—I shear in May.

Mr. Scott—When do you shear, Mr. McKerrow? We want to know what you showman do?

Supt. McKerrow—Some of the showmen have the reputation of shearing in December.

Mr. Briggs—I supposed they sheared the year around.

Supt. McKerrow—I don't know but we ought to follow up that subject of shearing show sheep. I think that no one makes anything by shearing too early as the sheep do not thrive as well. A good judge knows within a few weeks of when these sheep are shorn, and the extra wool doesn't cut any figure whatever in gaining the prize. Therefore, if we aim to feed sheep for exhibition for the good of the sheep, as well as for the good of ourselves we should not shear before the first of April, and that is a good time to shear show sheep. We gain nothing by shearing earlier where we have good judges, and we are getting better judges every year in all classes of live stock at our fairs; you cannot deceive those men, though you may deceive the public.

Mr. Scott—Have you any trouble with chronic indigestion, or the sheep running down through scours, in the fall?

Mr. Closs—I have had some, but very little; generally with late lambs. The way I accounted for that was that of late years we have had very dry weather and the grass was dry and indigestible.

Question—How much turnip seed do you sow with your oats?

Mr. Closs—What they generally sow is a pound and a half of rape seed and two ounces of turnip seed.

Mr. Chadwick—I sow a quarter of a pound of turnip seed to the acre with very good results. It furnishes a great amount of feed at very little cost.

Question—Are you troubled with ticks, Mr. Closs, and if so, what is your remedy?

Mr. Closs—I dip my lambs about ten days after shearing, in Cooper's sheep dip. While this is quite satisfactory, at the same time I think it will pay to dip the whole flock before they get into winter quarters. The cost after the first fifty cents is about a cent a head.

The Chairman—Is it not a fact that the best quality of mutton requires some root feeding in the winter time, or at least is not the meat improved?

Mr. Closs—I believe it is claimed to be.

Mr. Thorp—Every time you have sold lambs on the Chicago market, haven't you topped the market or very nearly so?

Mr. Closs—Always.

Supt. McKerrow—That would prove that Wisconsin can raise just as good lambs as any other state.

Mr. Closs—I have no trouble in topping the market with lambs, while there are few Wisconsin cattle that top the market.

Question—Are you not able to obtain a better price on lambs by having a carload?

Mr. Closs—No. I have had fifty down in Chicago, and have sold them at the top of the market, just the same.

Supt. McKerrow—It costs a little more to freight them, though.

Mr. Closs—I had ewes to finish up with at that time. I have had good results feeding yearling wethers, far better than feeding lambs.

Mr. Thorp—What do you consider the best mutton sheep in the market?

Mr. Closs—The Southdown is about the best mutton sheep in my experience. I raise the Oxford Down. I prefer them because our land is mostly level, heavy, prairie soil.

Supt. McKerrow—I thought you wouldn't get Southdowns to eighty-five pounds at that age.

Question—Wouldn't there be some margin if you should carry those lambs over until they were yearlings and put them on the market when they were, say, eighteen months old?

Mr. Closs—No, I think there is more money in selling them as lambs. You will have considerable of a flock to carry over. Of course, you would have the wool.

Question—Wouldn't that sheep weigh around 200 pounds?

Mr. Closs—Yes, but it will take considerable feed to make that weight; they would hardly sell for enough to pay for the feed. I had a carload of wethers and lambs and I only got forty cents a hundred difference.

Mr. Convey—It seems to me the question is, which mutton did you produce the cheapest, and which did you get the most money for when you sold it?

Mr. Closs—Up to a year old the mutton is made very cheap, and they are almost matured at a year old. Then after that they will cost so much more. You are feeding right along and not getting much gain. The same is true with lambs as with pork, yes, and steers.

Question—Isn't it true that the market demands sheep that are early matured?

Mr. Closs—Yes; they demand these mutton sheep; the mutton is of better quality.

Question—How do you sow rape?

Mr. Closs—I sow from three to four pounds. The best crop I ever had I manured the land in May and plowed it up. Then I kept harrowing and dragging it for a couple of weeks, until about the middle of June, when I sowed rape, four pounds to the acre, and it was a big crop. I also sow it after peas.

Question—Is it injurious to sheep to allow them to run on it after it is frozen?

Mr. Closs—I never had any. They ate it up before it was frozen.

Supt. McKerrow—We have fed off

rape to the middle of January. Of course I would be careful about letting a flock on, but the first freezings of fall and the thawing out don't injure rape very much. When I was in Canada last December at the Ontario Agricultural College, I found them feeding rape that had been frozen for three weeks. As soon as the heavy frosts came, they went in with heavy scythes and cut this frozen rape off and piled it in a pile and left it in the field. Every day they sent a team out to bring a load in, and they kept putting it in the sheep and cow and steer feeding barns. They allowed it to thaw out over night and cut it in the morning, after being thawed out, and it appeared about as fresh as it would be before it was frozen at all. The farm superintendent and stock manager said they had been doing this for three years, and it was the best and cheapest feed that they could get—better than roots. They sowed rape each year with that end in view.

Question—Can you do in this country as they do over there?

Supt. McKerrow—Yes; we are in the same latitude. They said that one year they had heavy snow and they had to shovel a way to the pile, but they thought it paid even then.

Question—Have you had experience in feeding it to breeding ewes?

Supt. McKerrow—Yes; breeding ewes are the ones that run on it in the wintertime, with me. Of course they had other feed—they only took that as a part ration.

Question—How would you recommend sowing, broadcast or in rows?

Supt. McKerrow—For a late crop for winter feed, I would recommend sowing it broadcast, because you get so much larger yield and you get it so much cheaper, but I would have that land cultivated weekly for four weeks before sowing the crop, so that all the weeds may be killed out and a good seed bed made. Then the crop grows rapidly. We have always had enough

to pay for the trouble, sowing it after barley.

Question—How would it work to sow it in the cornfield after the last cultivation?

Supt. McKerrow—It works very well in most cases. It works very well to sow it from two to five days after you sow your barley or oats. In some cases it works very well to sow it at the same time you sow your barley and oats, but in other cases in a rapidly growing season, with plenty of moisture, it starts your rape and it keeps pace with your oats and barley, and it acts as a weed in your crop; by sowing from three to five days later, the grain gets the start of it, it grows up later above your stubble and makes excellent feed, though not, of course, as good a crop as where you turn the barley land over and put it in as a second crop.

Question—Wouldn't it be in the way of harvesting your corn?

Supt. McKerrow—I never have seen a crop growing with corn that gave any special trouble in harvesting, though, of course, it was in there six or eight inches high and grew rapidly after taking the corn off.

Question—What kind of soil does it want?

Supt. McKerrow—Any soil that you can grow a good corn crop on will grow rape. The rape plant you might say is like the rutabaga or Swede turnip all gone to top. On rich land I have seen stalks three feet high and full of leaf.

A Member—We sowed ten acres of rye last August, and pastured sheep on it more or less until it froze up. We have practiced that most every fall. Two years ago I sowed five acres of rape—drilled it in, thirty inches apart. It grew to be about three feet high; we cultivated twice. We used two and a half pounds of seed to the acre, Dwarf Essex.

Supt. McKerrow—I would say do not sow anything else but Dwarf Essex, and from two and a half to

three pounds is sufficient for broadcast sowing, where you sow rape alone. Where you sow broadcast, it should grow so rank and strong that the sheep will not go into it at all.

A Member—I had a small experience feeding sheep on rye. I had a three acre plat. I sowed it early in the fall and fed it in the spring until the 10th of June. Then I took the sheep off from it and harvested 119 bushels of rye. It offered the last feed in the fall and the first in the spring. We try to make a change, go from one field to another, you can keep them in better condition, changing them all around; then, too, they get more exercise.

Mr. Chadwick—I keep about 500 sheep and I have them run together. I have them on three different pastures and change them frequently. I like it better than keeping them on the one pasture all the while.

The Chairman—What breed of sheep are those?

Mr. Chadwick—Shropshires.

Mr. Sayre—Don't you ever experience any trouble, having such a large number together?

Mr. Chadwick—I never have had so far, in fifteen years.

Question—Can you keep breeding ewes in the yard all winter and anticipate strong lambs in the spring?

Mr. Closs—Yes, I formerly used to exercise them, but I found it was unnecessary, for with proper feeding they are all right. Of course I feed several times a day so as to keep them moving in the yard, and I have a good-sized yard. It is probably 150 feet one way and 350 feet the other way, and there are 200 sheep in there. Of course, the lambs are confined to a smaller place than the ewes. I keep from forty to fifty in a flock.

Mr. Chadwick—We have one hundred ewes in a yard about 150 feet square and have no trouble, though they were not out of that yard from December 1st.

Mr. Sayre—How many times a day do you feed, Mr. Closs?

Mr. Closs—I feed coarse feed three times, and grain once; the lambs are fed twice, the ewes once. I like to feed the grain about two hours after they get their hay the first thing in the morning. While they are eating the grain, I see that they have plenty of water. In the afternoon I feed corn fodder, which has been planted quite thick and cut with a corn binder and shocked up into large shocks. When it is cured we haul it and stack it up. We run it through the cutter and we feed that in racks with a tight-bottom, and what grain there is in that

corn becomes mixed with the cut fodder. I think we have better success and there is practically no waste. We cut it because we can feed it in better shape than by scattering it over the yard.

Question—Do you add any feeding property by cutting?

Mr. Closs—No, I can't say that I do, but I consider that I save considerable.

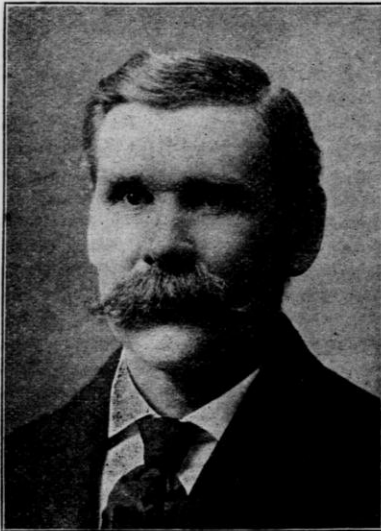
Question—What do you do for grub in the head?

Mr. Closs—I don't believe in grub in the head.

A Member—Grub in the stomach is the best thing for it.

BREEDING AND CARE OF SWINE.

GEORGE WYLIE, Leeds, Wis.



GEORGE WYLIE.

It was Artemus Ward who said "Old George Washington's forte was to not have any public man of the present day resemble him to any alarming extent," and it would seem to require a search light turned on the fraternity of breeders at the present time, to discover on whose shoulders the mantle of Thomas Bates or Amos Cruickshank has fallen. While these men were not exactly swine breeders, if it is true that breeders, like poets, are born, not made, no one will doubt but that they could have made as great a success with swine as they achieved with cattle.

At almost every cross-road now-a-days we find a breeder of some kind. It requires no great amount of skill or judgment to breed animals with mere pedigrees, if that is all that is desired, and in too many cases it seems to be the objective point most in view, but the ability to breed ani-

mals with more merit than their immediate ancestors, is a gift that few men possess. Of course none of us like to be told that we are lacking in the ability necessary for the successful breeding of swine, and in many cases bitter experience and financial loss is a more potent argument than good advice.

Pork For Profit.

There is more money in straight, legitimate pork raising than in selling your best pigs for breeders at from \$5 to \$10 each. In slang parlance a pedigree may catch a "sucker," but the run of that kind of fish among farmers is getting fewer every year. The farmer is the arbiter standing in the feed lot between the butcher's block and the breeder, and he tells the breeder what the block requires. The breeder who fails to give the farmer just what he calls for will in the end find a shrinkage in his financial receipts. For years past the farmer has asked for more bone and substance. The breeder has pointed to the show ring and said that the fine boned ones were winning.

Breeders should aim to breed the kind of hog that will make the most pork on the least food and in the shortest time. When swine are bred for mere fancy points, and when constitution and substance are lost sight of, they cease to be profitable assimilators of food. The best show sow in the herd may be a long way from being the best brood sow. A certain ranginess and roominess is necessary in a brood sow. The best show pig may have for a dam the smallest sow in the herd, but as a rule it is not safe to select breeders from that class.

Too Much Corn.

The tendency of all swine raised in the corn belt is towards fineness of bone and a general weakness of the muscular system, caused by too exclusive feeding from piggood to maturity on corn, and no matter how

carefully breeding stock may be selected, if these selections are not supplemented by proper food such as will maintain the bone and muscular system of the animal, the result will be degeneracy of the stock.

A natural tendency to fatness is necessary in the show pig, but pretty much all of our improved breeds of swine as shown in these days, have as strong a tendency to lay on flesh as it is safe to encourage in breeding animals. We can safely forego a little of the fattening tendency provided we secure in the prospective breeder, ranginess and a tendency to growth. Breeders of swine in the show ring do not study the economical side of the food question; they are out to win, fat covers a multitude of sins, and feed is no object. The same hog on what is termed "farmers' keep" might cut a sorry figure in the show ring. At the present time professional breeders of swine are striving for a close built, compact, fine boned hog, mainly because this kind can be brought to a finer finish, and on that account it is the type that is winning prizes at the fairs. Relatives of a prize winner usually find ready sale, even though they may have serious defects in conformation. The closely build, compact animal, with a new milk finish inside, and a coat of sweet oil externally, carries off the "blue" in what fashion terms a "hot ring," and the boys fall over each other in the rush to buy everything of the same strain in sight, whether good, bad, or indifferent, at fabulous prices. They usually realize in the end, however, more heart ache than profit, in the transaction. In fact, so strong has this tendency become, that with the Poland-China breed it has reached an era of wild speculation, and in the language of the Breeders' Gazette, "some one is dealing in mere brass, and fondly nursing the hope that it is fine gold." Either the judgment of many of these investors is pitifully weak, or they

are recklessly pursuing the matter simply as a game of chance, just as they might engage in a hand at "draw poker." In either case some one is bound to lose.

Pedigreed Hogs.

The history of stock breeding abounds in speculation in paper pedigrees, which have in each and every case finally landed those who were unfortunate in following it far enough squarely in the ditch; usually the daring speculator has escaped, leaving the innocent purchasers holding the bag. The worst feature of all is that such booms invariably do untold damage to the breed. They lead to the use of inferior stock bought at high prices, simply because the animal happens to be related to some other animal that has gained notoriety either in show or sale ring; they lead to neglect of patient but unbounded merit and exaltation of blue blooded inferiority, thus removing the highest incentive to the production of the best stock regardless of the whims of fashion; they discourage, in short, all progress along rational lines and disgust all men of sense.

A good pedigree is a fine thing to have provided the animal that goes with it has the individual merit to back it up, but at the present stage of advancement in swine raising, a scrub with a gild-edged pedigree, and there are such, should be worth no more than any other scrub. The ultimate end of all swine is the butcher's block, and the animal that gets there with the greatest profit to the man that feeds him is the kind that will win in the long run. Swine are so short lived, they reach maturity so quickly, and multiply so fast, that any man or set of men who attempts to "corner" any particular family or strain of blood, are simply starting a campaign of democracy that in the end will prove disastrous to all concerned.

DISCUSSION.

Mr. Everett—Tell us how to feed the brood sow during the winter months?

Mr. Wylie—I can only tell you how I handle my brood sows. In the first place we prefer to have our brood sows if they are mature, that is, yearling and two year old, go into winter quarters in rather thin condition, not poor and not fat. We want to keep them gradually gaining, clear through the period of gestation and clear up to farrowing time in the spring, when we want them in good flesh and heart. But if they are last spring pigs, we prefer to have them in good flesh all the time. We want to get as much growth on those sows as we can. In my experience, it is almost impossible to get young sows too fat for breeding purposes provided that the flesh is put on with the right kind of food, and she can run around and take plenty of exercise. Now, the feed that you give her during gestation, cuts a very important figure. If you feed them exclusively on a carbonaceous diet, such as corn, the chances are that the pigs in the spring won't amount to much. We feed them a ration that is bone and muscle forming in its character; we feed them oats, shorts and corn in about equal parts, and we feed each of those foods separately. We feed the oats the first thing in the morning, unground. In feeding those oats we spread them out thinly on a tight floor; if you feed them in a trough they will bolt their food, but if you spread them on a tight floor they pick up a few kernels at a time and they masticate more thoroughly, and it takes them a long time to eat. You know a hog's time isn't worth anything, anyway, and in picking up the oats in this way, it keeps them at work two or three hours every morning. This is more important than it seems; it gives them a certain amount of exercise, which is quite important for the brood sow. You can keep no animal in the highest vigor and health

without a certain amount of exercise. We feed the shorts, made into a slop, and feed them at noon and feed them warm. A pig's stomach is a very expensive place to warm ice water, give them about all they will eat of this warm slop. In the evening we feed the corn. In addition to all this we feed a certain amount of roots—mangel wurzels we feed—but any other kind of root will do just as well. We feed them mangels because we can raise a large crop on a small piece of ground, and we feed them not for any flesh forming qualities they possess, but for the purpose of keeping the animal's system cool. The farmers of Wisconsin do not appreciate roots as they should as a food for any kind of stock in the winter time. In addition to this our hogs have at all times free access to salt, to charcoal and wood ashes, and with this treatment we have never failed to raise litters of strong, healthy pigs.

Question—How many hogs do you generally raise in a year?

Mr. Wylie—About a hundred.

Question—What is the best care to give a sow after farrowing up to the fifteenth day?

Mr. Wylie—In the first place keep away from the sow entirely—do not bother her until she gets up of her own account and looks around for something to eat. Then give her less than half a pailful of luke warm water into which you stir a handful of shorts. This, with a small ration of roots at each feed, should be her entire ration for the first few days; you want to be very careful not to start a greater flow of milk than the pigs will take. See that she doesn't get too much to eat, especially if she is a mature brood sow, with a small litter. If it is a young sow with a large litter you can increase the feed a good deal quicker, bringing her onto full feed in a week or ten days, while a mature sow with few pigs, perhaps ought not to get to

full feed until the pigs are three or four weeks old.

Question—What is the proper age for young sows to breed?

Mr. Wylie—They should not farrow at less than a year old.

Question—What would you recommend for early pasture?

Mr. Wylie—As good an early pasture as we get is oats sown very thick and before the frost is out of the ground, at the rate of five or six bushels to the acre. Mud them in, if necessary. It comes up as thick as grass and it will last almost the entire season. It will last until some of the oats head out and the hogs will eat the oats off the top of the stalks. We always have an oat pasture. We find them very nice around the yard in spots that have been worn off the previous season. We sow the oats to prevent the weeds coming up, and without plowing, but harrowing thoroughly.

Question—Do you ever sow peas?

Mr. Wylie—Yes, with good success.

Question—Do you put rings in their noses?

Mr. Wylie—No, sir, unless it is some refractory old sow that thinks she owns the place.

Question—What do you consider a good sized litter?

Mr. Wylie—Some men would not be satisfied with twenty-five. I am satisfied with eight or ten. For a young brood sow five or six is enough. Fourteen brood sows at our place raised ninety-six pigs, a year ago.

A Member—I have a friend who wrote me that he had thirty, and they only raised a hundred last year; he is getting tired of it.

Mr. Wylie—That man doesn't know his business. His sows are lacking in constitutional vigor and substance.

Question—Do you make it a point to keep a brood sow as long as she appears to be a good breeder?

Mr. Wylie—As a rule we only keep the brood sows until we have something as good or better to take her

place. When the brood sow gets to be four years old, she is a little harder to keep up, and if she has a daughter as good as she is, or two of them, we let the old sow go.

Question—Isn't it a fact that old, heavy sows will kill their pigs?

Mr. Wylie—Not with me.

Question—Don't you find that hogs will root up your pasture if you don't ring their noses?

Mr. Wylie—If there are grubs in the pasture they will root for them and they ought to get them—it is the best thing for the pasture; but if the hog's system is kept from being feverish, they will not root enough to hurt anything. Of course, in very hot weather they will root so as to make a cool place to lie in.

Question—Do you ever feed any clover hay?

Mr. Wylie—Oh, yes, but it is not very filling.

Question—Isn't it necessary to keep some old stock in order to keep up the constitution and prevent your hogs from running out—getting too fine bone?

Mr. Wylie—There may be a point in that. A matured breeding sow raises stronger and better pigs, as a rule, and more of them at a given age.

Question—What would you advise breeding for, large frame and bone, or fine bone?

Mr. Wylie—You want a hog with plenty of constitution, plenty of substance, plenty of vitality; you don't

want a hog so fine that the constitution is all bred out of him, as some of our finer strains are, today. Our brood sows are lacking in size as compared with former years.

Question—What weight brings the best price on the market?

Mr. Wylie—About two hundred pounds.

Question—Do you think your method of feeding prevents hog cholera.

Mr. Wylie—I think it does, to a certain extent. I think that if hog cholera was in the neighborhood, it would not prevent them getting it. I know of no cure for hog cholera.

Miss Cunningham—All intelligent farmers know that the germs of hog cholera have been discovered. We also know that they are worse in the fall than at any other time of the year. We know that at that time our hogs are covered with flies, and each hog receives probably ten thousand punctures from the bites of flies, and we ought to know that these germs are continually boring into the throats and abdomens of our hogs. Now, with all these facts, is it right to say that hog cholera comes from feeding corn? Is it not from the bites of flies? Moreover, I can take a bulletin issued from Washington and prove that they come more from the bites of flies than from feeding corn.

Mr. Wylie—I am not prepared to say anything about it at the present time. We are possibly on the eve of having lots of light on this subject.

PRODUCING PORK FOR MARKET.

THOMAS CONVEY, Ridgeway, Wis.

The subject of pork making is not as thoroughly understood as it should be, although a great many points have been discovered with-

The station work has demonstrated that the lactic fermentation in milk is no detriment to its feeding value, which was a surprise to some of us.



THOS. CONVEY'S BROOD SOWS ON CLOVER.

in the past few years through the experiments of the Experiment Stations, perhaps as many at our own as at any station, though this is not classed as being a corn-producing or hog-producing region. However, many of us are very much interested in this matter, and are making an effort to keep track of such station work, and some of our pet theories have been knocked to "smithereens."

Mistaken Ideas.

For example, we have been advocating the feeding of sweet skim milk.

We have also found out that it takes from about a quarter to half as much to produce a pound of additional gain in young pigs, as where older pigs are fed. For instance, you can put a pound additional weight upon a pig already weighing from thirty-eight to fifty pounds at a cost of feed of about two and a quarter pounds, whereas, you attempt to feed a four-hundred pound hog and it takes about eight to ten pounds of feed to make one pound of additional weight. They have also discovered at the stations, that where hogs are properly sheltered, that it

takes only three-quarters of the amount of feed that is required when they are not properly sheltered, although the temperature need not be so extremely low in either case.

There are many farmers who are inclined to think that hogs can be so housed as to have the highest possible temperature without regard to ventilation, and that is very largely the cause of colds, rheumatism and lung complaints, everything of that kind. This is more particularly true of young stock than of older stock. Mr. Wylie has said that he prefers inexpensive hog-pens, but he believes, as I know, in furnishing comfortable quarters; cool, dry quarters for the older stock is all right, but for young stock you need a little warmer, and you must have dry bedding.

Profitable Feeding.

Another thing that the Experiment Station has discovered, is that there is eighteen to twenty per cent. more value in feeding grain on pasture, over feeding without pasture. You cannot depend on pasture without additional feed, but the additional feed is not in the line of profitable feeding, where you depend on slops and milk, or the by-products of the dairy. You cannot make the gain that you would realize with a moderate amount of grain. You can feed about one-third of the grain ration on grass and get about as good results as you would for the full grain ration in the winter time, but if you were to neglect to feed that grain ration on the grass, your hogs would not be in condition to go on the early market, and you will receive lower prices later.

Mixed Feeds for Hogs.

In regard to mixed feeds as compared with either single variety, the mixed feeds bring much better results. Oats is good in connection with corn, but it would be too expensive feeding to feed alone. Mixed feeds tend to promote a better appetite and better digestion of the feeds consumed.

Another feature in connection with pork making is that very many people, especially dairymen, might cure meats and put them on our local markets and do it very profitably. Farmers who will market their hogs in the fall at three cents a pound, will buy the same product from the city in some cases, at eleven to fifteen cents a pound. There is a good market which dairymen should take advantage of. The "picnic" hams that we hear about are simply shoulders trimmed down to resemble hams, and often shoulders from cull hogs.

The feeder who expects to make money feeding hogs, especially at low prices, must study the type of animal that will put on most flesh with a given amount of food. This is always with the blocky, thick-meated, low-down animal, having a good head, which indicates a good disposition. The by-products of the dairy, cheapen the cost of meat and produce a better quality, on healthier, better grown animals. A foul atmosphere around old pens in warm weather, particularly, is almost certain death to young pigs. Dusty feeding places are very injurious, and lack of sunshine for early pigs is very detrimental.

DISCUSSION.

Question—What kind of bedding do you use?

Mr. Convey—Oat straw. It is really the poorest class of straw that you can use for bedding, but that is what we have. We change it as often as is necessary; sometimes every two or three days, under certain climatic conditions, and it may last for a week and still keep dry.

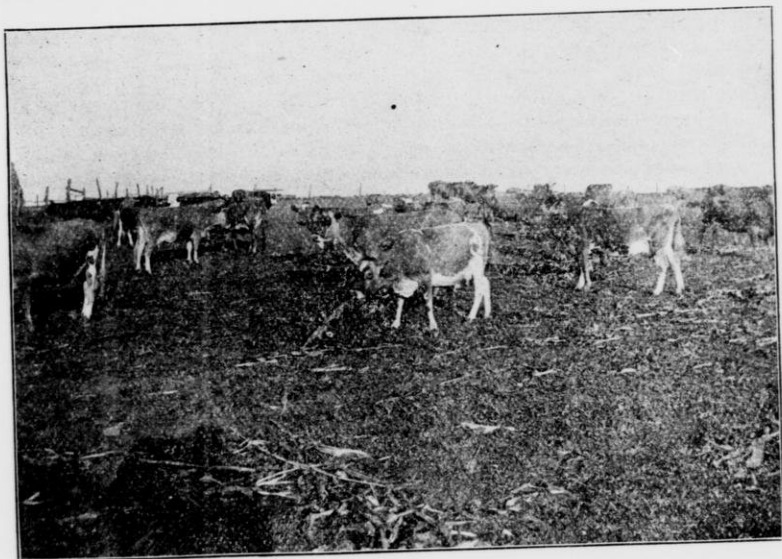
Mr. van Loon—Is it proper to feed all they can stand and digest with your good pasture, from the beginning?

Mr. Convey—As far as the thrift of the animal is concerned, it is necessary to feed liberally. As far as getting the largest returns for the grain consumed, and all other feeding, it

will give the best results. We hear a great deal of complaint about fine-boned hogs, and the proper way to use your sow for breeding purposes. It is very much the fault of the farmers that their stock is immature and they fail to feed as liberally as they should, and when they breed from immature animals, they can't expect good results. However, I have not yet come to the conclusion that you can afford to feed them to the highest limit if

Question—What is the propriety of housing hogs at eight or nine months old, in order to finish them for market?

Mr. Convey—I prefer to allow hogs at least a moderate range, but I have seen hogs that would take too much exercise. I have noticed in reports of experiments made at our Experiment Station, that where hogs were confined at the end of three months it takes about thirty-three and a third



DAIRY HERD OF THOS. CONVEY GETTING FODDER CORN.

you wish to keep them for breeding purposes. If you are keeping them for putting them on the market then, of course, liberal feeding only will give the best results. The larger the amount of feed you can get a healthy animal to consume, the greater the profit is, providing you have not developed an abnormal appetite.

Question—What kind of grain do you recommend feeding while they are on pasture?

Mr. Convey—I prefer soaked corn to any other grain. I am not afraid to feed liberally in connection with the by-products of the dairy.

per cent. more feed to produce a pound increase than it did at the beginning of the experiment; in other words, the longer they are in confinement, the poorer the results were.

Question—How would you carry out this idea of curing our own meat where we have only the common facilities of the farm?

Mr. Convey—We can handle our hogs carefully; we catch and kill them as quietly as possible, butcher just as cleanly as possible, see that the meat is chilled down to the freezing point for at least twenty-four hours; then cut up and salt, being careful to get

it in nice shape, cut regularly and smoothly in every respect, cutting the ham off with a saw instead of the ax; use preferably rock salt, though you can use good, common salt, and let it stand so that the brine will escape. At the end of the week we salt again. We always like to use granulated sugar before using salt, though brown sugar will give good results. Later in the season we dry and smoke for a short time, and if we wish to hold, we pack the hams as a rule in dry salt, being careful that the hams are dry when put away, or they will take up too much salt. We usually pack the side meat and shoulders in oats that have been run through a fanning mill and are clean. Be careful to put your meat away on a dry day, because if it is damp it will accumulate moisture and mould in the oats.

Question—Do you think you can get as good results from soaked corn and grass, as you can from corn that is first ground and then soaked?

Mr. Convey—Where experiments have been conducted, the additional advantage obtained from grinding, would scarcely pay for the grinding. We soak our corn twelve hours and get very good results.

A Member—I have tried both ways and have thought that I got far better gain from the ground, soaked corn, than the expense of grinding came to.

Prof. Henry—Mr. Convey has accurately stated the results of our Station work up to date in regard to the value of ground corn. We have completed our third season's work at Madison, but the results are not worked out yet on that point. So far as we have gone we saved eight per cent. by grinding the corn, and when corn is worth twenty-five or thirty cents a bushel that saving does not pay for the trouble of grinding. If the corn was worth fifty cents a bushel, it would pay. Our work is practically backed up by work at some three other stations, but still we feel that we have not done enough work yet to get

an average from. I think it is pretty largely a matter of the condition of the corn. If the corn is old and dried out thoroughly in the crib, I think such corn will not do nearly so well for the hogs as corn that is fed shortly after it is cut, and that has more moisture in it. Hard corn often injures the hogs' mouths, and they do not eat a whole ration. In that case there may be as much as twenty-five or thirty per cent. of loss, but we have no data on that point. We fed with old corn.

Mr. Wylie—Have you fed along the line of soaked corn?

Prof. Henry—No. but experiments in Iowa and Kansas with soaked corn, if I recollect rightly, showed that the soaking was about equal to grinding.

Question—Can you tell us, Mr. Convey, what difference you would make between sweet whey and fresh skim milk?

Mr. Convey—At our own Experiment Station and at others, they have come to the conclusion that whey represents about one-half of the value of skim milk; buttermilk represents about the same value as skim milk.

Question—What would you do to prevent swine from destroying their pigs at farrowing time, being in a feverish condition.

Mr. Wylie—The main thing is to see that the sow's system is kept cool by feeding cool roots and so on, that is about all there is to do.

Question—Will you explain your farrowing pens, Mr. Wylie?

Mr. Wylie—I have two farrowing pens; they are peculiarly built, and it is absolutely impossible for a mature sow to lie on the pigs. We have used the two for four years, and have never lost a pig in those pens, by being overlaid. There is a place on the floor that is hollowed out, in which the sow's body will just fit. She can only lie in one position in that pen. The principle of it is that the animal will never lie with her back down—she may lie with her head in either direction, but

always with her back uphill. There is a space at the lower side and a rail that the pigs can get under and are always in safety. The brood sow may get up and turn around, but she cannot lie on the pigs. There is a patent on it.

Question—How shall we keep down the fever at farrowing time if we don't have roots?

Mr. Wylie—You have got to have roots. In the absence of roots or anything of a laxative nature, the best thing you can do is to feed castor oil.

Supt. McKerrow—I think it would be better to feed middlings and a very little oil meal.

A Member—I have been cooking feed for my hogs about two years, and it saves me going to the mill. I cook everything. In the first place I put in two or three baskets of mangels. Then two bushel baskets of oats and a bushel and a half of rye, then two baskets of clover, and I cook that all up together and feed it to the hogs with ear corn, and I believe it is a good thing in the winter, and I don't have to cut my feed. I want to ask what the effect would be if you fed just corn and cold water to your sows.

Mr. Wylie—The tendency would be towards feverishness and drying up the milk.

The Member—I have seen my grandfather feed nothing but cold water and corn.

Mr. Convey—We had different hogs in those days.

Question—How many hours would you soak shelled corn in warm weather?

Mr. Wylie—Soak it until it is soft—twelve to twenty-four hours.

Mr. Convey—I have cooked feed for hogs for twenty-five years and I found it was lots of labor, and I got better results by feeding the grain uncooked—whole grain—than I did from whole grain cooked. Of course, warm food is good; potatoes should be cooked, but where you attempt to feed all cooked food, you will have your labor

for your profit, and that is all the profit there is in it. Warm food, as I say, is all right, and it helps in the digestibility, but don't depend upon it altogether. My attention has been called to this by the work of our own Station and that of others, and my practice in handling feed is right along in the same line. We have winter roots and we cook them, the same as we do for our own table. We bring them to a boil and let them stand over until morning and feed them as a swill twice a day. Where you feed once a day you are apt to overfeed, especially with pigs.

Mr. Lovejoy—We feed our sugar beets whole, but we feed corn, oats and shorts fed together in a thick mush. We have never cooked the beets.

Mr. Convey—I consider roots among the best feed I have, but they must be very moderately fed, particularly to young stock.

Mr. Arnold—There is very much said about cleanliness among our farm animals, except pigs. I want to call attention to the fact that we never can have cleanliness with swine if we have their sleeping place connected with the feeding floor. We ought to always insist upon having our bedroom several rods from the feeding floor, and in this way we can keep the feeding floor clean. Another thing, many of us are feeding in V-shaped troughs, which should never be, in my opinion. When we cannot feed upon a clean feeding floor, we may feed in a flat-bottomed trough. With a great many there is a chute, the swill is poured in, and the large hogs get the most of it. This should not be; we should fill the trough before the hogs are allowed in, and to do this a swinging partition should be placed perpendicularly over the side of the trough on which the hogs are feeding. Then after they are filled, swing the partition away from them; then the partition hangs diagonally over the trough and the hogs cannot get into it.

Question—How would you do if you fed one hundred or a hundred and twenty hogs out of doors, and they were in different lots?

Mr. Arnold—The sleeping quarters should be seven or eight rods from the feeding quarters. There is no use of a hog pen except for sleeping quarters. I have fed two hundred hogs for three years; I had a tank and I had a chute coming in, so they came up on either side.

Question—Does cooking the whole grain make it lose any of its feeding value?

Mr. Convey—The presumption is that the protein part of the food partakes very much of the character of the boiled egg that is boiled excessively—it is not so digestible. Then, in cooking you dilute the food too much; there is too much water contained in it, in connection with the dry matter.

Question—How long will a hog do well on an exclusive corn diet, heavy feeding?

Prof. Henry—Mr. Chairman, I feel that I can answer that question, for we have kept hogs repeatedly at the University, starting with pigs shortly after weaning and feeding them exclusively upon corn with water. They did very well at first, gaining up to a hundred pounds pretty fairly. It is a surprise how long they can survive upon corn alone, but after they were about half grown, we found that they were deformed, they had not developed any frame work. They had grown in weight, but it was fat, and we found that their bones, after we killed them, were very weak—they would break at about half the strength of pigs standing beside them, which had received ashes in addition—the ashes about doubled the strength of those pigs' bones. When we fed bone meal to the pigs, they were a little stronger than when we fed ashes, but not much. The pigs which received corn only, were so fat that their jowls nearly rubbed the ground and their bellies nearly

touched the ground, although the Poland-Chinas would not stand more than twelve or fourteen inches high; the corn brought about this deformity. I believe if we had fed those pigs upon wheat alone, or barley alone, that we would have had a good deal better results than with corn, but we would still have a pig which would be far from normal, either a Poland or a Berkshire. I think if a human being were kept on wheat flour alone, or on meat alone, or any one single article of diet, you would find that the person would suffer in a short time, a craving for other food. These pigs had a craving for wood ashes, and they ate the wood off their troughs. I could give you no experience with mature hogs kept only upon corn. I can say that when we fattened hogs, keeping them upon corn and ashes, we found at the end of twelve weeks that it took thirty-three per cent. more feed to make a pound of gain.

Question—Can you give us the value of skim milk fed in connection with other feed to hogs?

Prof. Henry—We have conducted nineteen experiments with skim milk, fed in various quantities, alone, and with corn meal. Our results show that five pounds of skim milk equals one pound of corn meal, or five hundred pounds of skim milk equal one hundred pounds of corn meal. We fed corn separately and got one hundred pounds of pork from five hundred pounds of corn. Then we mixed the corn and milk together, a thousand pounds of milk fed with a certain amount of corn, and found that it would make a certain amount of pork. You must have a combination. It would take sixteen hundred pounds of skim milk alone.

Question—Is the skim milk sweet or sour?

Prof. Henry—We generally have it sweet, but a number of Experiment Stations give the results reported by Mr. Convey, the general result being in favor of feeding the milk somewhat

sour. We fed the milk and the corn meal together.

Question—How would it do to feed the corn and then the milk?

Prof. Henry—That would be all right. It is a matter of comfort and convenience. If the two get together in the stomach, I suppose there is not much difference. It is certainly a waste to feed skim milk alone.

Mr. Convey—The souring referred to was lactic souring and not putrified, decayed milk; that would not do at all.

Prof. Henry—I hope no farmer will go home and say that rotten milk is as good as wholesome milk. We refer to milk that is slightly acid, about what the milk in our factories would be, the acid that we like in butter-milk that seems to be advantageous to the growing pig.

Question—Have you ever tested the value of whole, sweet milk? Occasionally in warm weather the question

arises whether the farmer can afford to send his milk to the creamery.

Prof. Henry—There has been a little work done in Europe in feeding whole milk to pigs, where milk was fed alone to the pigs, and it took about eleven hundred pounds of whole milk to make one hundred pounds of pork, but it would have been much better had it been fed in connection with corn. I know of no such experiment. Generally the farmer had better let the fat go to the creamery and feed the skim milk, because a pound of fat in the milk is worth ten cents under almost all circumstances, and that pound of fat can be replaced to the pig with corn, which furnishes starch and some fat at a much less price. There might be times when we could feed it profitably to breeding or exhibition stock, but generally, as a matter of profit, it would be wiser to feed skim milk.

The Institute adjourned to 7:30 p. m.

EVENING SESSION.

The Institute met at 7:30 p. m. Music, orchestra from blind institute.

DOES FARMING TEND TO ELEVATE MANKIND EQUAL TO OTHER OCCUPATIONS?

MRS. H. A. BRIGGS, Elkhorn, Wis.



MRS. H. A. BRIGGS.

It is important in any occupation that the person engaged in it should be fond of his profession, in order to develop the most and best in himself or his business. I firmly believe a person may engage in a business that is not pleasing, and from principle conscientiously do his best, and thus exalt his business and bring honor to himself, but not in so great a degree as he can if he loves his work.

A Broad Business.

In looking at this question of farming in comparison with other occupations, it seems to me you will find it difficult to think of any business or profession that is so broad as farming. Whoever turns his attention to farming is anxious to get the largest possible returns from his labors, therefore, finds it necessary to know something of the nature of his soil, and for that reason will find it very desirable to study the chemical qualities of his farm, and what grains and grasses are particularly adapted to it. If the land is rather low, and a little sour, what will sweeten it; if the water seems to stand on it, what is the subsoil, and what is the easiest and best method of draining it; if the soil is a trifle light, what will deepen it; if inclined to be annoyed with drouth, what will tend to cause it to absorb and retain moisture.

Reading for the Farmer.

A farmer also finds it important to read the best agricultural papers within his reach, to learn the views and experiences of others. His reading can not be profitably confined to the agricultural papers, for when the harvests are gathered in he is anxious to dispose of his surplus, and he wants to know what present prices and what future prospects are. How is the supply throughout the country, and indeed the world over. What are

they doing abroad, will they require this surplus, and at what figures. If there is a scarcity in one part while we have an abundance and still cannot afford to send it there on account of the expense of transportation, what is the matter, and how is it to be remedied. This brings us right into the field of commerce and politics, and ere he is aware of it, the farmer, as he harvests his grain, is deep in the problem of free trade or protection, tariff high or low, which shall it be, and he settles down in the evening to the study of political papers and the views of statesmen, and watches what is being done in congress. Very soon the weekly paper is altogether too slow for him, so you find the daily on the sitting room table, and to a certain extent he has rural daily delivery, for the children bring the mail in the afternoon, when they come home from the village school.

Do you remember what Governor Hoard said in a speech he made in Milwaukee in 1883? An acquaintance of his from Louisiana was visiting him, and after spending a few days in riding about and seeing the country and meeting the people, and seeing the papers and books in the homes of farmers, he told Gov. Hoard that he could understand how the people of the north voted so intelligently. The farmer does not sit down alone in the evening with his paper, but frequently his employees gather around the table with paper or book, and are fitting themselves to be intelligent citizens.

Must Use His Head.

In many kinds of trades after they are thoroughly learned, they become very mechanical, almost a matter of habit; one goes on doing the same thing every day, and it becomes even more so from year to year on account of the perfect machinery and because of the large manufactories where one person does just one class of work, but does not learn the business in its

completeness. A mechanic not far from my home stated that in a few years it would be difficult to find a blacksmith who knows all the parts of his trade as formerly. Now the shoes are made in factories, also the nails. The same may be said in regard to the carpenter's and other trades. Formerly the carpenter had to plane the lumber he used; not so very many years ago he had to make the doors and casings, and window sash, and it was the work of the painter to set the glass. Now all that is changed. Possibly you think that work on the farm has changed, too,—that much more machinery is used now than in olden times. That is so, but it does not cause the farmer any less thought, but necessitates his knowing more, for he ought to have some knowledge of mechanic arts, and indeed, in some instances the skill of an engineer to use the implements properly.

The trades are more narrow in their range than farming. Tradesmen may have more leisure for mental improvement, but they live in villages or cities, and when the work is finished, in many instances they get together in little cliques, and pass the time unprofitably. Farmers live more isolated, we often think too much so and frequently think they have not enough of the society of their neighbors and friends, but in lieu of that they form the acquaintance of authors, and spend more time in reading on subjects pertaining strictly to their own business, and from that to more general literature.

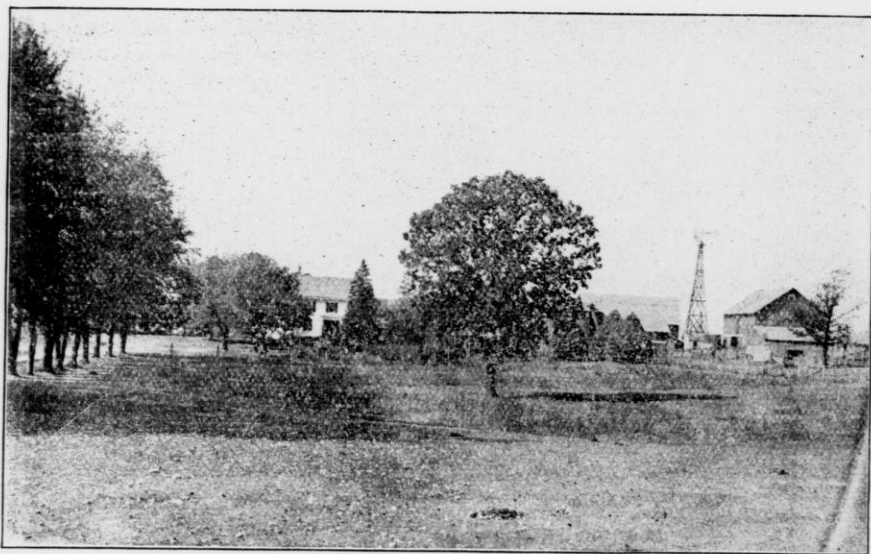
Energy-Alertness.

Farming is a business that requires people to think for themselves, and often to think quickly and come to immediate conclusions; such experiences always develop people. Although General Banks had such a complete military education, still he was forced to yield to a Wisconsin lumberman to take his army down the river. That lumberman had had

to think and devise expedients to get along, in his own experiences in the woods and with his rafts. These experiences had made him broader; he had made these discoveries, perhaps there was nothing new in them, but they were new to him, and he had thought them out himself. It is very probable that no one is in circumstances where he has to think for himself more frequently than the farmer. It is told of an eminent lawyer, that when he had a difficult case

"But, Mousie, thou art no thy lane,
In proving foresight may be vain;
'The best laid schemes o' mice and men
Gang aft a-gley.
And lea'e us nough' but grief and pain,
For promised joy.

Still thou art blest, compar'd wi' me!
The present only toucheth thee;
But, ach! I backward cast my e'e,
On prospects drear;
And forward, tho' I canna' see,
I guess and fear."



FARM HOME OF MR. AND MRS. H. A. BRIGGS.

to work out, he took his fishing tackle and went to the creek by himself to study; if the fish bit too readily and distracted his mind from his study, he moved to another spot where he would not be so disturbed. How many knotty problems and profound questions has the farmer settled as he milked his cows or foddered his stock, and how many little poetical gems did Burns evolve from the common-place, every-day work on the farm.

Again, many of us like to think and have our own individuality, but our business is such that we fear to express our real views against public opinion, for so many are dependent upon the public patronage that their living is at stake. The farmer is less bound in that respect than many others.

A Good Influence.

One thing that tends to elevate the farmer is his communion with nature. As he turns the sod in long smooth

furrows, smells the fresh earth, and breathes the pure air, hears the birds sing and sees the herds close by as they select the grass they prefer or lay in the sun or shade as suits them best, with their peaceful contented faces, or sees the young playing around their mothers or by themselves, who can dwell amid such surroundings and not be a better man for it. Or as you attend to your work and look up at the sky, to see the clouds and read in them the promises of rain or sunshine, or watch the ever changing wind, who is not led to think of the over-ruling Hand who says "Ye hear the wind, but ye cannot tell whence it cometh or whither it goeth." If we have a fondness for looking upward, we can soon find a little time for astronomy, and an outing, some moonlight week, down to the Yerkes Observatory, where even those who devote their whole time, for years, to that one department of science, are constantly finding something new in it.

Ideal Home Life.

This living near to nature should and does make us purer and better, and the better and more upright we are as individuals, the better and more upright we are as citizens, and the better citizens we are the better the nation. It seems to me that in the agricultural districts we see the American life at its best. The father is with his family; the family are one in thought and aspirations; the Lord has granted them the prayer

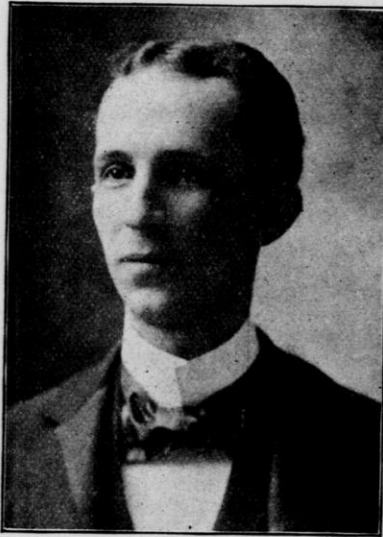
of Agur, "Give me neither poverty nor riches, feed me with food convenient for me." You find them in their own homes, on their own farms, surrounded by the comforts and even the luxuries of life, free from the vexations, envyings and jealousies of the very rich, who either are so worried and burdened with the accumulating and investing their immense estates, or give so much time to society and pleasure, that they have no time for mental improvement.

Let no one think for a moment that he is of no account, he is only a farmer, it may be with a very small farm. He is a part of this great nation, and many of the leading men of the nation, from Washington to the present day, were reared on a farm. It is a conceded fact that the leading men of our cities are from the farm, and that the city would degenerate rapidly, unless they were reinforced from the pure, strong, intelligent country blood. Let each of us go to our homes with fresh courage and enthusiasm, and strive anew to make our home a veritable Paradise, remembering that the most beautiful place our Heavenly Father could create for our ancestors was the Garden of Eden.

"This Paradise I give thee! Count it thine to till and keep.
Not only these fair bounds, but all the earth
To thee, and to thy race I give;
As Lords possess it."

EDUCATION.

PROF. ROBT. RIENOW, Brodhead, Wis.



ROBT. RIENOW.

From the very nature of my subject and the limited time at my disposal it is necessary that I should throw aside all preliminaries and come at once to the point under discussion.

A few weeks ago while listening to the discussions at one of your Institutes the question was raised as to whether the average farmer was capable of properly handling a Babcock milk tester. In answer, a gentleman, himself a farmer, suggested the necessity of farmers becoming better educated to the use of modern farm implements. These with other sentiments expressed seemed to indicate clearly that there does exist a necessity for more complete and to some extent a technical education on the part of the farmer. And so as you have stood here to discuss the

problems of your farms; your dairy and stock interests; I take the liberty of pleading the cause of the rising generation of young farmers for a better and more complete system of rural education.

What is Education?

It would be difficult to find in all the vocabularies of the human family a more misunderstood, mis-applied, abused term than our word "education." It has been applied to everything from the training of a colt to the training of a child; from the learning of his primer lesson to the receiving of his diploma. We hear such expression as: "I want my boy to get a fair education" "John is going to college to finish his education" as though it was something to be poured into their life, as though they were to receive something into that shadowy vague receptacle called in common terms "the brain." Pupils complete their course of study and receive their diploma. They place the hard earned prize in the hands of admiring parents, perhaps it is framed and hung upon the home walls, school books are packed away, school work is forgotten, they have "completed their education" and are ready for life. In some pupils this vehicle of the mind receives its allotted load of knowledge much earlier in life and they are allowed to complete their education from the eighth grade or district school. Or a parent says "I don't care to have Willie study this or that; it will be of no practical use to him in his work." Another says "My boy doesn't need any 'education,' I got along without any and I guess he can." These, I think, I may truthfully and without exaggeration say,

are all popular ideas concerning education. Schools have in many instances come to be looked upon as hot houses for artificial cultivation of fanciful and dream-like theories, and professors and teachers as skillful and theoretical cultivators and pruners, guiding the young idea along the flowery path of artificial knowledge.

In the face of such ideas I am not surprised that the farmer often doubts the advisability of expending any more than he is absolutely forced to upon his rural schools. In such a case there is one duty very clear. It is his business to inform himself upon the educational needs of his children and then see that they are supplied at any cost. To do this it is necessary that we know exactly what to demand of a teacher when we call upon him to educate children.

Why We Educate.

Locke, the English philosopher, seems to me to come very near the complete truth when he said "The business of education is not, as I think, to perfect the learner in any of the sciences, but to give his mind that freedom and disposition, and those habits, which may enable him to attain every part of knowledge himself." We see clearly that our higher form work in grammar and high school, our attention to the classics, to mathematics, to grammar, geography and to the sciences are not for the purpose of pouring into his absorbing brain material and knowledge to be drawn from at will during his life, not to supply him with stock in trade which we hope will be of value to him some time, some place in his after life. Rather are we interested in so training that mind that it will do its own work, in so cultivating those faculties that they may carry on their own education, in establishing there such power as will enable him to apply them to whatever task he may be called upon to perform, to use them in whatsoever condition he may find himself, whether as a mechanic, a pro-

fessional man, or farmer, to make it possible for him to place himself in perfect harmony with his surroundings whatever they may be. By education in its full complete sense, then, we mean to train, to enlarge, to invigorate the man in all his parts; to make him an instrument for service not a mere receptacle of knowledge. But when thus broadened, we find ourselves unable to confine it to the intellect alone; it is no longer bounded by the covers of books, it must and does include the complete mental, moral and physical development of the person. It is as necessary to the day laborer as to the college professor, to the mechanic as to the lawyer, to the business man and farmer as to the professional man, to the girl and woman as to the boy and man. It must apply to all alike. It is a power that should be within the reach of all, should to some extent be required of all. There must be no aristocracy of brains. The end and aim of life must be to bring into fullest play all the possibilities in every individual, regardless of his condition of life. The development of a man mentally, morally and physically must be full, perfect and symmetrical if we would have all the possibilities of that man. Nothing less than this must be the ideal of education.

Our Common Schools.

And now we naturally ask, What means have been placed at the disposal of our people for acquiring this power? And our answer is clear and plain, The common school system. How vain to talk of universal education without a universal means of education! America of all nations seems to have realized this fact most completely. The desire was born with our nation. As Chapin has said "If we ask whence springs this giant republic we must look back to that stern and manly people, the Pilgrims, who laid there, on the rock bound coast of New England, that founda-

tion for free thought, free speech and free schools." Side by side with the simple log meeting house rose the little village school. Westward the march of civilization journeyed and with it on the prairies of Illinois, Iowa and Wisconsin appeared the little log school house. The golden gate was reached and as the burnished rays of the setting sun poured out upon the calm Pacific they saw a journey ended, the drama closed, the march completed and with it had gone the school teacher and the "little red school house." I cannot exaggerate its importance, I cannot over estimate its value. Edward Everet has said "It is our common schools which give the key of knowledge to the mass of our people. Our common schools are important in the same way as the common air, the common sunshine, the common rain, invaluable for their commonness."

State Education is State Preservation.

But at this point a most important question confronts us. How far is the state interested in education? The question as to whether the state has any interest in the education of its citizens has become such a truism in this day that its discussion is unnecessary. Time and experience have most faithfully demonstrated this fact. But the question as to how far the state may be asked to educate is as yet an unsolved problem. There is one duty the state must not shirk, one ideal it must never lose sight of, that in some form, to some extent all its citizens must be provided with an education. Why you ask is this necessary? Is it for sweet charity's sake? Is it to give culture and polish to a certain proportion of its citizens? We know this is not its purpose. The underlying principle of state education is state preservation. Self preservation is said to be the first law of nature; so is it with the state. Above all is this true of a republican state, for popular government must rest

upon the firm foundation of popular education. With us, our only sovereign is the people's will, our only law the people's desire, our only aim the people's welfare. To this extent then is the state responsible to its citizens that their will shall be righteous, just and intelligent; that their desire shall be elevating, noble, and pure, that their welfare be such as is becoming to a Christian nation, and an advanced civilization. True it is, our forefathers in laying the foundation of popular education "builded better than they knew." But they had seen the results of ignorance. They had seen the spirit of liberty crushed by its blasting influence. They had seen a people robbed of the sweetest privileges of freedom for not knowing how to care for them. From struggling France came the cry "O Liberty, Liberty, what crimes are committed in thy name" and we may add "when ignorance is thy guide." In the light of experience we are justified in saying that an intelligent vote, an intelligent public opinion is the only safeguard to the republican institutions of America. The supplying of that intelligence is the interest, nay more, the absolute duty of the American state. The preservation of our institutions depends upon it; the welfare of the future demands it. These truths are self evident; they have never been contradicted, they cannot be, they are tacitly accepted by all with a nod and a smile, yet notwithstanding this, we find many communities much more disposed to talk of education in general than to enter patiently and minutely into its principles and methods; more disposed to laud it than labor and pay for it.

The Duty of the State.

Not for one moment losing sight of the ideals of education, let us confine ourselves to what seem the necessities to every individual. Let us first lay down this principle, a public school system, supported by public money can justly aim only at public

ends. Its first interest lies with the masses of the people. Its first duty is to raise the majority of its citizens to a necessary standard before giving a few luxuries. I believe every individual, mentally and physically sound, may justly demand the right and power of honest self support; the ability to use the governing power intelligently, and to be given the advantage of such moral surroundings and influence that if after he reaches maturity, he chooses to do wrong it is with open eyes and not in ignorance.

The Elementary Schools.

Let us take these up in their order. How far may we ask the State to go in supplying the necessities of honest self support? Understand that in this I refer only to the preparation for some work, not the providing of such work, nor do I refer to the preparation necessary to professional or expert training, but simply of placing within the reach of the great mass of our rising generations means for living a satisfactory and useful life. To this end we cannot look to our universities or colleges or normal schools nor even our academies, whatever is given must be through the medium of our common schools. It is only with many reservations that I would even include our high schools as part of this preparatory work. It has been estimated that scarcely 5 per cent. of our primary pupils ever complete even a high school course. In New York City it is said the great majority of the children of school age never get beyond the primary grades but must begin earning some sort of living at the ages of from 12 to 14 years. But we need go to no city schools to illustrate this fact. How many of our district or ward school pupils ever continue their education beyond the course provided in their own district or ward? Nay, more, in many instances it is impossible for them to do so even if they would since they are so far removed from any higher institution. Yet it is these

same district schools, these primary grades that are giving the finishing of the education of the masses of our people. The majority of our people are not college graduates, and let us be thankful they are not.

If then it is to these elementary grades we must look for our coming men and women, can we overestimate the importance of that work done in those grades. I believe a child's character for good or evil is practically formed during the first fourteen years of his life, and in many instances even sooner. It follows then that not a moment of such time ought to be wasted; that those years should be filled with the noblest influences and receive the most careful attention. For next to the privilege of the ballot, the influence of the public school is the most vigorous force in the transformation of the alien to the American.

Liberal Support Necessary.

Yet in spite of these facts the necessity of first class primary work and district school work is not appreciated. It is looked upon as trivial, any one can teach a primary room. The work of our higher institutions may be more showy, it may appeal to the people from many standpoints, but it is not at present the work that needs the most attention, it is not the work that is to teach our people honest self support. And any system of public education that has for its end and aim simply and primarily the preparation of pupils for these higher institutions is top heavy and undesirable. Let me not be understood as saying one word against higher education, its true worth and merit is only too well known, but I do say that in building up such institutions for higher learning, the more important secondary schools must not be allowed to suffer. They must receive the first thought of our people, they must combine the education of the hand and body as well as of the head, the appliances for teaching

these fundamentals of education must be most modern and complete, and carried on under the best hygienic surroundings, they must be provided with the very best teachers money can procure. There should be no selfish economy here. Money should be poured out like water for the child's intellectual and moral life, it should never be weighed against the soul of the child. If this cannot be done in single communities then let them combine their strength.

Physical Training.

And now a word as to what shall be taught in our secondary schools. Through the education of the mind we may create desires for better lives, wants for better things, but if we have not put into his hands the power to satisfy those desires and wants, we have done the pupil an absolute injury, we have developed discontent with no means of ending it. Our pupils must be taught that their lives are to be lives of usefulness, of labor unceasing, untiring, persistent to the end. Let the sharp, well trained brain be united with a strong body and skillful hand. In this respect I look with pride upon our own great state of Wisconsin passing a law appropriating a certain sum to every school that shall organize and maintain a school of manual training, where it can be used by every child that desires such an education. If our children must leave school at so early an age let us provide them, during those years they are in school, with the very best training that can be procured, and moreover let it be free, free as the air, from the primer class of the district school, from pencils and paper to school text books, to the graduate of our highest institution. But not alone should the head and hand receive our attention, but the body as well should be developed. The strong body is useless without the clear brain to guide it, but likewise the strong mind is hampered and its work narrowed without the

strong body to support it. I hope and believe the time to be not far distant when the gymnasium will form a part of every school building and when physical training will find a place in every curriculum. These aims are more than ideal, they are possible, they are necessary, and may time speed the day of their realization.

Patriotism.

But while the young man and the young woman are being prepared as far as their time will allow, for self support, the State makes one request, namely: that during this period there shall be instilled in his mind such a love of country, such pure patriotism that native land will be ranked second only to his God; that during this period he shall have acquired also the ability and desire to use the governing power intelligently and justly. This duty on the part of our schools is secondary to none, upon its careful performance must the institutions of our nation depend.

Fact, not Fancy.

But if we desire to give to our country strong characters, well rounded, symmetrical men and women, prepared to take upon themselves the duties and responsibilities of citizenship, our methods of education must conform more nearly to the world at large, to nature and her laws. We need more practice and less theory, more facts and fewer fancies. Preparation for a life work was never found between the covers of a book. If we would have a self governing, independent wise nation our schools must turn out self governing, independent, wise citizens. Calm judgment and common sense, fearless honesty and perfect probity are of more value than the three R's. Here then in our schools should be laid the foundation of obedience and self government.

Schools are governments in which pupils should be taught not only to preserve and demand their rights, but obediently to perform their al-

lotted duties. Order is nature's first law. All nature moves to laws of harmony and order.

"From harmony, from heavenly harmony

This universal frame began;
From harmony to harmony
Through all the notes it ran."

The pupil, be he boy or girl, who leaves home for any institution of learning, be it public or private, university or college, before he has acquired the principles of self government, self restraint, and independent judgment to some degree, goes to his peril. To this end it is necessary that our schools should turn out something more than students, we need men and women.

"What constitutes a state?

Not high raised battlements and labored mound,

Thick wall and moated gate;

Not cities proud with spire and turret crowned;

Not bays and broad armed ports;

But men, high minded men

With powers as far above dumb brutes imbued

In forest brake or den

As beasts excel cold rocks and brambles rude."

And for these men, and I include with them women, our state is looking to the public schools of America.

The Higher, Nobler Life.

But when the mind has been developed, when the body has been trained, are we through with our embryo citizen? Too often this is true. In the words of Bishop Spaulding "Our aim seems to be to have more rather than to be more; our ideal is that of material progress; our praise is bestowed upon those who invent and discover the means of augmenting wealth; liberty is made the opportunity to get rich, and education the development of the money-getting power." These conditions are

the most natural results of our purely industrial life, our too practical natures.

Children are to often sent to school simply to be prepared for self support; they are urged to remain because, they are told their time and labor will be more valuable in dollars and cents when they are through. While this may be true, while this as I have admitted is one of the purposes of our school system, it is only one. And it is not the ideal to be placed before our pupils. Are we to keep continually before them this mere material, industrial machine which our so called practical business men call life, while they remain forever blind to that higher, nobler life inherent in the souls of men, that life that is capable of infinitely greater possibilities, infinitely greater power.

As some one has said "If democracy is the best government then it necessarily follows that it is as conducive to purity, virtue, intelligence, religion and high ideals as to business and sordid speculation." While we nourish, educate, and develop the child to a proper conception of his human possibilities, we keep him blind to the divinity within him, the soul which is all that stands between him and the brute creation. For as the poet has said "the soul that makes man immortal has alone the power to make him beneficent and beautiful."

Mind and Morals.

While the school is directly interested in the mental development of its pupils the moral life must not be neglected. Through his intellect he shall be taught the usefulness of his being, the value of his life, the responsibilities and obligations of living. Through his moral nature he shall be taught to see life as God intended, to love the good, the beautiful, the true. Let his soul be timed to the music of poetry, his eye to the beauty of symmetry and outline, his ear to the harmonies of nature.

When our schools do this, when the child from its entrance into the school, to his leaving shall be brought into daily contact with all that is high and ennobling, then is he being truly educated, then is he learning self-government and self respect; then is he being prepared for those temptations that beset the path of youth, and which we are only too apt to fall by, since we do not recognize them in their true form. School will then become real even in its ideals, it will be truly preparation for life, not merely the life of the market place and counting house but the life of truth and righteousness.

May the personal interest in our schools never be lost. Let us stop talking and act. Show your children you are interested in their work and welfare. Encourage your teachers to

put forth their best efforts. Stop criticising and help us remedy the evils. It is easy to tear down, hard to build up. The cause needs the unswerving fidelity of every true citizen regardless of politics, creed or sex. The new education has in store rich rewards, it is clothing the dry bones of men of book learning with the warm flesh of reality and nature, it means development in all proper directions, mental, moral and physical, it means better men, better women, a better world.

I close with the words of Edward Everett: "Education,—when we feed that lamp, we perform the highest social duty. If we quench it, I know not where (humanly speaking), for time or for eternity,—

"I know not where is that Promethean heat
That can its light relume."

AN ADDRESS.

GOVERNOR EDWARD SCOFIELD, Madison, Wis.

My Friends:—Because my occupation was only remotely related to agriculture, I had not been especially interested in the subject; but of late I have paid a good deal of attention to the work of farm education which is being carried on by the state, and I confess I have come to have a great respect for it. It is not a mere fancy that the farmer's lot is a happy one. The story of developing civilization bears testimony to the many homely pleasures which are the exclusive portion of the tiller of the soil. If you who are engaged in farming do not appreciate your advantages, we, who are less fortunate, do.

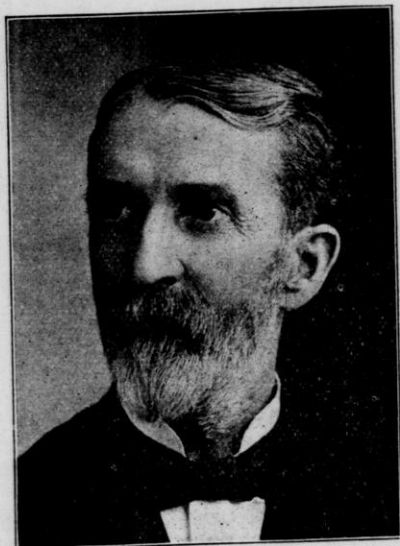
I sometimes fear you neither understand nor appreciate your privi-

leges, and that the farming element of this state which, rightly estimated, is the dominant element, has not exerted the influence it should have done. The reason for this is, I believe, that you have not taken an affirmative position in the field of politics, nor in matters generally pertaining to social development.

The solidarity of the farming interests has been manifested more frequently in an unanimity of complaint than otherwise, and that is, at its best, but a negative use of power.

The farming interest will never play the important part which it might in politics and in the development of society generally while it devotes its best energies to mere complaining. I look to these Farmers' Institutes, and

the other means of education and development which are being brought to the farmer in Wisconsin, to bring about a better state of affairs. I expect these, first of all, to teach the farmer a higher respect for himself and for his profession. When he learns this he will understand how



GOVERNOR EDWARD SCOFIELD.

much influence he has and then how to use it.

Inter-dependence of Industries.

One of the first results which come from the better education of the farmer is a higher respect on his part for those in other walks of life. I think you will agree with me that there is a tendency among the farmers to discredit the character and motives of people engaged in other industries. The higher the farmer goes in the scale of education the broader will be his sympathies. I can see, what you have, no doubt, noticed, that in Wisconsin there is coming to be a more intelligent understanding of the inter-dependence of the industries and a recognition of the fact that no one

legitimate industry can exist by preying upon another; and that, in fact, all are so closely related and inter-dependent that the prosperity of one necessarily means the prosperity of all. This view awakens a better feeling—one of more sympathy among people.

Theoretically the farmer is a sturdily independent character, and his conservatism is a strong safeguard to society. But the farmer is not truly independent so long as he is in a state of mind where he feels that he is being oppressed. I would have the farmer take his proper place—the place which the fundamental character of his contribution to the support of society warrants, and become a positive force in shaping public sentiment instead of a mere negative complainer.

If he is to reach this plane he must shun the demagogue, who, for pelf or personal advancement, devotes his time to stirring up class animosities. The walking delegate in the manufacturing industries and the declaiming delegate in the fields of agriculture must both be paid off and discharged before the people in the various industries can come to an intelligent understanding of their relations.

What Farmers' Institutes are Doing.

As I have said before, I know that the work of these Farmers' Institutes, along with the technical information which they impart, are broadening the sympathies of the farmer and bringing him into closer touch with the other people of the state. I think it is coming to be seen that it is an abnormal state of mind which makes a man to believe that all but himself, or those employed as he is, are rogues. The world is growing better daily. The vast majority of men in our industries are honest and upright. There is more of simple faith and of kindness and sympathy, and less of dishonesty, vice and corruption than ever before. We are moving steadily but surely forward. There are some fellows who insist on riding backward and think, therefore,

the world is going in the wrong direction, but they are mistaken.

If I were called upon to advise the farmer, (and I think I may offer this without being called upon), I would warn him against declamation. This seems to be an age of talk, and it is very cheap. Cultivate a dignified silence; the whole country is running rather too much at the present time to talk, and the farmers must remedy this evil. Keep in mind that the man who is devoting his highest energies to living an upright life and improving the community in which he lives, has, as a rule, neither time nor disposition to proclaim the short-comings of his neighbors. There are wrongs to right and there are times to cry out against wrong; but just at present our country seems to be somewhat given over to declaiming and not enough given to individual righting wrong. We would have more men in line fighting the real battle of life and helping to solve its serious problems if there were fewer back among the sutler's wagons talking. More has been done in any given generation to remedy the evils of society by the earnest and quiet effort of individuals to live right lives, than the mouthing of demagogues could accomplish in a thousand years. I speak of this, not because farmers are given to talk themselves, but because they are the chosen audience of a large majority of demagogues who desire to talk; and because intelligence on the part of the farmer will do much to lessen the evil propagated by the men who incite class animosities. Remember this—that it does not improve your character nor reputation to denounce your neighbor, whether that neighbor lives next to you and is employed in the same field, or toils with his hands or brain in some other field for the upbuilding of society.

Intelligence and Profit.

I am looking for great results from the continuous work which the Farmers' Institutes are doing. The number

engaged in agriculture will probably always exceed in our own state those engaged in all the other industries and it is highly important that they get right views. The real secret of the success of these institutes, and the other branches of education which the state is carrying on, is that they teach, first of all, to the farmer the inseparability of intelligence and profit. That is the purely business side of it. But it is not merely to increase his profits that the farmer must learn. There are many ways in which, more directly than he ever has done, he is to lend his assistance to the solution of the great problems of society. These problems are both moral and economic. One of them has been called attention to in a forcible manner by ex-President Harrison recently in his address upon "The Obligations of Wealth." Most of you, no doubt, have read what he had to say on the subject of taxation. This problem of taxation is a serious one which we of Wisconsin have to solve, and you farmers must lend your assistance in the solution.

I do not for one moment think that the inequalities so apparent in our system of taxation can be suddenly righted, even by the combination of all classes of industries, or the people engaged in them. But there can be much done and an honest intelligent effort will eventually bring order out of the unfavorable conditions which now exist. A tax commission was created in this state a little over a year ago and the members of it are hard at work attempting to bring some order out of our system of assessment of taxes. Their task will be a futile one, however, if there be not cultivated a higher sense of the duties of citizenship and of the obligations resting upon every individual within this state to pay his just share of the expenses of government. I wish there might be cultivated such a moral sentiment as will put to shame the man who will not

perform his political duties and who, for one cause or another, shifts his burden of the expenses of the government upon others.

Our Taxes.

You will hear a great deal of talk upon this question on the part of men who would stir up animosities and class against class, and who would make the farmer believe that he, above all men, is paying too much in the way of taxes. But all this kind of talk is misleading. If you are to do anything towards solving this tax problem you must, first of all, get an intelligent understanding of the situation as it is, and then, without prejudice, lend your aid in solving it. We are no worse—rather better off, in fact—in this state than the people of other states but that is no particular comfort so long as the inequalities of the system are so glaring. It is a notorious fact that in Wisconsin by far the greater part of personal property escapes taxation entirely. Mr. Kennan, of Milwaukee, a member of the state tax commission, who has devoted long study to the question, informs me that it is probable that at least 90 per cent. in value of the personal property owned in the state of Wisconsin escapes assessment. Mr. Thomas Brown, tax commissioner of the city of Milwaukee, who is an authority on the subject, gave me as his opinion that 75 per cent. of the personal property in the city of Milwaukee escapes taxation, and the balance of the state, he thinks, will not differ greatly. In corroboration of this are the figures given of property values in Wisconsin by the United States census of 1890, and a comparison of these with the total assessed valuation of property in the state.

Property Valuation in Wisconsin.

The United States census of 1890 places the total property valuation in Wisconsin at \$1,833,308,532.00. Deducting from this valuation the value of the real estate which is taxable

and the real estate which is exempt, there is still left a balance of personal property to the amount of about \$735,000,000.00.

It is pretty fair to assume that while the United States census may not be altogether correct it is more apt to err in putting the figures below than above the actual valuation. Our own state reports show that the total valuation, by assessors of all state property in the state of Wisconsin, for the year 1897 was \$629,735,508.00. This, understand, includes all real estate not exempt from taxation, and all personal property. For the same year the total valuation, by assessors of the personal property of the state, is \$110,066,353.00, or a little more than one-sixth of personal property as shown by the United States census. But the most serious things about these figures is that there is a gradual decrease in the value of the personal property as shown by the returns of the assessors. Thus the returns for personal property, by the assessors in 1895, showed \$116,000,000.00; in 1896, \$114,000,000.00; in 1897, \$110,000,000.00; and this while the value of the real estate, as shown by the assessors, shows a steady increase.

Something of the importance of this problem of taxation you can learn from these figures. They show plainly that it is what is known as intangible personal property,—mainly mortgages and other securities,—that escapes taxation. In other words it is not the employed capital, the capital invested in industries, in manufacturing, in farming and otherwise, which escapes taxation for the most part, but that which is loaned and invested in securities. The larger industries and corporations of this state have their property in sight and accessible to the assessor. A member of the tax commission gives it as his opinion that the banks of Wisconsin are more justly taxed than any other property, and next to these the railroads. It may be considered that the latter are

not paying enough for their privileges, but if this is true it is not that they hide their property, but because the legislature has not placed the percentage sufficiently high.

Industries That are Taxed.

Take some of the other great industries. There are, as I stated in an address before the Dairymen's Association at Manitowoc, over 700 corporations organized in the state of Wisconsin for dairy manufacturing purposes. You will readily understand that the property of all these companies can be reached by the assessor. Then take the lumber industry, in which I am interested. The nine saw mill companies, and paper and boom companies, doing business along the Menominee river in my section of the state, pay in Marinette \$126,733.74 this year for the taxes of 1897; or for considerably more than one-half of the entire taxes of a city of 16,000 inhabitants; a city, too, where the working people for the most part, own their own homes.

Escape Just Taxation.

There are corporations doing business in the state of Wisconsin that are not paying their just share of taxes. Take the trust companies for instance, which pay but a trifling license fee. These companies should be taxed exactly as the banks are taxed. A bill for this purpose was introduced in the last legislature and passed, but, owing to an oversight in framing it the amended bill was left so that the companies would necessarily be taxed twice on a majority of their capital and so the bill was vetoed; but unquestionably the next legislature will set this matter right. Then there are the sleeping car and express companies, neither of which is paying anything like what it should toward the expenses of government. Bills, as many of you know, were passed by the legislature of 1897, which would have made a start in the direction of compelling these com-

panies to pay their share of taxes, but unfortunately in their passage a specific provision of the constitution was violated which made the measure void, and they were vetoed.

Then there are the big insurance companies of the state. If they should be taxed at all they certainly should be made to pay a proportionate amount. At the present time they are paying but a small license fee. Mr. Brown, the tax commissioner of Milwaukee, informs me that he has been told by brokers who loan money in Milwaukee, that one reason why they are compelled to resort to various subterfuges in order to avoid having mortgages and other securities taxed, is that they are unable to compete in loaning money with big insurance companies which pay but a mere trifle in the way of license fee and whose mortgages are not taxed separately. These brokers claim that if the insurance companies were compelled to pay taxes upon their mortgages there would not be such an incentive for brokers and other money lenders to hide mortgages, and that the state would thus be greatly benefited. This is a matter which I have no doubt the tax commission will bring before the next legislature.

A Serious Problem.

Various methods have been suggested whereby this evasion of taxes can be prevented but, as I have already said, it is too big a problem to be hastily solved. There are many expedients which might be resorted to but none of them can be considered as permanent in character. For instance, the same comity which exists between the executive departments of the different states of the union might well be established between the counties of different states, so that when a mortgage is filed with the register of deeds in Milwaukee, and alleged to be owned by a man in some county in Indiana, the register of deeds in Milwaukee will notify the officials of the Indiana

county and vice versa, and the mortgage will be taxed where it is alleged to be owned. The people of other states are just as anxious and are making just as much of an effort to discover hidden personal property and assess it, as we are. In many of the states the most stringent measures have been adopted, but these, even if they were successful, are so repugnant to the sense of people living under a republican form of government that they can hardly be commended, and they are not successful.

Taxation in Ohio.

Dr. Ely, of the University of Wisconsin, in his work on the "Taxation of States and Cities" gives the result of some of these inquisitorial measures in Ohio and quotes from the message of the governor of that state, sent to the legislature in 1887, after the stringent assessment law had been in force for a number of years. The governor's message says: "Personal property is valued all the way from full value down to nothing. In fact the great majority of the personal property of the state is not returned, but entirely and fraudulently withheld from taxation. So far as personal property is concerned the fault is chiefly with the people who list their property. The idea seems largely to prevail that there is injustice and inequality in taxing, and that to perjure themselves and rob the state is allowable."

In Ohio, as in Wisconsin, the assessment returns show a steady decrease in the value of personal property. In the same work quoted, Dr. Ely gives something of the conditions of Wisconsin. This, it will be remembered, was about eleven years ago, and the author's investigation has shown that then, as now, it was the opinion of well informed men that the greater portion of personal property escaped assessment.

All this goes to prove what I have already claimed, that it is no mere holiday problem which the people of

the state have to solve; and that it will not be solved by denouncing this or that industry, nor charging dishonesty against any class of people. The most glaring fact in connection with it is, as I have said before, that it is not the employed capital—not the capital which is used in banking or in the great corporations of the state, in railroading, in farming, in dairying, in lumbering, etc.—which is evading taxation, but the capital owned by men who are not using it thus; who are not employing labor or assisting in developing the resources of the state. There might be some justice in denouncing these people; yet such denunciation would not help matters.

A Personal Matter.

Hasty and ill considered legislation foisted upon the state will not help the situation. I have no doubt the tax commission will be able to make some very valuable suggestions to the legislature when it meets; but in the meantime let us remember that our individual effort and not denunciation of our neighbors will do more than anything else to bring about a just solution of this great problem. First of all let me urge you to inform yourselves on the subject. It will only retard the real movements of reform in this direction to "cry away" from the real evil and try to set one class of people against another, and to declare that one or another class engaged in this or that industry is evading payment of its share of taxation. Let us see to it first of all that we are paying taxes upon all of our own property, and are not allowing this spirit of tax evasion to get control of us. Let every man build over against his own house and the work of reform will be pushed far forward. In the meantime if any of you can devise or suggest methods for remedying this evil, submit them to the tax commission.

Much as I might feel like denouncing the money lenders for their eva-

tion of taxes and their refusal to pay their just share of the expenses of maintaining the government, I am forced to believe that their action is not due in the first instance so much to dishonesty, but rather to the fact that they recognize the inequalities of our system of taxation, and that each one of them feels that if he will disclose his securities for assessment he will have to pay more than his just share because the other fellows will not disclose theirs. You see this comes back after all to a question of individual responsibility. I can not hope that all of these men who are now evading taxes will come at once to a sense of their duty as citizens and professedly honest men, and will

tell the assessor what they have this year; but if each one of us will do that, something will be gained in the interest of tax reform and every step gained will make the next step easier. I am convinced that the responsibilities of citizenship are not studied carefully enough. I hope that out of these Farmers' Institutes and the general system of farm education, will come to the farmers a keener and juster sense of their duties as citizens; and from the farming element will come the reform movement which will stir every man to a desire to perform his whole duty as a citizen, and bear cheerfully the financial as well as the political burdens of citizenship.

THE AGRICULTURAL DEPARTMENT OF THE UNIVERSITY OF WISCONSIN.

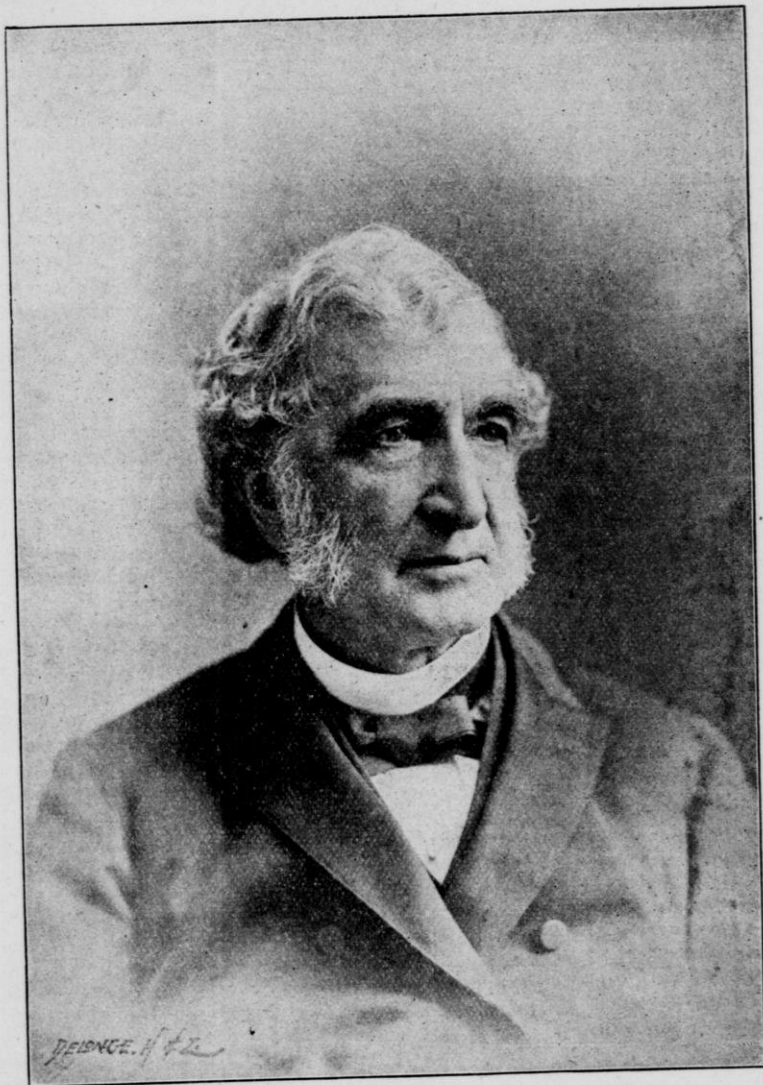
W. A. HENRY, Dean College of Agriculture, Madison, Wis.

It is sometimes well, in these matter of fact times to go back to the foundation of things, in order to have a proper conception of the causes for what may now be taking place. It is eminently proper that Wisconsin farmers should have a clear understanding of how our agricultural college originated, who were its founders and what is its purpose.

"The Morrill Bill."

A bill was introduced into our National Congress in 1858 by Representative Justin F. Morrill, of Vermont, now the senior senator of the upper house. Passing both bodies by a good majority the bill was vetoed by James Buchanan. A careful reading of his objections shows no good reason for his action. On April 30, 1858, Representative Morrill delivered an address

before the house of representatives, which is a classic of its kind, and which has been unequalled as a plea for the education of the children of the industrial class of our country, especially farmers' sons. In this address he points out how agriculture is the base of national prosperity. He quotes Adam Smith as saying "That which arises from the more solid importance of agriculture is much more durable and cannot be destroyed but by those more violent convulsions occasioned by the depredations of hostile and barbarous nations continued for a century or two together." He shows that "National wealth is greatly increased or diminished by the more or less skill, dexterity and judgment with which labor is generally applied." Congressman Morrill pointed out that European nations



HON. JUSTIN S. MORRILL, SENIOR UNITED STATES SENATOR AND
FATHER OF AMERICAN AGRICULTURAL COLLEGES.

were already awakened to the importance of agricultural education and were providing schools and experiment stations for the advancement of this great art. He showed that our system of farm practices was faulty and ultimately disastrous, because each year saw the fields poorer in fertility than before, the crops gradually diminishing in quantity and quality. He showed that our farmers were not indifferent to these conditions, but were groping in the dark for help while only meager or desultory assistance was rendered them. There was some help from agricultural papers, and the annual fairs of the agricultural societies but nowhere were there laboratories and schools for exact investigations and competent instruction.

A Plea to Congress.

Closing his plea, which was one of the most eloquent ever delivered in the halls of congress, he said "Pass this measure and we shall have done—

Something to enable the farmer to raise two blades of grass instead of one;

Something for every owner of land;

Something for all who desire to own land;

Something for cheap scientific education;

Something to induce the farmers' sons and daughters to settle and cluster around the old homestead;

Something for peace, good order and the better support of Christian churches and common schools;

Something to enable sterile railroads to pay dividends;

Something to enable the people to bear the enormous expenditures of the national government;

Something to prevent the dispersion of our population and to concentrate it around the best lands of our country—places hallowed by church spires and mellowed by all the influences of time—where the consumer will be placed at the door of the producer and thereby

Something to obtain higher prices for all sorts of agricultural products."

Washington must have had something akin to our agricultural colleges in mind when he wrote in his last message "It will not be doubted that, with reference either to individual or national welfare, agriculture is of primary importance. In proportion as nations advance in population and other constituents of maturity, this task becomes more apparent, and renders the cultivation of the soil more and more an object of public patronage. Institutions for promoting it grow up supported by the public purse; and to what object can it be dedicated with greater propriety."

But James Buchanan turned a deaf ear to the pleas of the people and it was left for congress to consider the subject once more, and for that patriot, Abraham Lincoln, whose heart was always in accord with the hopes and aspirations of the common people, to sign the bill which gave away eleven million acres of the public domain for the education of the children of the industrial classes. The agricultural college land grant bill was signed by Lincoln July 2, 1862, at a time when this country was in the throes of an awful civil war.

Provisions of "Morrill Act."

By this grant there was given to each state in the union thirty thousand acres of land for each representative it then had in congress. It was specified that the income from the sale of all such land should constitute a fund, the interest of which should be forever used to maintain at least one college where the leading object should be the education of the children of the industrial class. This was the grandest gift ever made for education. When the Morrill act was passed Wisconsin had six representatives and two senators in congress, and consequently received a grant of two hundred and forty thousand acres of land. Some of the states founded

new colleges, while others assigned the grant to their universities or to some other educational institution. In New York Cornell University was founded on this grant; in Michigan it was given outright to the agricultural college already established at Lansing. The legislature of Wisconsin assigned the land grant to the state university at Madison, and Dane county bonded itself for forty thousand dollars to raise funds with which to purchase the lands now known as the university farm.

The different states handled these lands given them in trust in various ways, some wisely and some foolishly. Iowa made excellent use of the grant, and its agricultural college now has a large income from this source. The Michigan agricultural college received the same number of acres that was given Wisconsin; it has sold a little over half of these lands for \$530,000.00 and has remaining over one hundred thousand acres worth between half a million and a million dollars.

Wisconsin's Mistake.

What did Wisconsin do with her lands? The legislature directed that agricultural lands be selected, and that these be sold at the uniform price of \$1.25 per acre. The lands have all been sold and the resulting trust fund amounts to \$300,000. Bear in mind in considering this small return for the magnificent gift, that the government donation was accepted by the legislature, which body directed the selection of the lands and set the price at which they should be sold. The regents or trustees of the university had no voice or responsibility in the matter. Of all the states in the union Wisconsin could and should have received the most dollars per acre for her lands if she had only selected them wisely.

Cornell University, receiving her land grant at the same time as Wisconsin, through the foresight of Ezra Cornell, selected pine lands in this

state and patiently held them until good prices were secured. Every Wisconsin citizen has heard of the Cornell pine lands located in the northern counties, and know of their great value. Millions upon millions of dollars have poured into the coffers of Cornell university from the sale of these lands. Had our legislature directed that pine lands be selected and held in trust for our university we would today have an interest bearing fund of at least two million dollars, and with good care it might have been made three or four million dollars.

In the wasting of this heritage we have an explanation of why our university and its agricultural college must make frequent appeals to the legislature for assistance in order that our showing in the way of instruction and equipment at the university shall equal, or even fairly approximate kindred institutions in other states.

Increased Appropriation.

Because of the immense bodies of lands thrown upon the market through the homestead act, the grants to railroads, and the agricultural college land grant, before referred to, and because of lack of proper foresight and business judgment many of the agricultural colleges derived but a small income from the original land grant. Believing that the errors of a few who had handled this trust should not be visited upon the young of our country seeking education, Senator Morrill introduced a supplementary bill increasing the income to the agricultural colleges, which passed August 30, 1890. By this second act, money derived from the sale of public lands to the amount of fifteen thousand dollars was appropriated to each state, this sum to be increased by one thousand dollars annually, until it should aggregate twenty-five thousand dollars, at which sum the annual appropriation should stand. Our agri-

cultural college receives a portion of this income.

Because of the government grant the cost of the agricultural college to the tax payers of the state has been exceedingly light; most of the expenditures thus far called for having gone into the construction of buildings.

I have entered into this brief history that our people may know how and under what circumstances their agricultural college was founded, and from whence a portion of its income is derived.

Early Days of Our College.

The government gift of lands was accepted by the university in 1866, at which time the university was re-organized and placed upon a broader and more secure foundation. Dr. W. W. Daniells, a graduate of the Michigan Agricultural college, was the first professor of agriculture. Practically no students applying for instruction Professor Daniells' time was gradually absorbed in the up-building of the chemical department, which had grown to such magnitude by the year 1880 that he asked the board of regents to be relieved of the care of the university farm, which was all there then was of the agricultural department. In 1880 I was asked to take charge of the botany in the state university, and the agriculture. Doubtless botany was named first in my duties for the reason that it was surmised that agriculture would occupy but little of my time, and it was important to keep me busy. When I came to the university there were no students asking for instruction, nor was there, aside from the farm with a limited amount of stock and tools, and a couple of wheel-barrow loads of books in the library, any evidence of a department or facilities for instruction.

Some farmers who now listen to me will recall those early days when in the meetings of the old state agricultural society in the capitol or the

farmers' meetings, held at other points in the state, I was asked how many students there were in my department, sometimes I stated that I had one or two, or occasionally I was forced to admit that at that time there were none. Experience showed that with our limited facilities for agricultural education, and with the opportunities for employment but few young men would come to us for the four years' course of instruction, which was all that was then offered.

Rapid Growth.

Twelve years ago the board of regents directed the establishment of the short course in agriculture. This course provided brief, practical instruction in agriculture designed to meet the wants of young farmers who could be spared from the farms during the winter months. The first term found nineteen young men seeking instruction with us, and we were greatly encouraged with the prospect. For a time numbers increased each winter, then there was a decrease, brought about by less favorable agricultural conditions, and by the further fact that we still lacked the equipment and instructors required to make the course attractive to those whom we were seeking to instruct.

By the favorable action of the legislature, heartily supported by the board of regents, we were enabled to increase the number of instructors and improve our facilities, though we have not yet all that we wish or are needed. Our short course has grown until it now covers two winter terms of fourteen weeks each, and the outgrowth of the course known as the dairy school, provides instruction for a term of twelve weeks.

Our Present Status.

During the term just closed we have had 157 students in the short course, and 115 in the dairy course. Several college graduates have been students with us, and half a dozen young men are taking the long course in agri-

culture. In all, more than 275 students, representing 16 different states of the union, have received agricultural instruction this year at Madison.

During the first three years I was connected with the university I did not have even so much as an office in any of the university buildings. At last I was given three small rooms on the third floor of old south dormitory for an office, library and chemical laboratory. Having gained admission to a building, there was gradual growth and expansion until we acquired the whole structure, and a generous legislature has provided two additional buildings, so that now the college of agriculture occupies three of the university buildings. Our library has grown until it now numbers more than four thousand bound volumes. Instead of being obliged to teach all of the botany of the university, and constituting the sole representative for agricultural instruction I have now associated with me about twenty professors and instructors in agriculture during the winter months.

"The Hatch Bill."

In 1887 congress passed what is known as the "Hatch act," giving fifteen thousand dollars annually to each state in the union for the establishment of

an experiment station. Confining our instruction almost wholly to the winter months, those professors who are engaged for the most part in teaching during that time have the remainder of the year for investigation. Wisconsin farmers are quite familiar with the work of our Experiment Station, and I will not enter into a description of it at this time. Some idea of the magnitude of our work may be gathered from the fact that last year over eight million pages of printed matter were distributed by the station to the farmers of Wisconsin.

Farmers' Institutes.

A dozen years ago our legislature performed what time is proving to be the wisest act standing to its credit—the establishment of the Farmers' Institutes, and placing these in the care of the University. In our triune system for the advancement of agriculture we have the Farmers' Institute instruction forming the base of the pyramid. Here all farmers and others studying agriculture who cannot attend the university find instruction and assistance. At the university facilities are provided for those who are gathered there to learn of agriculture. Finally, at the apex of the pyramid we have original investigation under the direction of the Experiment Station.

MORNING SESSION.

The Institute met at 9 o'clock. H. C. Taylor in the chair.

BREEDING AND DEVELOPING A DAIRY HERD.

CHAS. L. HILL, Rosendale, Wis.

To me a dairy herd means one kept for the sole purpose of producing the greatest profit possible from their production of milk or its products.

From the careful work done at Experiment Stations we now know that the value of one hundred pounds of milk depends upon the amount of fat it contains, whether cream, butter or cheese is to be the product sold.

Breed up the Herd.

It is the herd of special purpose dairy cows we are to discuss and not the herd kept to furnish chores for the owner or hired man, and eventually to make salt junk for Spanish soldiers in Cuba. It is not possible, or wise, for many farmers to own a herd of full blood cows, but it is every farmer's own fault who has been keeping cows for five to ten years and has not reached or passed the 300-pound mark in butter production. What has been done can be done. Note the example of such men as H. D. Griswold, C. P. Goodrich, Charles Thorp, Sebastian Heller, and dozens of others, who with grade herds have reached an annual butter production of 350 to 400 pounds and even more, per cow.

The Dairy Sire.

Every herd of native cows must contain one or more cows, that, if properly fed and cared for, would enter the list. These, if bred to a full blood bull, should become the foundation of the future herd. It is a common saying that the sire is half the herd or

"flock," and any man who has made a success as breeder will tell you that even more than half depends upon the sire. How good shall he be? The best is none too good. His mother should be a cow that is a producer of at least 350 pounds of butter per year, and one from a 500-pound cow will be cheaper in the long run. What breed shall he be? The breed that, after careful investigation, you decide is best suited to your conditions, and after you have decided, stick to it. When you get a sire that suits you, keep him as long as he is useful, as an old bull certainly sires better calves than a yearling.

Care of the Calf.

Raise only such heifer calves as you have reason to believe will increase the production of your herd. Feed only such foods as will grow bone and muscle, and not fat. Keep in mind that you are after a herd of dairy cows and just as soon as you fat one of these calves its tendency will be away from this purpose. Don't starve her, however, but give her plenty of skim milk, bran, oats, and clover hay. Just at first a little oil meal or flaxseed jelly will help keep the calf thrifty. If you have a silo, a little of the leafy ensilage without grain will be good for her.

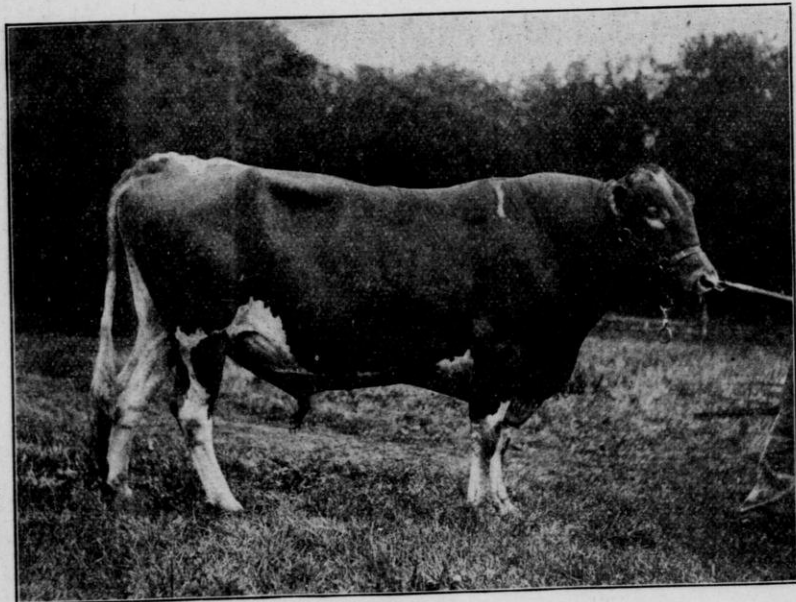
Let her be well acquainted with you, so she can easily be handled and halter broken. Have her come in milk at about two years of age. Two or

three months before she is to become a mother increase her grain ration to about all the bran or other similar food she will eat, as any fat she may put on at this late period will all disappear after she gets to milking. We do this to induce her to make a large udder this first time she is fresh, as her business is to be the production of milk, and the sooner her functions all tend in that direction, the better.

who are constantly saying of the successful dairyman, "He pays out more for feed than he gets for the milk," unless you have carefully estimated just how much they do feed, and have stopped to figure what the 300 pounds of butter, each cow should produce, is worth.

The Babcock Test and a Pair of Scales.

If there is any one thing that will



GUERNSEY BULL—BEN BISHOP 3506. FULL BROTHER OF MADAME TRICKSEY. GEO. C. HILL & SON, ROSENDALE, WIS.

The very best time to have a heifer drop her first calf is in the flush of grass, in May or June, and let her milk continuously for thirteen or fourteen months, dropping her second calf in October. This will help establish your cow as a persistent milker. Always treat your cows with kindness. Feed, water, and milk regularly. Remember it is nearly always true that the more grain you can get your cow to eat and assimilate, the larger will be your profit.

Don't number yourself among those

help us to succeed as dairymen, more than any other, it is a constant use of scales and the Babcock test on our farms. It will pay any farmer to keep an accurate record of the milk produced by each cow. It is not as much work as you think. I have here a sample of the milk record sheet that we use. This is more elaborate than it is necessary to use. A sheet of foolscap paper ruled, will answer every purpose. Once a week weighings will answer just as well to show approximately a cow's yearly record, but the

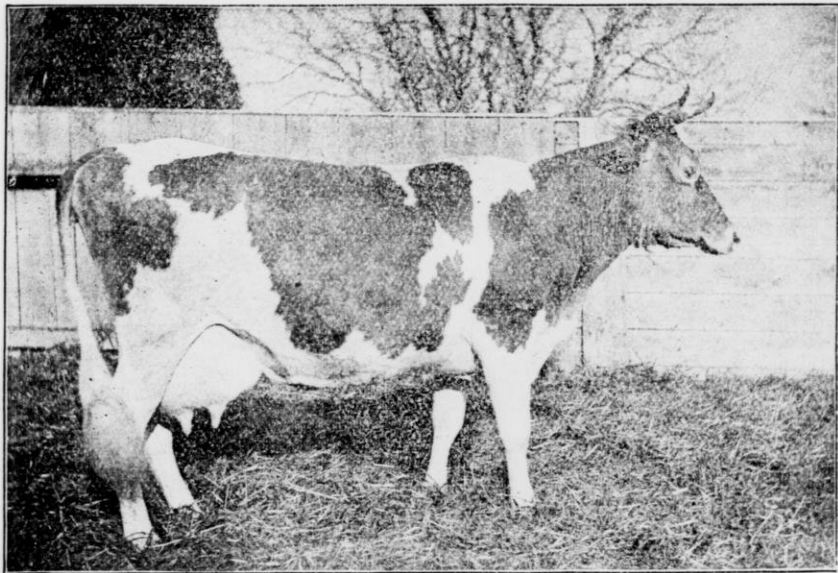
daily weighing will more than pay in keeping track of milkers and of the individuality of each cow. It will pay if you have many cows to have one of the scales made for this purpose, so that it reads zero with the pail on, and shows the net weight of the milk. A twenty-five cent spring balance will answer, however.

The middle of each month take a composite sample of each cow's milk

never expect to do it again, but I think if a lot of your animals freshen at one season, it will pay to milk three times a day.

Mr. Arnold—Judging from your experience in breeding, what proportion of the improvements in dairy qualities do you consider is due to the feeding, what proportion to training, and what to breeding?

Mr. Hill—There is just enough truth



GUERNSEY COW—NUBIA'S VESTA 5986, 556 LBS. BUTTER IN 6 MOS.: 25 LBS. 8 OZ. IN 1 WEEK. GEO. C. HILL & SON, ROSENDALE, WIS.

for from four to eight milkings, and test it with the Babcock test; then at the year's close you will be able to tell just what each cow has done, and weed out your cows intelligently. Finally, brethren, love your business; study every detail of it, and be satisfied with nothing short of success.

DISCUSSION.

Question—Do you milk three times a day?

Mr. Hill—No, I never have, with one exception when I made a test, and I

in the old saying that we hear from some farmers, that the corn crib is good enough for them, to make it hard to answer such a question. First-rate stock can be ruined any time by feeding or improper handling, while, on the other hand, cattle can be bred up to be real good dairy animals from what are inferior ones, by the right kind of feeding. The training goes right along with the feeding, and I should say that half of it was due to breeding and half to the feeding. Any breed of animals cannot probably be

improved a great deal by one alone, but by feeding and breeding you can make great improvement.

The Chairman—For that word "improvement" I would substitute the word "development."

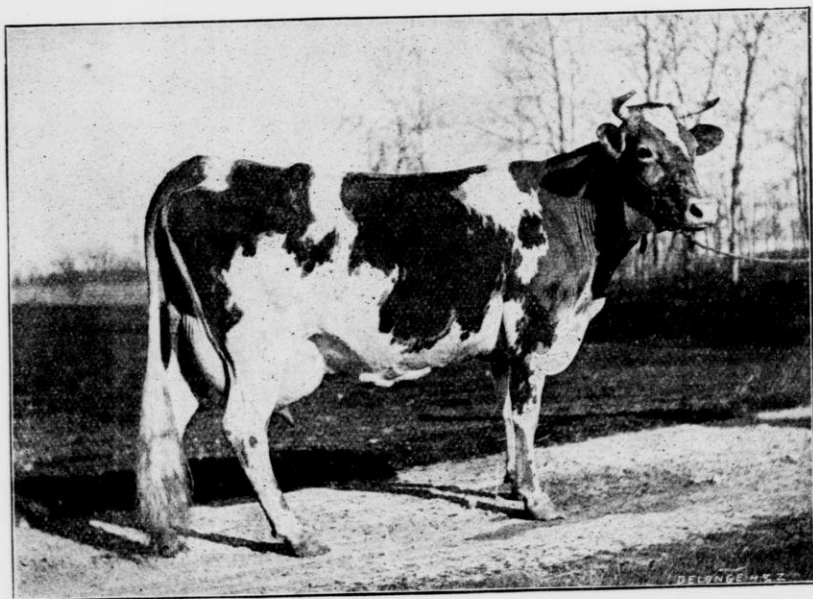
Mr. Hill—Yes, I would, too. I have seen miserable, poor scrubs that only gave fifteen pounds of milk in their flush as two-year-old heifers, develop after a while into good cows, because

of the grandmother more than I do of the sire himself.

Question—Will Mr. Hill give his method of raising calves?

Mr. Hill—Unless the calf is a weak one, and even then, I don't know as it makes much difference, we take it away from the cow almost immediately, and put it by itself.

Question—What do you mean by immediately?



GUERNSEY COW—MADAME TRICKSEY 6519, 16 LBS. 12 OZ. AT 3 YEARS OLD. FIRST AND SWEEPSTAKES AT OMAHA EXPOSITION, 1898. BRED AND OWNED BY GEO. C. HILL & SON, ROSENDALE, WIS.

they had been on farms where they rustled for a living and never knew what it was to have a good, straight meal, such as a dairyman feeds his cows.

Mr. Arnold—In selecting a herd, don't you think that the progeny is more apt to go back to the grandparents than to the sire?

Mr. Hill—I think a great deal more of knowing what the sire's mother is, than any other one thing, and I expect in the progeny to see the production

Mr. Hill—Well, you may let him have one meal, if you will, but I find it just as well not even to allow that, and if I can get him away from his mother without her seeing it, I am just as well satisfied. That night I do not try to feed that calf. They will learn to drink a great deal quicker if they are hungry the first time you try to feed them. I let them go until the next morning; then I take the mother's warm milk, fresh milk, and let them suck my finger as little as possible. Four out

of five times, the calf will drink the second time. We feed whole milk until 10 days old, then change gradually until at three weeks old, it gets all skim milk, helping out with a little oil meal stirred in hot water and added to the milk. The only thing to be careful about with the oil meal feeding is continuing this so long as to fatten your calf. I teach it as early as possible to eat half bran and half whole oats and if they don't accomplish that in two or three weeks, I throw a few oats on the nose while it is damp, and they will soon get to eating the grain all right. I increase this up to two quarts of feed, half bran and half oats, by measure, which will make it two-thirds oats. Then I gradually shut off the oats until they get on an all bran ration. A little of the leaves taken from ensilage is good for the calf. I continue this skim milk ration for the calf, with clover hay, just as long as I have the milk to spare.

Question—Along this line of breeding and developing the dairy cow, is it not true that in order to develop the cows you have got to begin with the calf at a very young age, so that she has the greatest tendency toward muscle growth and the least towards flesh? If before it comes to milk the first time that calf is allowed to get fat, it detracts just so much from its value as a future cow.

Mr. Hill—That is certainly so. There is not any other one thing that I would caution against in raising a calf to make a No. 1 dairy cow, as I would caution you against any tendency to letting it get fleshy up to a month or two before it comes in, but especially before one year of age. You can ruin almost the best calf that ever was born by doing that one thing.

Mr. Briggs—Have you ever had any of this contagious disease among your calves, where quite a number of them die off at a week or ten days old?

Mr. Hill—Yes, we did have.

Mr. Briggs—What is the cause of it, and what the remedy?

Mr. Hill—You have got me, as to the cause of it, anyway, and I don't know but you have me as to remedy. We commenced to feed a patent calf food and it stopped immediately. I am not prepared to say that that did it.

Mr. Briggs—Were you feeding your milk fresh from the separator?

Mr. Hill—Yes; but they were sick long before they had skim milk, if they were sick at all.

Mr. Briggs—The only remedy I have found is to let the calf die and throw it away.

Mr. Goodrich—Have you ever had calves have the scours even before they were taking any milk at all?

Mr. Hill—No, sir.

Mr. Goodrich—I had a letter from a man the other day stating that his calves died; they were taken with scours right off, and they never had had any milk at all.

Mr. Hill—Mr. Bradley has told me that he has had such trouble. The first thing we did for our calves was to give them some oatmeal gruel, but that is lots of trouble to prepare. We would take about two cupfuls of oatmeal, boil it to a jelly, and mix it with warm water and feed that.

Mr. Everett—Would you not place a great deal of importance upon the dairy form in the cow, and where do you get this dairy form?

Mr. Hill—I never owned what I called a good cow that hadn't the dairy form.

Mr. Everett—Give us the Wisconsin idea.

Mr. Hill—First of all things, I would place the capacity to eat a whole lot of food, and going along with that a constitution to stand it year in and year out. I had my attention called the other day by a man who was buying cows, to a nine years old Jersey, that was almost an ideal cow. She looked to be about five or six years old, and she will be just as good at twenty years as she is today, if nothing happens. Capacity first, along with constitution, and shape

almost exactly opposite of what we know as the beef type, showing an entire lack of beefiness. Have them broad on the hips, on the loins. I don't care so much for the wedge shape, because I don't want them to lack heart girth. Have plenty of room for an udder. I like to see good milk veins and lots of things besides that, but just how far they go towards utility we do not know. I like to see a big jaw, showing capacity to eat, and a good eye.

Mr. Foster—How much do you feed your calf?

Mr. Hill—After we get onto an all skim milk ration, about six pounds twice a day. It makes some difference what kind of skim milk it is in the solids that remain. If I had skim milk from milk that originally tested three per cent., I would feed more than if it was from five per cent. milk.

Mr. Goodrich—How much oil meal do you put in when you put the calf on skim milk?

Mr. Hill—Only a small handful; at first just a small teaspoonful to each calf.

The Chairman—You intend to feed the calf to keep it in healthy, growing, thrifty condition, whether it will take more or less.

Mr. Hill—I feed that oil meal quite as much as anything else to keep the calves' bowels in first class shape. I know it does it by the condition of the hair.

Mr. Merrill—What importance do you attach to the training of the heifer during the first milking period, as to the length of the period?

Mr. Hill—As I said, the very best way is to milk them continuously the first time and let them go over fifteen months from the first calf to the second one, so as to milk them through a specially long milking period. It is the persistence in milk that comes out best at the end of the year, it is not the cow that gives fifty pounds of milk at first, but the one

that gives twenty-five pounds and continues to do it through the year.

A Member—During the second period of the calf's life, just previous to the first freshening, we all know there is a natural tendency to flesh up. Then after they have freshened, they do not seem to lose this beefy tendency. How do you combat that tendency?

Mr. Hill—In my experience, if they are bred right, they will lose it. I never take alarm at this fleshing up that comes, if it is not more than a couple of months. They will lose that as soon as they come to milk. Of course the more strictly your animal is bred along dairy lines, the less inclination it will show to put on flesh. About the only way I know to combat it is in the class of feeds you should feed. Confine the ration largely to bran, and perhaps new process oil meal.

Mr. Everett—We find a good many farmers who are not satisfied with the tests at the factory, showing the fat contents of milk; they argue that they are feeding corn meal and the milk should test higher. I would like to have Friend Hill state to this convention the facts in this case, as regards feeding the fat into milk.

Mr. Hill—As far as my experience goes, I will say that I know the amount of fat in milk comes from the breed and not from the feed, unless it is by a very slow increase from year to year; and that fat cannot be fed into milk.

Question—How soon after your heifers have their first calf do you put them on full feed?

Mr. Hill—Well, with my heifers I wouldn't have them off full feed. I never have had any trouble in giving them a good ration two months before they freshened, and keeping it right up.

The Chairman—Heifers with their first calves should be fed quite liberally, even if they are in high condition, but, of course, upon the right kind of feed.

Question—You said that no sire was too good. Does it make any difference what you do with him, whether you turn him out or keep him in?

Mr. Hill—The more exercise they can get the better. We use ours twice a day on the tread power. They should be fed on something to keep them in condition, but not fleshy.

Mr. Convey—As to whether butter fat can be fed into milk, I think there is a misapprehension on the part of a great many persons. I have always claimed that you could increase the butter fat by feeding in this way, so as to shrink the milk flow, thus increasing the per cent. of fat, but that is not in the line of profit.

CHEAPEST MILK PRODUCTION.

A. G. JUDD, Dixon, Ill.

Mr. Chairman, Ladies and Gentlemen:—Doubtless you all realize by this time, that the best results received from these meetings come from the freedom with which you ask questions, and determine how far you can apply the principles promulgated by the speaker to your own individual business. It must also be remembered constantly, that methods adapted to a black loam soil will not produce similar results on a heavy clay soil; neither will the methods that I shall state, as applied by me with my surroundings, produce similar results for you, if your surroundings are radically different.

If my talk is to be of practical benefit to you, do not expect highest results from moderate conditions, but be willing to improve conditions until higher results are reached.

The Dairy Cow.

We have not time to go back and follow the history of the cow down to the present day, or the characteristics of the different breeds. The dairy cow is a cow, bred, fed and handled for the single purpose of producing milk, the quantity and quality of said milk determining the value of the cow and the amount of profit her owner shall receive. As the quality

is determined by inheritance, it remains for the owner to apply his skill in developing the quantity and preserving the quality. By that, I mean if a cow is born with the ability to produce five or six per cent. milk, no foods or system of feeding can materially increase that per cent. of butter fat. But it is possible to feed so as to reduce that per cent. of fat; hence the necessity of the dairyman's learning at the outset, that nothing but a well-balanced food ration and careful handling under favorable conditions, will enable any dairy cow to do her best.

Now, let us for a moment study the outlines of a dairy cow. She should possess a medium long, thin head, large nostrils for plenty of air, great breadth between the eyes, high forehead, a bright, clear eye, sound teeth, thin neck, deep through the chest, with large lung capacity, long, large backbone for plenty of nerve force, broad hips, high pelvic arch, thin thighs well apart, giving plenty of room for a good udder. She should be deep through the flanks, with plenty of store room for food; the udder should be well developed, extending well up behind and well forward on the body, with large milk

veins, teats set evenly on the four quarters and of good size. A cow with these points well developed indicates that she is descended from a line of dairy cows, and will rarely prove a failure if properly handled from birth up.

Thus the young man can buy a few cows from those around him, secure a good dairy sire, and in a few years build up a valuable herd. Having se-

it is from one to three days old, according to the disposition of the cow. If it is the first calf, I prefer to remove the first day to prevent, if possible, the inclination of the mother to hold up her milk, which is liable to induce a bad habit. When the calf is removed feed it for three or four days with the mother's milk, twice a day; then drop out a pint of milk, add a pint of warm water and a teaspoon-



FARM HOME OF A. G. JUDD.

cured a herd by careful selection and systematic breeding, we will proceed to the ways and means of maintaining it.

Raising the Calf.

We must raise our best heifer calves. The first six months' or year's care of the calf determines largely the future usefulness of the cow. Here we can develop the tendency to take on fat and ruin the milking qualities. It is a very easy and cheap matter to raise calves if you know how. Here is my way. Remove the calf from the mother when

ful of oil-cake meal. In a couple of days drop out another pint of milk, and add another pint of warm water and a handful of shorts, and so on. Reduce the milk every two days until at ten or twelve days you have taken away all the new milk and substituted oil cake meal one tablespoonful, warm water four quarts, and shorts two handfuls. Put whole oats, corn, and hay, where it can get them when first removed from the cow. Do not take away all the new milk until it is eating freely of the grain.

Put boiling water on the oil meal and shorts and temper with cold water or skim milk.

The Young Cow.

Try to have the heifer fresh as near two years old as possible, and do not allow her at any time to take on fat. A hearty growing condition is what we want, and any time you see her plumping up and rounding out, shut off feed somewhere. Angles are what we want, and while it will not make a picture the most beautiful to look at, the credit side of her milk account will grow amazingly later on, and you will have developed a cow that dairymen will want and will pay a good price for.

Do not discard a young cow if she does not meet your expectations the first year, but give her another trial. Frequently she will double the amount of milk the second season. If the second season is not satisfactory, however, sell her to the butcher.

Having told you how to breed a dairy cow cheaply, and how to raise a calf without a dollar's worth of milk, I will now tell you the ordinary way of feeding cows, its cost, and how to reduce not only the cost of the feed nearly one-half, but the labor one-half also, and do away with all machinery.

Feed for Milch Cow.

It is customary with many to feed a milch cow clear corn meal and hay, and for a little time she may appear to be doing well, but some morning you will find that the milk has fallen off wonderfully, and probably some of it is ropy, one quarter of the udder is hard, and she does not care for any breakfast. Now you are in for a setback, sure. It is the certain result of an unbalanced concentrated ration. The system is full of fever. The Babcock milk test will show that the butter fat is almost entirely burnt out of the milk.

Right here I want to say that even

with the most judicious feeding the butter fat in milk is more sensitive to changes than any organ of the body. The wonderful variations in the quality of milk from day to day cannot be satisfactorily explained by anyone, and is one of the few unsolved problems that has attracted the attention of dairy scientists. You may keep the cow from day to day under exactly the same conditions as nearly as possible—temperature not allowed to vary a single degree, food and water weighed and exact amounts given each day—and yet the butter fat test will show variations that look about like the notes on a bar of music. I have known men to get a contract to sell milk at the condensing factory, go to the cow sales, buy everything that had a calf by its side, whether it belonged there, or not, pay high prices, take them home and feed to each cow an eight-quart pan full of clear corn meal at each feed. In the course of a few months we find the same men cursing the whole business, and complaining that there is no money in cows, anyhow. Of course not. The man was wrong, the selection was wrong, the breeding has been wrong, the feeding was wrong. The only correct thing is the result,—a burned up, dried up, beefy cow.

A Balanced Ration.

Many dairy writers say that a cow is a machine, and returns you a profit only after she has appropriated enough food daily for her own support. Well, that is not my idea of a dairy cow. A true dairy cow will return to you a certain proportion of milk if you feed a milk ration. So the point is, to combine the foods in a proper manner to contain the standard amount of protein, carbohydrates and fat. Then feed all the cow will safely consume, but see that she eats it all up clean, and is greedy for the next meal. Corn, oats and bran, each one-third by weight, make an ideal standard ration if you desire to feed ground grain.

Grinding Feed.

The question of profit is affected greatly by the manner in which we make the food combination. The usual way is to plant corn three and four kernels in a hill, husk it in the fall, and put it in the crib. Sow the oats, thresh them and put in the granary. Feeding time comes on. You go to the crib and fill the wagon-box with ear corn, fill a number of sacks with oats and take the load to the nearest grist mill, which is anywhere from one to five miles. Probably you must wait an hour or more for your turn to unload, and possibly by waiting another hour or two you may get your grist, or you may have to go home without it and return the next day. You pay Mr. Miller \$1.25 per ton, leave your cobs, and take your chances on a hundred pounds shrinkage. Thus it goes for a few years, then you make a heroic resolve to buy a mill and power of your own and do this grinding yourself. Very well! That is a long step in the right direction.

You buy a mill that costs \$75, and a power costing as much more and you think that you have solved the problem. But alas! The cold, stormy weather of winter soon presents the disagreeable features of that system, for if you have ever dug a power out of a snow bank, thawed out the oil can with a fire from a bunch of hay, and endured a stiff northeaster for three or four hours while keeping up motion, you then realized that even this way had some drawbacks. You see I have been through the whole business and know whereof I speak, for I fed a dairy of fifty cows in just that way for several years, and probably should be doing it yet had it not been that so many factories came into Dixon, and took my hired help away, not even leaving a boy to drive the horses on the power. So out of sheer necessity I got my "thinker" to work, and discovered that cows had a grinding mill, power, and sheller, all their very

own, and I commenced to shove in ear corn. By a little further investigation I discovered that they had a husking attachment also, and I put in snapped corn. Well, that pleased me so that I kept on investigating until I found a whole shredding machine, without any patent on it, and capable of doing vast amounts of work without repairs, and I rolled in the corn and stalk both together, and the results were very satisfactory.

But I still had to grind the oats, and that did not quite suit me. So I experimented and investigated, until one day I discovered—what do you think? A whole threshing machine, self-feeder, stacker and all! So now I just drop down the sheaf oats in front of the self-feeder, it picks them up, and presto, change—milk.

Saving Feed and Labor.

I immediately set to work to study the matter closely, and decided that by proper previous arrangements, I had discovered the means that would enable me to reduce the cost of feed and labor nearly one-half, do away with all machinery, save toll, produce a larger milk yield, enable me to meet the constantly decreasing prices of farm and dairy products, besides increasing the income of the farm one-third, by selling all the hay formerly fed to the cows.

My present method is to plant an acre with corn for each cow, putting as nearly as possible six kernels in a hill, thus getting nearly double the fodder on an acre. The ears are not so large, and hence more easily eaten by the cow; the stalks are not so large around, and have few leaves, thus making the fodder very nutritious and relishable. Cut the corn fodder just as soon as the ear is mature enough to keep in the crib. The bottom leaves are beginning to turn brown then, and the cutting should be hurried. Put them in large shocks so as to have as little exposed to the

weather as possible. Draw the tops tight and tie with binder twine. When ready to crib husk out five or six average shocks and find how many bushels of corn they yield. Calculate to leave twenty-five bushels to the acre; husk out the balance by working around the shock without untying any of it. In this way you disturb the shock very little, and your husking is done about as soon as your neighbors.

How I Feed.

It is necessary to have a small yard

the sides from springing apart, and you have a bottomless rack that you can take hold of and turn over whenever it needs clearing of refuse, thus saving much time and annoyance in clearing out the old way where stationary racks are used. Get a couple of low wheels, about 16 inches in diameter, have a couple of old wagon stubs fitted to them, attach to a good, strong wood axle; take two 4 by 4 by 16; lay across the axle a little behind the center and bolt solid. Bolt a cross piece at each end. Put a couple of fence boards on lengthwise to fill



FEEDING SHED OF A. G. JUDD.

well protected by buildings, sheds, and high, tight fences, to shield the cattle from the cold winds. With warm water to drink, and corn fodder in racks to pick at, the mercury may stand at zero or below, and you will not see a humped up or shivering cow in the bunch, if turned out regularly from four to six hours every pleasant day. Build frames or racks to feed in, by taking five planks 2 by 12 by 16. Put two planks on a side, and the other plank makes four pieces for the two ends. Put old posts in the corners to nail to, a fence board in the center up and down to prevent

the middle. Spike on front ends a couple of 2 by 6's about two feet long for runners. Attach double trees to the front end with a short chain, and in a couple of hours on a stormy day you have rigged up a truck on which you can carry fodder enough for fifty cows, and one man can go to the field, load and fill racks in three-quarters of an hour. Three such racks will hold enough for fifty head. Whenever I have time, I fill my barn with fodder to use on stormy days and in the spring.

After milking in the morning I feed bran. After breakfast feed sheaf oats;

these are eaten while the man is filling the racks with corn fodder. If the oat straw is free from rust and cured in good condition, the cows will eat it as greedily as hay, and you will find the oats are thoroughly digested. Allow half an acre of oats for each cow. Cut when the grain is turning and about two-thirds ripe. Be sure the berry is ripe enough to fully mature in the shock, for we want the full benefit of mature oats. Bind in bundles, the same as usual; put in shocks, and as soon as safe move into the barn. After the oats are eaten up, turn out the cows, clean the stables, fill the mangers with fodder corn for the night. After milking at night, feed bran again.

By having shoats to follow the cattle there is no waste whatever. You have saved in a dairy of fifty cows, for grinding, at least \$125. You will sell \$300 worth of hogs, \$500 to \$700 worth of hay. One man can do the work of caring for the fifty cows, thirty shoats, and ten calves. Your corn fodder will not cost you to exceed \$1.50 per ton. You have saved in the cost of the feed as follows:

A BALANCED RATION.

8 lbs. bran, 5 lbs. oats, 26 lbs. corn fodder.			
	Pro-	Carb-	
	tein.	Hy.	Fat.
8 lbs. bran...	1.00	3.52	.24 at \$9.00 pr. t. = .036
5 lbs. oats...	.37	1.80	.17 at .18 pr. b. = .027
26 lbs. fodder			
corn,	.70	7.38	.25 at 1.60 pr. t. = .02
39 lbs.	2.07	12.70	.66
			.083

Comparison of cost of two ways of feeding at market prices November, 1897. Each system containing one-third corn, oats and bran, by weight:

Corn, 60 lbs. at 20c. plus 4c for grinding and 1c for hauling	\$0.25
Oats, 60 lbs. at 18c equals 31c, plus 4c for grinding and 1c for hauling	.39
Bran, 60 lbs. at \$9.00 per ton	.27
180 lbs.* Cost	\$0.91
180 divided by 10 lbs. equals 18 cows, grain cost	\$0.91
20 lbs. hay times 18 cows equals 360 lbs., at \$7.00	1.26

\$2.17 divided by 18 (No. of cows) equals 12c per day.

*Amount fed each cow per day.

Second way of feeding.

Corn, 80 lbs. cob and husk at 20c, minus 3c for husking, 4c for grinding and 1c for hauling	\$0.12
Oats, 80 lbs grain and straw, at 18c equals 36c minus 3c, 4c for grinding and 1c for hauling	.28
Bran, 80 lbs. at \$9.00	.36
240 lbs. Cost	\$0.76
240 lbs. divided by 10 equals 24 cows.	
\$.76 divided by 24 cows equals	\$0.036 grain cost
	.02 corn stover
	\$0.056

Total cost of each cow, or less than half the cost of the other system.

DISCUSSION.

Mr. Wilson—I have probably fed as much corn fodder as any man in southern Wisconsin, but I never found any device by which I could take care of corn in the way you speak of when there are four or five inches of ice.

Mr. Judd—We load our corn in the fall and put it in the barn when the ground is dry, to use at such times. If land is flat and wet or you are north where snow is troublesome, stack it in the fall if you have not barn room.

Question—How did you manage to milk fifty cows with only one man to do all the work.

Mr. Judd—We have one man and a boy—three of us do the milking. This idea is for young men. I have a tenant on my farm who manages thirty-eight cows with himself and his wife and boy. His wife helps milk so his expenses are very low.

Question—Do you recommend putting a woman out to milk? The women on my farm don't like to work out in the winter time.

Mr. Kellogg—We don't want money bad enough for our wives and daughters to milk.

Mr. Judd—This is not for the older men who have their machinery and everything paid for, and money ahead, but supposing a young man starts out and has a farm to pay for, and his cattle and everything else to pay for, it is all right if his wife is willing, that she should go out and

help him; or if a man has three or four children, they can help, and it is reduced to a system where that one man can do all this work with their help to milk.

Miss Cunningham—It is no disgrace to any lady to know how to milk.

Mr. Merrill—In our state the farmers and dairymen, as a rule, are feeding too wide a ration. Mr. Judd has just stated that we should feed a balanced ration to our dairy cows, because a wide ration will get them fat, which, of course, we must avoid. I fail to see how we can balance up a ration with the feed suggested by Mr. Judd. As I make it, it figures about one to eight, and it ought to be one to six.

Mr. Judd—It is a great deal closer than that.

Question—I want the gentleman to explain something of his line, how he happens to produce milk so very cheaply, and what he does with it.

Mr. Judd—We sell our milk to the condensing factory. We have the largest factory in the world, and of course they do not buy by the test but by the hundred pounds. Our milk is tested every two or three days, and we never know when it is coming; if it runs below three and a half we hear from it right away. If it runs above that it is all right, we don't hear anything.

A Member—According to what the gentleman says, it is one thing in the condensing factory, and another thing in the butter factory. If I had a Jersey herd giving four, five or six per cent. milk, I am sure I could not afford to put my milk in that factory against others that tested away below that.

The Chairman—It is not a question of producing cheap milk, but the cheapest method of producing milk.

Mr. Judd—That is it. The milk produced under that system is more uniform in quality than if you fed more grain, because you are apt to put the cattle out of condition.

The Chairman—Do you cut your fodder corn?

Mr. Judd—No, because that entails the expense of machinery and more help.

The Chairman—Wouldn't it more than pay for the extra expense?

Mr. Judd—No, I don't think it does. I have tried it and have found that my cows will eat it up as well without cutting. The thing is to cut your corn fodder right in the field to have it palatable.

Mr. Thorp—How long have you practiced feeding oats in the bundle?

Mr. Judd—This is my fourth year.

Mr. Thorp—And this is my first year. I too came to the conclusion that we as farmers are using a great deal more labor and spending a great deal of money that is unnecessary. I have been in the habit of threshing and grinding all my grain up to the past year, and this winter I have been feeding it in the bundle. I find that the grain is digested a great deal better than it was when we fed it whole without grinding, or better than it was when we cut it up with the feed cutter, as we used to do. I found that the cattle had to eat altogether too much straw to get what grain they wanted if it was run through the feed cutter, but by feeding it whole in bundles there is a great amount of the straw that is left, but they get all the grain. The horses, cows and steers all do well on it, and the hogs get lots of exercise—the breeding sows get plenty of exercise in threshing their own grain. I have come to the conclusion that I don't want any more threshing machines, I don't want any shredders around me, and I don't want to cut up any more fodder for my cattle. There has got to be some waste anyway and I can raise such quantities of it, that I would rather give the cattle an opportunity to pick out what they want and leave the balance than to cut it up and make them eat what they don't want.

Mr. Judd—You must all bear in mind the locality in which you live and the condition of your land. If you have flat land where the water stands, you want to have a shed or barn room where you can move this fodder in the fall when it is in good condition. You must have it in good condition if you are to get good results, and if it stands out until the water comes around it, it will be spoiled.

Question—How do you keep oats from being destroyed by the mice?

Mr. Judd—We stack them in the barn as we do out doors, the heads all in and solid as we can, and we leave a little room outside for the cats to run.

Mr. Thorp—Stack out doors. I build my stacks out doors on top of cedar posts about twenty inches high and cover them with boards; I find this the cheapest and best way of putting up grain or hay.

Mr. Convey—I have been advocating feeding unthreshed oats and unhusked corn for the last ten years, in Wisconsin Institutes, but only under certain conditions. Where you depend almost entirely upon feeds of that character they are too coarse and bulky and will not give good results. I am entirely opposed to yard feeding for dairy stock—there is too much exposure and too much waste of manure and feed. It may do for beef.

The Chairman—The conditions of the dairyman in Wisconsin are quite different from those in Illinois.

Mr. Judd—You must have a yard that is tight—that will keep out the wind and let in the sun. A cow that is turned out every day usually grows a nice, thick, glossy coat and she will keep up the circulation that is necessary to health and handle enough more food than the stall fed cow to produce as good results.

Mr. Convey—We tried that for thirty or forty years in Wisconsin, but we know better now. The gentleman makes no allowance for waste.

Mr. Everett—I appreciate the remarks that have been made by Mr. Judd, but I must differ from him in some respects, particularly in regard to the yard feeding for dairy stock. My experience teaches me that it is not economical feeding the year around.

Mr. Arnold—It seems to me there is one point in favor of Mr. Judd's remarks. There is a possibility that dairymen by the confinement of their cows may reduce our cattle to a condition in which they are more liable to disease by overcrowding in a warm stable, but this wide ration as recommended by him and his coarse feeding, it seems to me, are only possible where land is cheap and labor is very high. Now, in southern Wisconsin our lands are high, and labor is comparatively high, but not as high as in the northern part of the state where land is cheap. There it is excusable.

Mr. Judd—Land with us probably is as high as it is here. It is worth from \$100 to \$125 an acre, and our help is high. We pay \$20 for our best men and from \$14 to \$16 for our second help. My milk is weighed every day in the year, my milk tickets come back and I know from my experience for I have followed this thing right through for fifteen years and I have made just as close study as they do at the Experiment Stations, it is dollars and cents to me. I figure everything carefully, taxes, interest, and everything. I went into this intending to solve this problem of how I could make money the cheapest with less help, and this is the result I arrive at. My figures show me that I am making three times as much money as I did under the other system. At our State Institute the other day, there was a young man, Mr. Ralph Allen, who has adopted this system, and he stated that he has made more than twice the money since he adopted it than he ever made before. Two years ago I went down

near St. Louis to a Farmers' Institute, and gave them this same talk, and nearly the whole neighborhood there adopted this system, although many of them had their machinery. I got a letter from the secretary of that association lately, and he says, "This winter, 1897, is the only winter that we could see that we got a good, fair profit, and that when everything was at the lowest." He said the only men in the neighborhood that were complaining of hard times were those

that had followed out the old system.

Many here seem to think this system only work where you can feed outdoors. It is just as applicable to the stable. Have a tight open floor to feed on. Once a day with a barley fork push the refuse out the door onto the fodder truck or a double rope and take it where you please or have a cutting machine on the feeding floor and the refuse can be run through it in a few moments and used for bedding.

CARE OF MILK.

L. E. SCOTT, Neenah, Wis.

Not long since, when visiting an establishment where a certain article is manufactured, I noticed that each man was engaged in making only one of a number of component parts. Day after day he had worked, turning out piece after piece of the same part or pattern, until he had grown very deft in the manufacture of this particular piece, if indeed he had not himself become a veritable machine. Others were engaged in putting these several pieces together, and the thing was complete and became an article of commerce. The thought occurred to me that should one unskilled or careless workman produce a defective piece, the whole thing would be condemned, and if sold at all, it would be at a reduced price, quite likely below the cost of production.

Skilled Labor Necessary.

Now, the manufacture of our grasses, clovers, and grains, into dairy products, constitutes the greatest manufacturing industry upon the face of the earth today, and according to the same natural laws that govern other manufactures, the lack of knowledge on the part of a single

patron of a cheese factory or creamery, or any carelessness in the production or care of his milk, will not only affect the quality and price of the output of his factory, but it will tend to lower the reputation of the state or country abroad, when this product is sold in a foreign market.

A couple of years ago the Hon. S. A. Cook in order to ascertain the effect of "filled cheese" upon the reputation of our state and country purchased a uniform lot of full cream cheese and caused a portion of the same to be shipped to Canada, where it was branded "Canadian cheese" and re-shipped to Liverpool, England. The remaining portion was shipped direct from Wisconsin and being sold upon the Liverpool market brought two cents per pound less than did those of the same make which were sold under the "Nom de Canadian." Of course the farmers were not to blame for this particular state of affairs, but the illustration will suffice to show how much depends upon a reputation, and a reputation can only be gained and maintained by honest and enduring effort.

Our department of agriculture is doing all within its power to gain a foothold in the British market for America's surplus butter, but notwithstanding our cheaper lands and the cheapest dairy food crop that the world has ever known, little Denmark without these natural advantages, sells thirty pounds of butter in England for every pound imported there from the United States. We find, too, that some of the other small countries of continental Europe are also strong competitors.

Early Training.

Without any attempt at solving a problem so complex, I desire to call your attention to one important fact. Realizing that the foundation of their success lies in the production of good milk and the care of it, the peasantry who have the care and control of these matters, are being taught at governmental expense, along these lines and at an age when such teaching will produce the most marked effect viz., during their school days. Hon. A. C. True, Director of the Office of Experiment Stations, U. S. Department of Agriculture, in visiting one of the public schools of Belgium, says that while present, instruction was being given to a class of boys and girls of twelve years of age upon the composition, care, and uses of milk. Samples of milk and cream were at hand, with which illustrative experiments were tried, and Mr. True says that, young as they were, these scholars proved that they possessed a practical knowledge of the subject. And this is not an exceptional instance. On the contrary the essential elements of dairying and other lines of agriculture are being taught in every rural school in Belgium today.

In Wisconsin our agricultural press, our State Dairymen's Association, and our Farmers' Institutes have all done much toward improving our dairy products, but there still remains very much to be done. The field is indeed large, and the laborers are compara-

tively few. But whatever may be done, let us not neglect the instruction of the masses, for it matters not how skillful a cheese maker or creamery man may be, he cannot be expected to make a fancy article from defective milk.

Good Milk.

To produce good milk it is first essential that we have good, healthy cows, and with our privilege of selection and knowledge of breeding and feeding, and rearing the heifer, there would seem but little excuse for failing in this requirement. Everything should be provided that will tend to keep the cows in the most perfect state of health and thrift, and the highest degree of comfort and contentment. Wholesome feed, proper amount of exercise, pure water in sufficient quantities, fresh air, clean, light and well ventilated stables, and the general care of the cow, all have their effect upon the quality of the milk.

We should avoid feeding those feeds that will impart a taint to the milk. We should never give our cows damaged food of any kind, and while such foods as turnips and cabbage may possibly be fed in limited quantities ten hours or more previous to milking, without material damage to the milk, yet there are other feeds that may be fed just as profitably and without incurring any risk.

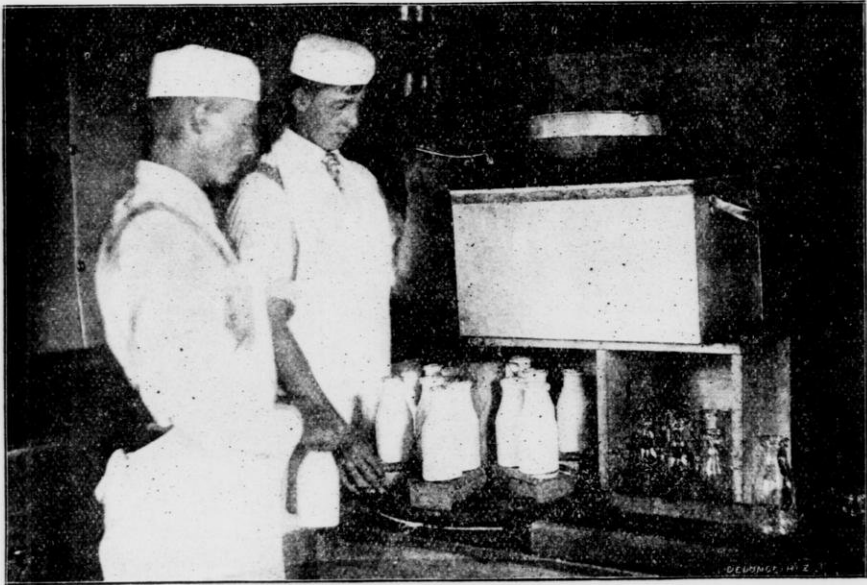
Bacteria in Milk.

But there are other taints than those resulting from the feed which are more troublesome. I refer to those of the germ origin. These are minute organisms which we call bacteria, numerous in variety, and they cause a correspondingly large variety of undesirable flavors, and also the souring of milk in all its various forms. While the milk in the udder of a healthy cow is probably free from these troublesome germs, every particle of dirt or detached hair that finds its way into the milk pail, carries with it numbers of them.

Cleanliness.

It is necessary then, to thoroughly clean the udders and under parts of the cow previous to milking. In our practice each milker is provided with a good horse brush which is used vigorously and the teats stroked with the bare hand, before the open pail is placed under the udder. It is necessary also, to see that the milk pails, cans, and all utensils are thoroughly

precautions, as regards cleanliness, are observed, the bacteria which the milk contains when brought from the stable, will not of themselves cause serious trouble; but at a temperature ranging from 65 to 100 degrees Fahr. they will multiply and develop with surprising rapidity. It is essential, then, that we cool the milk at once after milking, to a temperature below 50 degrees, when bacterial growth is



FILLING BOTTLES AT ELMHURST DAIRY.

cleansed. It is not enough to give them a rinse and a promise, but after a good washing, using an effective grease eradicator like sal-soda, washing powder, or soap, they should be thoroughly scalded in boiling water. In summer time, at least, subject them to the purifying rays of the sun.

Aeration.

In purchasing new tinware always see that there are no deep seams. If there are, have the tinner resolder them flush with the surface. If reasonable

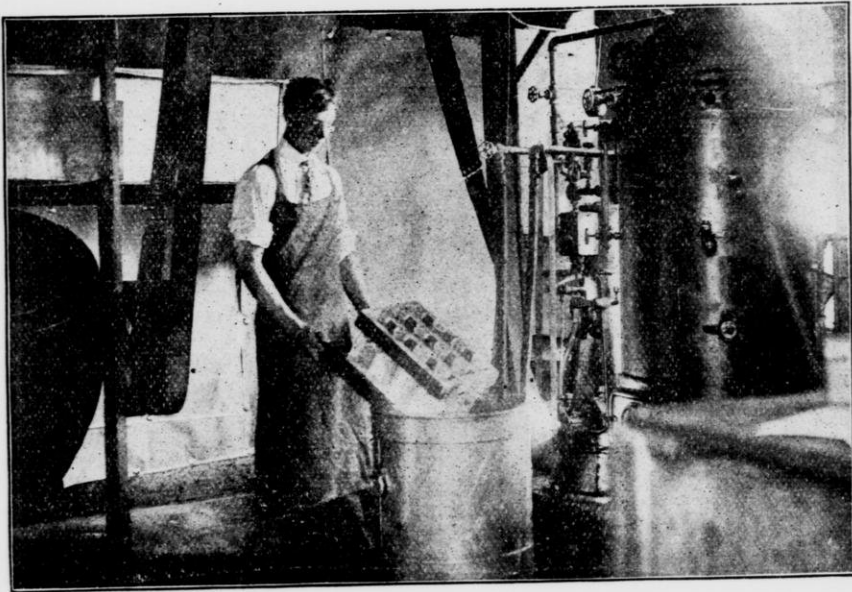
checked only to be renewed when the milk is again warmed. As these bacteria are really a low order of plant life, any temperature that is best adapted to the growth of the plants of the field, will produce the most rapid souring of milk and the production of bad flavors. Contrary to the popular notion that thunder or a humid condition of the atmosphere will cause milk to sour, it has been proven that it is a question of cleanliness and temperature only. Milk, in all cases, should be removed at once from the stable to

a place free from contaminating odors. Night's milk intended for the factory should be run through an aerator, cooled, and stored in an open can set in a tank of cold water. Morning's milk if hauled any considerable distance should be treated in precisely the same way, but may be taken warm for a short distance, if done immediately after milking. It should never be turned in with the night's

than water and if stored in large cans before being perfectly cool, it should be stirred occasionally or decomposition may commence in the center before it is cooled through.

Care of Bottles.

As our own milk is sold in the city by the quart, a brief description of our methods may be of interest to those who are engaged in that branch



SCALDING BOTTLES AT ELMHURST DAIRY.

milk unless it is first cooled to the same temperature.

If butter is made upon the farm, the milk should be set at once without aerating, for the reason that to aerate is to cool it and not nearly all the cream can be raised by the gravity process if the milk has once been allowed to cool. If a separator is used there is no better time to separate than when first drawn from the cow, and the cream can be aerated and stored in cold water until time to ripen. Milk or cream cools more slowly

of dairying. Quart and pint bottles are filled with milk as soon as drawn, and stored over night in a tank of ice water. The bottles being small the cooling is very rapid. In the morning the bottles are sealed with caps made of wood pulp, which are used but once, and the milk marketed. When returned the bottles are all washed, however clean they may appear to be. A small percentage are returned by careless customers without ever being rinsed. These are first brushed out in tepid water, when this is changed and

a tank of clean water is provided, containing sal-soda and a sufficient amount of soap to make a good suds and placed under a revolving brush. A steam jet with a convenient valve enables the operator to keep the water at as high a temperature as can be borne by the hand.

After a thorough washing the bottles are locked in cases containing a dozen, and plunged into a tank of clean water kept boiling by another steam jet. Each case is left in this boiling water until the next case is washed, when it is taken out, inverted, and slipped into a frame to drain. When wanted for use the bottles are always found to be clean and thoroughly sterilized.

Our morning's milk is separated, the cream stored in Cooley cans in a tank of ice water, and finally marketed in bottles the same as the milk. A portion of the skim milk is made into cottage cheese, cream added, and marketed in pails.

We use coupon tickets, and as they are used but once there is no danger of carrying germs of disease from one house to another, as has sometimes been done by the use of the old-fashioned ticket.

DISCUSSION.

Mr. Goodrich—Do you know the cause of bitter milk, and how to prevent it?

Mr. Scott—It might be caused by one of the forms of bacteria. There are flavors that come from the feed and others from the air, and they may enter the milk from one source or another, and as they multiply and develop under high temperature, they may and do produce these bad flavors.

Mr. Goodrich—Years ago I had bitter milk and I found it was from bitter weeds. My cows were kept in an oak opening where the feed got short.

Mr. Edwards—Do you get all the cream from the milk when you scald it?

Mr. Scott—If the milk has been cooled once you cannot recover all the cream by the old-fashioned or gravity process. You can get it by the use of the separator.

Mr. Kellogg—How many minutes after milk is freshly drawn will it take on odors, standing in a filthy place?

Mr. Scott—It will not take on odors while it is cooling, but after it has become cool it will.

Mr. Kellogg—How long will it take to cool?

Mr. Scott—To be on the safe side, I would remove it from the stable as soon as the pail is full.

Mr. Convey—Where they have aerated milk in the stable they have found that it does take on bad odors.

The Chairman—As I understand it, it takes on the bad odors of the barn as it cools.

Mr. Convey—Unquestionably it does. That has been tested and found to be true, particularly where they have aerated in the barn.

Mr. Hughes—Would you recommend aerating milk to increase its keeping qualities?

Mr. Scott—It is simply a question of rapid cooling; if you can cool it as quickly without aerating, it will keep just as well. You can, however, remove more or less animal odors by aerating.

Question—Which is the better of the two, aerating or pasteurizing?

Mr. Scott—I prefer aerating. Of course, pasteurized milk will keep longer than milk simply aerated, but I have never seen pasteurized milk but what the flavor has been more or less affected.

Question—Would you recommend aerating or separating in the barn?

Mr. Scott—My practice is to separate in an outside building, but I know that some of the best dairymen in the state have their separators in the stable, without any perceptibly bad results.

Mr. Convey—A few years ago a question was asked in an Institute as to the best method of getting a cor-

rect test of butter fat. I suggested that they aerate the milk in order to prevent the rising of the butter fat and in order to have a more perfect sample. A year later we visited that same place, and they made the statement that aeration had not only a tendency to give a better test at the factory, but it also tended to improve the quality of the product to a remarkable extent.

A Member—I have seen some persons who did not wash their separators after using them in the evening until after using them in the morning again. How is that?

Mr. Scott—That might answer for making butter, but in my business I am obliged to wash immediately after using, each time.

Mr. Convey—Is the gentleman quite sure that it might answer for making butter?

Mr. Scott—I know good butter makers who wash only once a day, but

they fill the bowl with cold water and let it stand till morning.

Mr. Convey—They would be better butter makers if they washed every time they used the separator.

The Chairman—When I bought my separator, it was told me as an inducement, that we did not have to wash it twice a day, but I would strongly recommend washing it every time it is used

Mr. Scott—While a guest at a certain hotel in this state, I overheard the landlord chiding a servant for a little dust remaining on the stairs. I noticed upon the wall, in another part of the building where the servants could daily read it, this placard—"Cleanliness is my hobby," a most excellent motto for every dairyman who would succeed.

The Chair appointed the following committee on resolutions: L. E. Scott, H. C. Taylor, and George C. Hill.

TUBERCULOSIS.

PROF. H. L. RUSSELL, Madison, Wis.

The subject of my talk today is, "What shall we do with tuberculosis stock?"

It is hardly necessary for me to go into any lengthy discussion as to what tuberculosis is, how it is produced, and the conditions under which it is disseminated, and the inter-relation which exists between the animal and the human form of the disease. It is a contagious or infectious disease; it is produced by a certain specific germ which is called the bacillus of tuberculosis. This organism is taken into the system and is there able to develop in the living animal or human body and produce the disease.

Perhaps the first question to con-

sider is the amount of tuberculosis which exists in this state. It is difficult to secure satisfactory evidence on this point for the reason that tuberculosis is an extremely insidious and slow-developing disease; it is impossible for us to determine its presence until the disease has gotten a firm foothold in the animal or human body, and, therefore, there are many cases of incipient tuberculosis that pass without being recognized.

Tuberculin Test.

A very valuable means of recognizing it has been introduced within six or eight years and is known as the tuberculin test. This test was discovered by Prof. Koch, one of the lead-

ing bacteriologists of the world, and it consists in injecting into the animal a small quantity of substance known as tuberculin. The course of the reaction consists in a rise of temperature in an animal affected by the disease, while, in an animal which is not so affected, there is no such rise, so that by means of the thermometer one may determine very simply whether an animal is diseased or not.

This tuberculin test has within the last six or eight years been used in hundreds of thousands of cases throughout the world. There is, therefore, no question as to its reliability, because thousands of autopsies have been made on cattle that have been tested first with the tuberculin test, and it has proven itself to be so reliable and so accurate that it has now displaced all other means of diagnosis. We don't know how much tuberculosis we have in this state for the reason that the test has been used but very little.

Prevalence of Bovine Tuberculosis.

In Massachusetts, Vermont, and some other of the eastern states, it has been used to a very much larger extent. In Denmark and Germany it is very extensively used, and it is showing the dairymen that the amount of tuberculosis in the world at large is very much greater than has been hitherto suspected, and also that it is on the increase. I might say that human tuberculosis, owing to the better sanitary conditions, is gradually losing its grip but in the bovine form, an alarming state of affairs is shown.

In Denmark, the leading butter country of the world, over forty per cent. of all animals which have been tested, have been shown to be affected. Even in our own country, in the eastern dairy states, the average of diseased cattle found among those inoculated is as high as in Denmark.

The peculiar characteristic of this disease is in its slow, insidious de-

velopment. It remains in a latent condition for a considerable length of time, and then, owing to some peculiar condition, such as giving birth to a calf, or a cold or severe drain upon the system, the disease may pass from this latent over into the acute type of the disease, and become worse. Large numbers of the animals which react to the tuberculin test are not seriously diseased. One of the advantages of the test is that it detects the disease in the very earliest stages, even though there may be only slight lesions in the animal. Its value therefore comes in enabling us to separate those animals which react from the animals in the herd which do not react, although it does not necessarily follow that those animals which we put in the quarantine class are at the present time dangerous. They have in their system the seeds of this disease, and therefore there is a possibility that the disease may go from the latent form into the acute form without our knowledge, but sometimes this does not occur for months.

What Investigation Shows.

The study of tuberculosis among cattle reveals some very interesting data, and some from which we can draw very practical conclusions. One of the most important is that the disease is not equally and uniformly distributed throughout our country. It is sporadic. One herd will have fifty, ninety-five, even one hundred per cent. of its animals tuberculous; a herd on the next farm may be free from it. From one herd to another it is distributed very largely by the purchase and sale of high bred animals. I don't mean to say that high bred animals are necessarily more disposed towards tuberculosis than the ordinary scrub or native stock, but tuberculosis exists in these older dairy sections of the east, and therefore it is possible in buying animals from those sections to introduce an

animal which may have the disease in its early stages, and it may not be far enough advanced so it can be recognized. In this way many dairymen have thus unwittingly introduced into their own herds the seeds of the disease. The disease may go on growing in a slow manner,—two or three or four years before it breaks out in an acute form,—but all the while it is present and ready when the proper conditions are reached to pass over

attitude of breeders will materially change, because they will be willing to have their herds tested when it becomes necessary to sell the same, and in all probability they will not until that time comes.

On the Increase.

Statistics show that there is considerable tuberculosis in this country; we cannot tell how much in this state for the reason that the tuberculin



DEMONSTRATION OF TUBERCULIN TEST WITH SHORT COURSE STUDENTS.

into the acute stage, the tubercles break down and are thrown out from the body, and the seeds of the disease are thus disseminated and other animals acquire the disease.

This brings us to the important point as to what should be done in the purchase of such animals. It seems to me the part of wisdom with the intelligent purchaser is to insist upon buying such animals only after being tested by the tuberculin test, or buying them on the basis that they will not respond to that test. In that way one can avoid any trouble of this sort. If intending purchasers will take that stand, we will find that the

test has not been used to any considerable amount. Probably the number of animals which have been tested under the auspices of the Experiment Station, and also in private herds, does not exceed one thousand, so it is impossible to make any statement as to the percentage of affected animals. In Europe and the eastern part of this country, the disease is undoubtedly on the increase, and we have every reason to believe the same course of events will follow here. In all probability there is only a small amount of the disease here at present, and it is highly important therefore, in a great dairy state like this that we

take this matter in hand promptly before we reach the condition of those older dairy regions.

So we come back to the original question: What shall we do with stock when we find them affected with tuberculosis?

The tuberculin test reveals a very large percentage of stock reacting to this test, but it does not tell us the actual condition of the stock; it does not discriminate between an animal which may have a single tubercle the size of your thumb, from a case in which the whole animal may be affected with the disease.

The method which has hitherto been followed in treating animals that respond to the tuberculin test, has been to condemn and slaughter such, but this frequently works a severe hardship, not only on account of the money value, but from the labor which has been spent in breeding up these herds.

Subsequently, it has been found on post mortem examinations that very frequently the animals which respond only show very small lesions, and the disease would remain in a latent, torpid condition for a considerable period. The meat and milk from such cows are not necessarily infectious or capable of transmitting the disease.

"Weeding Out" the Disease.

During the last two years the Experiment Station has taken up this matter from another aspect. It has proceeded on the basis that consumption is not an hereditary disease, that if the child of an affected mother is removed from a tuberculous atmosphere, the probabilities are that the child will not die of consumption, because it is taken out of the surroundings where it is likely that the disease germs may be taken into the system.

The same is true in reference to animal life; in a very large number of cases, unless the mother has the disease in an advanced stage, if the

calf is separated from the mother at an early age, so that it cannot breathe the same atmosphere which is charged with germs of this disease, and fed upon boiled or pasteurized milk, it is possible, in a very large percentage of instances, to raise a healthy calf from tuberculous ancestry. This suggests a method along which stock can be saved even though it reacts. In place of condemning and slaughtering all animals which respond to the test, we have been working to find out if it were not possible to weed out, in place of stamping out the disease, and we hope in this way to raise a healthy calf from a tuberculous mother and thus retain the good qualities of the herd.

Experiments We Have Tried.

Take a fancy pure bred cow worth a couple hundred of dollars or more. If that animal responds to the tuberculin test, it is possible, if she is not too far advanced, to raise several calves from her, and the probabilities are that they will possess to a considerable degree the same valuable traits as the mother. This method has been tried at our Experiment Station. We have worked with different herds. In one herd we found sixteen mature animals out of the twenty-three that responded to the tuberculin test, and when the herd was closely examined to determine the condition of each animal with reference to the disease, and fourteen were found to be in an advanced stage of the disease, and were therefore considered as being disseminators of contagion, they were killed in order to eliminate this possibility. Ten of them were in such a stage of the disease that it was thought possible to utilize them for breeding purposes. They were separated from the rest, and calves were taken from the mothers within a few days after birth and fed upon boiled or pasteurized milk; they were kept under conditions where they could not

contract the disease from the infected air of the barn nor from the feed which they consumed, and under these conditions there was a considerable number of these calves raised. They are now two years old. The test was made soon after birth and they were found in every instance not to respond to the tuberculin test. The heifer calves that are still living, all of them are free from the disease and show that it is possible to raise healthy stock from this tuberculous ancestry. The same results were obtained in 1897, so that in place of destroying all these valuable animals, they were kept for breeding purposes isolated from the others, and the calves were in all cases healthy. The mature part of the herd have been tested at intervals of about six months, and it has been shown that those originally infected still respond to the tuberculin test, and still possess the disease, although it has made practically no progress in all those cases with two exceptions. Those two have finally grown worse. The remaining animals are at the present time in better physical condition than they were two years ago.

This has proved that the progress of the disease can be checked and healthy calves raised from diseased mothers. The animals that are isolated on account of the disease are watered in separate receptacles, pastured in separate paddocks and treated as an entirely separate herd, although in the barn they were only separated from affected part of herd by a board partition. We propose to continue our experiments upon a farm in the country near Madison and we hope to improve the condition of the diseased animals, although we do not expect they will all fully recover. We propose to continue these experiments and to determine how many years such animals can be kept if they are given good conditions,—such treatment as any man ought to give his animals in any case.

Danish Experiments.

During the progress of this work a similar set of experiments were carried on on a larger scale in Denmark. The method has now come to be known in Europe as the Danish method of regulating tuberculosis. I will say that butter made from the milk of tuberculous cows—those that react to the test but which do not show the disease in an aggravated form, will in the great majority of cases, be entirely harmless. We can, however, go farther and treat the butter, or the cream from which the butter is made, in such a manner as to absolutely destroy the seeds of any disease, by pasteurizing or heating the cream to a temperature sufficiently high to destroy the disease germs.

Pasteurizing.

It is a well known fact that when milk is heated in this way that the cream does not readily rise; therefore, if you take the whole milk and first pasteurize it, then allow it to set by the gravity process, you will find you do not get as large a quantity of cream as you would otherwise. If you have a farm separator, it is entirely possible to pasteurize the whole milk, and then separate the cream and make it into butter and skim milk, and it can be fed to the stock without danger. If you have no separator, the cream can be raised by the gravity process and then pasteurized. The skim milk should also be first pasteurized or boiled before it is fed to stock, thus rendering it possible to utilize all of the milk of such animals while you are breeding the same. With a valuable herd it pays to weed out rather than to "stamp out" by the more drastic measures which have been used.

A great deal is being said in the papers concerning this question of bovine tuberculosis and its relation to public health. I believe, however,

that certain views of it have been exaggerated in the public mind. From a sanitary standpoint the gravity of the situation is not as serious as has frequently been stated, while on the other hand the economic phase of the subject, that which relates to the breeding of stock, has been greatly underestimated.

DISCUSSION.

Question—Does this tuberculosis of this insect ever come to having wings so it can get about?

Prof. Russell—No. The tubercle bacillus, the cause of tuberculosis, is not an insect; it is a microscopic form of life, which belongs to the plant rather than the animal world, and it has no power of locomotion which enables it to pass in the atmosphere, except as it is carried by wind currents. As long as the material is in a moist condition, it is unable to be disseminated from place to place, but when it dries it gets into the dust and is breathed into the lungs of man or animal.

Question—Tell us something about the appearance of the animal which has the disease.

Prof. Russell—There are such a variety of symptoms that it is almost impossible to give an accurate picture. It is frequently called the "wasting disease," because an animal gradually becomes emaciated and dies, without any apparent disease connected with it. The coat of the animal is almost always hide-bound, and staring and rough. The udder may possibly be swollen so as to have one or two quarters very much enlarged. There is, of course, shortened breath, and upon active exercise the animal will very frequently have a fit of coughing.

If you make a post mortem examination of that animal, you will find large, yellowish masses of broken down tissue; the lungs are also filled up with this broken down tissue, and you will find particles of lime formed, so that it will grit like sand. The disease

usually affects the lungs and lymph glands first; it may also be found in the abdominal cavity.

Question—Then it will come down to the saliva?

Prof. Russell—There is where the danger comes. In the incipient stages, the disease cannot be transmitted; these tubercles in the body must be broken down and coughed up by the animal, and the matter from these is the material that is dangerous.

Question—How about the excretions, are they hard or soft?

Prof. Russell—Usually in the advanced stages a diarrhoea sets in, although this is not necessarily so. It is entirely possible where tuberculosis is in the intestinal tract for the excretions themselves to be infectious, and it is possible that in one way or another they might get into the drinking troughs, and for this reason it is unsafe to allow healthy animals to drink from a reservoir that is also used by tuberculous animals. The discharges from the lungs also are likely to infect the watering devices.

A Member—I am interested in some four or five different herds of cows, and I came here for the special purpose of studying this question, so as to know if any of these cows are infected.

Prof. Russell—You can determine their condition by the tuberculin test, almost invariably, and that is the only way that the disease can be recognized in the beginning stages. In the advanced stages, the symptoms are more pronounced, but there are so many diseases which show similar characteristics that it is unsafe to rely on a physical examination.

Mr. Fraser—I want to relate in a moment, some experience we had with a herd at Mendota, a herd of Holsteins, numbering sixty or sixty-five. It was in the year 1895, we had the tuberculin test used by the state veterinarian in the case of all of those cows, and he condemned about forty of them, and killed them. Now, while

it is true that some of those cows were in a run-down condition to some extent, and some of them were undoubtedly badly affected with disease, still I know that there were several killed that were in good flesh, and might have been saved. How long might they run from such a stage to the breaking down condition?

Prof. Russell—It is impossible to state in any given case, but any sudden lowering of the condition of the animal may cause it to pass from the incipient to the acute stage. I visited a herd yesterday and one certain cow has been running down steadily since she gave birth to a calf, two months ago; she has lost about two hundred pounds in weight, and I haven't any idea but what that animal has gone from one stage to the other of this disease, and the change has been brought about from the strain in calving.

Prof. Henry—This year, 1898, at this closing Farmers' Institute, I wish to ask for information. Are there any persons in this room who have had their dairy herds tested with the tuberculin test? We want to make a record on that, and five years from now we will take the census again.

A Member—F. H. Scribner of Rosendale, Wisconsin, has had his herd tested.

Prof. Henry—How many cows have you, Mr. Scribner?

Mr. Scribner—Twenty, Jerseys.

Prof. Henry—Did you find any diseased in the herd?

Mr. Scribner—None whatever.

Mr. Hill—My herd of forty-five has been tested twice, and one has responded each time. We killed both cows.

Prof. Henry—Did you find the disease?

Mr. Hill—Yes, very marked.

Prof. Henry—State briefly what you found.

Mr. Hill—The lungs of both animals were affected, one a great deal more than the other. One had practically but one lung left, and the one that had

the least on the lung had another place in the body, quite a large place.

Prof. Henry—Now, Mr. F. H. Merrell of Portage.

Mr. Merrell—Only a portion of my herd was tested, a very few of the cows. We did not have tuberculin enough to go through the entire herd. We tested the young stock and had no reaction. We tested two or three suspected cows, and one heifer especially, that had a bunch on the jaw. She showed a reaction. A week or two later we removed that bunch; we had a veterinary surgeon take it from the jaw, and she died a short time after, whether from the effects of the disease or from the effects of the surgical operation, I do not know, but upon opening that bunch we found it was filled with yellowish matter that had little granules all through it, and we had no doubt whatever but that was the location of the disease in that heifer.

Miss Cunningham—Why is tuberculosis more prevalent among the Eskimo than any other nation?

Prof. Russell—I was not aware that that was true.

Miss Cunningham—More families are found dying at once. It is also more prevalent among Indians.

Prof. Russell—There are reasons for that. The Indian has degenerated very much from his pristine glory since the introduction of civilized methods in this country.

Prof. Henry—We have had seven members of one family die in Madison.

Prof. Russell—Judging from the experience of the past, the probabilities are that there are forty people sitting in this room who will die of this disease.

Miss Cunningham—Can you prove that the germs are absorbed from without.

Prof. Russell—I think so.

Miss Cunningham—If you can, I can prove that they are not.

A Member—What is the cause of bitter milk?

Prof. Russell—That may be due to a

variety of causes. One cause may be the presence of abnormal organisms which get into the milk and replace the sour milk bacteria. They work upon the casein of the milk and break it up into different substances.

Mr. Merrell—Why is it that an advanced type of dairy cattle is more susceptible to this disease. I have an idea, and I would like to know whether it is correct. The strain on the vitality of a good dairy cow in converting her product into milk and butter, is so great,—and the better the cow the greater the strain—that when this cow is placed in the barn along with other cows that perhaps are affected, is it not true that the better the cow is the more apt she is to contract this disease?

Prof. Russell—I think you have the kernel of the truth, but I would hardly go as far as you do in stating it. There is no doubt that there are influences at work, but if the tuberculous tendency isn't there, you can't have the tuberculosis. If it is there you have a lot of modifying causes, which come in and tend to increase or retard its development.

Mr. Merrell—Is it not the same as is the case in a man? A man has not an inherited tendency towards tuberculosis, but when he is in a run-down condition, he is susceptible to the disease. Now, our highly bred cattle, when they are working at their best, are putting a tremendous amount of vitality into the production of milk and butter, and they cannot resist the disease—the system is just in the right condition. Do you understand whether what is known as "lumpy-jaw" is tuberculosis?

Prof. Russell—No, sir, it is an entirely different disease.

Question—Where can a person obtain tuberculin?

Prof. Russell—Just drop me a card at the Experiment Station, with your name, and I will be glad to give you full information concerning this point.

Mr. Convey—From my knowledge I

am inclined to think that this is a contagious disease.

A Member—I have had experience with this disease. The cattle run down with this diarrhoea and die, and there is no way to stop it. My son, who has Jerseys, and takes good care of them, uses slacked lime water—he puts a double spoonful into the milk every time he feeds his calves, and he hasn't had one attack of the disease.

Prof. Henry—Some of the eastern states are taking heroic measures to free themselves from this disease. Massachusetts has spent about \$150,000 and is spending it annually in payment for diseased cattle, and in the maintaining of a commission to find out the disease and then kill the animals, paying for them up to a certain price. If we should add that amount to our taxes in Wisconsin there would be a great hue and cry at once. On the other hand, shall we allow this thing to pass on without any study or any thought. I do not believe there is a great deal of tuberculosis in the state, I believe it is here and there, in herds, but not every dairy has it yet. I wish you who have suspected animals, or even if you have not, would correspond with us at Madison, and let us see how much we can help you, and help ourselves. We can do it quietly, and without taking the expensive and drastic measures that some of the eastern states have adopted.

Now, three young men have stood up here today and said that they have taken means to free their herds from this disease. I wish that next year and the next year, and so on, when a census shall be taken at our Institutes, that we may find more and more who are trying to clear their herds of that disease. There has been a man passing through the state recently, buying a herd for a party in Minnesota, but he will buy no animals that are not tuberculin tested, and that is a wise rule. You who are going to buy or want to sell, get your herds

tested; never buy an animal and take it into your herd without its being tested, and when that plan is once adopted, it will not be very long before every intelligent buyer will insist upon having a certificate to the

effect that the animal he is buying has been tested. Don't be so careful about some things and so careless about others. Let us go at it in a business-like manner.

AFTERNOON SESSION.

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

ECONOMICAL FEEDING.

C. P. GOODRICH, Ft. Atkinson, Wis.

My subject is economical feeding. I take it that the most economical feeding is that by which we obtain in return the greatest amount of money for a given investment in feed. We get the returns in the growth of the young animal, in the increase in weight, in the increase in value per hundred pounds, or with the dairy cow, in the increase of product as represented in her calves and in the milk product.

Profit in Young Stock.

It is a law in the growth of animals that a young animal takes less feed to make a given gain than an older one. This has been thoroughly proved at the Experiment Stations and on farms, and still we see many farmers feeding animals in such a way and at such an age that one would think they did not really understand this subject. The fat stock shows in Chicago, and the records that those who exhibited there were obliged to keep as to the weight of their animals and the cost of the feed, has been of immense value to all those who have been interested in studying this subject. It has shown in a very marked degree that every day that an animal grows older, the more

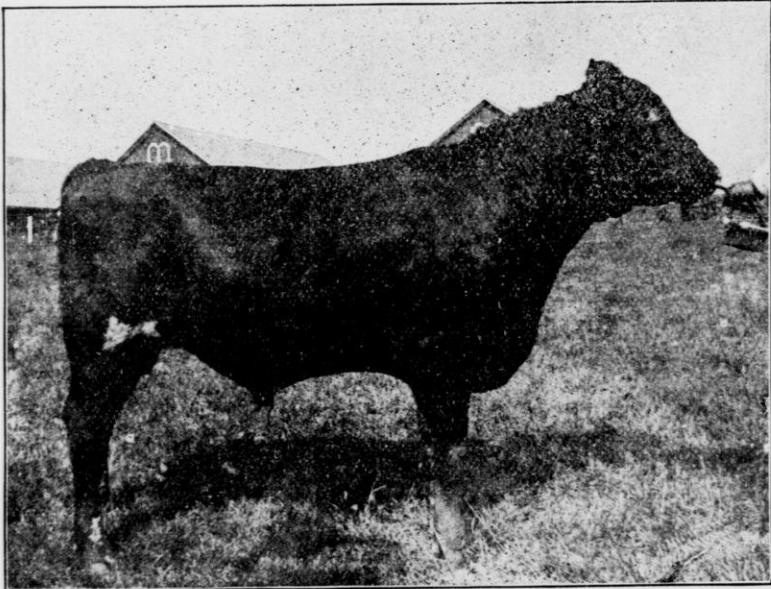
feed it takes to put on a pound of weight.

A Comparison.

I have lately been looking over the records of the fat stock show, and I have selected two steers that seemed to just about represent what I want to illustrate. They were very fine Short-horn steers, and when they were one year old their average weight was 1,000 pounds; the cost of the feed had been \$34.17 each, or 3.42 of a cent per pound. Now, if they had been sold at six cents per pound, there would have been a profit of \$25.83 on each one, but they were fed longer. When they were two years old they weighed 1,600 pounds each; 600 pounds had been put on during the year, at a cost of \$52.12, or 8.68 cents per pound. It cost over twice as much a pound to put on weight the second year as it did the first, although they were very rapid growing steers. They were kept still another year and they put on 650 pounds more each, which made them weigh 2,250 pounds each, and this last year's growth was put on at a cost of about 12½ cents a pound, as the cost of the food this third year was \$81.50

for each steer. Now, if they had been sold when they were two years old for six cents a pound, the profit would have been \$9.71 as against \$25.83, if they had been sold at one year of age; and they would have had to be sold for \$7.50 a hundred at three years old in order to get pay for the feed. Not a great many years ago we used to keep steers until they were three or four years old before we sold them, but

with lambs. We farmers should understand these things. We don't use enough arithmetic. I will give you as an example a problem in feeding that came in my way once. Just to show you the necessity of figuring. The question was: What shall I do with calves that I don't want to raise? Shall I make veal of them, sell them right off, or what? Well, to start with, the calf buyer would give me a dollar apiece



SHORT-HORN CALF 9 MONTHS OLD; WEIGHT, 900 POUNDS. BRED AND OWNED BY J. D. DOUGLAS & SON, SHELBY CO., IND.

the records of these fat stock shows have positively proved that we must make such animals grow more rapidly and during the early life of the animal, and the best posted men say there is more money in selling at one year old, "baby beef," as they call it, than there is in keeping them any longer, provided they can be sold for as much, or somewhere near as much per pound as when older, which has been the case of late years.

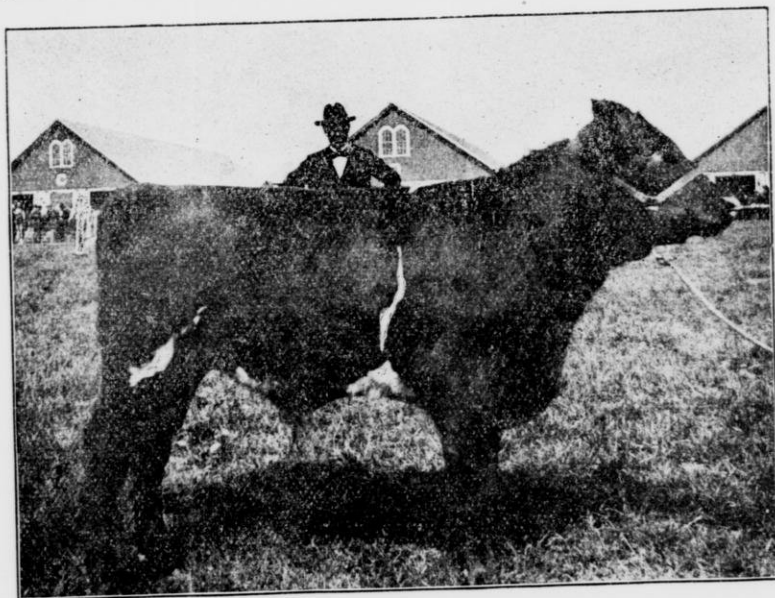
A Problem in Feeding.

This is equally true with hogs and

for the calves when they were two or three days old, or if I made veal of them he would give me five cents a pound. Now, how many can tell me what I ought to do between these two propositions? I didn't know until I investigated and figured it. We must first find out how much it will cost to make veal of the calf. In the very first place, how much milk would it take to make a pound of veal? How was I going to weigh the milk that the calf sucked from the cow? That was easily done by weighing the calf just before

he took his milk and then weighing him right away after. I did that; the calf was weighed four times a day. We experimented with two of them, and found that for the first week, with a good, thrifty calf, seven pounds of milk made a pound of gain. The milk was worth one cent a pound to make into butter, so that it cost me seven cents the first week to make a pound of gain which I could only get five

I put on was costing more than I could get for it. If I kept him twenty-one days, he would gain sixty pounds, which, added to the eighty pounds at birth, made a hundred and forty pounds; counting twenty-four cents a day, the cost would be \$5.04 for feed, and the one dollar that he was worth before would be \$6.04, that he would cost me. If I could sell him then at five cents a pound I would get seven



SHORT-HORN CALF 4 MONTHS OLD; WEIGHT, 450 LBS. BRED BY J. D. DOUGLAS & SON, SHELBY CO., IND. OWNED BY O. K. LUEY, CO-LUMBUS, WIS.

cents for. The next week, to my surprise, I found that it took eight pounds; that is, he took twenty-four pounds to make a gain of three pounds a day—it cost eight cents to make a pound of weight. The next week it took nine pounds, and the question that confronted me was as to how long I could afford to keep that calf. Now, then, the very first minute I got that calf so he would bring five cents a pound was the time to sell it. That was plain enough, because every pound

dollars and make one dollar profit. If I kept him till he was four weeks old he would cost me \$7.93 and I would get \$8 for him, weighing 160 pounds; thereby making seven cents, and if I kept him one day more I would lose money. Some of you are laughing about that; I don't see anything funny about it; it's a serious and important truth.

Somebody asks me what breed that calf was. It doesn't make any difference what breed it is. You will admit that

they were good calves that would gain three pounds a day. It doesn't make any difference what breed it was or what the color of its hair was, or whether it had bristles or wool, the longer the animal lives the more it costs to make gain, and it is just so with older cattle.

Keep Them Growing.

Another thing: The more rapidly you make an animal gain, the less the

if you are not going to veal the calf, but going to raise it to be a cow or a steer, you don't have to give it as costly feed as whole milk, but if you are going to make good veal, you will have to feed it costly feed from the start. For the calf that you are going to keep for a steer or a cow, you can substitute something that does not cost as much as butter fat, take off the cream and feed the skim milk, put in



SHORT-HORN CALF 1 WEEK OLD; WEIGHT, 90 POUNDS.

cost of that gain, other things being equal, because it takes a certain amount of feed for the food of support, and if the animal only gets food enough to support his life, he doesn't gain anything. If you only give him a little more, every pound of gain will cost you a great deal to put on; but make the animal gain as rapidly as you can, and do it at just as young an age as you can.

Of course, it makes a great difference what the cost of the nutriment is that you give the calf; for instance,

oil meal or flaxseed jelly, and the calf will gain in weight almost as fast.

Balanced Rations.

Now, I want to talk a little about balanced rations that we hear so much about. What does that mean? I take it to mean this: That it is a ration that has the right proportions of the elements of nutrition,—the right ratio between protein and carbohydrates to be of the best value to the animal that you are feeding. This chart shows a balanced ration is one to six, and that

is all right for certain classes of stock, but it is not a properly balanced ration for young animals. Milk is the best feed that can be given to a young animal, and the ratio of milk is about one to 4.4, and as the animal grows larger the ration should widen. Animals that are simply being wintered, kept over without making growth, or producing milk, can do so on a ration of about one to twelve, which makes the food of support, but such a ration will not contain the elements to build up muscle or produce milk. A ration that is best adapted to working animals which has to have in it protein sufficient to repair the wasting muscles, the ratio should be something like 1 to 7 or 8. The ratio required for a milking cow as determined by the scientist is 1 to 5.4. This balanced ration idea has been worked out of the experience of practical stock feeders and dairymen, in addition to the work of the scientists. And it has been found profitable to take heed to it, not only in feeding young animals for growth and milch cows for milk, but in feeding hogs, sheep and cattle when fattening them. It has been found that to feed such animals exclusively on corn for their grain food, is not economy, although corn may cost less per hundred pounds than any other grain. When fed in abundance to the exclusion of other grain it makes an unbalanced ration—a too carbonaceous one. It has been found to be economy to feed in connection with corn some food that contains more protein, like bran, middlings or oil-meal.

DISCUSSION.

Mr. Convey—Have you ever known of good results from feeding a wide ration?

Mr. Goodrich—I have never known as large a production from feeding a wide ration as I have from a well balanced ration. It may be possible that it is more economical when the protein in the narrow ration would cost too

much; in that case it may pay better to have a wider ration, although the product would be less.

Mr. Convey—I do not believe you can afford to feed your heifer an improperly balanced ration, and in that way injure her tendency to give milk.

Mr. Goodrich—You must feed the young animal as you want to feed it when it gets older. You want to feed the heifer before she ever has a calf, when she is a yearling, and a two-year-old, on such food as you ought to feed a mature cow, though not as much grain or concentrated food as though she were giving milk.

Mr. Convey—Mr. Judd, of Illinois, advocated the feeding of everything out in the yard, without grinding or cutting. Now, I followed that and I found that it took more than double the amount to feed the same cows out doors in pleasant November weather, than it did to feed them inside. You may have a large farm and not keep nearly as many cattle on it. I claim that on the same farm, with proper machinery to work that fodder up in good shape, he could keep many more cattle, and the extra expense would not be nearly as much as the waste of feed amounts to; also he has that fodder in the very best shape for bedding, whatever is left over, and it absorbs all the liquid manure; he can drive in the barn and haul that manure directly to the field and thus get the entire value of it; whereas, if he feeds in the yard, the manure leaches out and he cannot get it out in the spring.

Mr. Judd—The gentleman evidently does not understand my system. I do not feed anything out of doors but the corn fodder, and that is fed up just as clean as it is in the barn. I have shredded corn and cut corn, and I know I cannot add one cent's worth of digestibility to that corn fodder by cutting or shredding it. It simply takes lots of machinery, time and expense, and more help to do it. A young man can take hold of this system and

make money out of it, and not be surrounded by a lot of help and expensive machinery.

Mr. Goodrich—Economical feeding is what we are after. It is true that the corn crop will produce more cow feed per acre than any other crop, and I don't believe it pays a man to husk and grind corn, but I know it pays to cut it up and put it in the silo, because we have it in a succulent form, which stimulates the production of milk, and we get the feed very cheap. It costs me 'three days' work to the acre to harvest a crop of corn, and put it in the silo,—grain, fodder and all—and it can be fed without any waste; and the cows never held out in the flow of milk through the winter so well as they have since I have had a silo. There are a hundred and forty silos in the township of Lake Mills, Jefferson county, Wisconsin, and every man who hasn't one is looking forward to the time when he will have one.

Mr. Merrell—I misunderstood the conditions under which Mr. Judd feeds. I learned this noon that he has a well-protected yard with either buildings or sheds all around it, and he is a great deal further south than the dairymen of central Wisconsin. We all know that it costs more to produce milk where we allow our cows to stand out in the cold and become chilled, than it does where they are well protected.

Question—Mr. Goodrich, has your corn any more nourishment in it after it comes out of the silo than before it goes in?

Mr. Goodrich—I don't think it has.

Question—Has it as much?

Mr. Goodrich—I don't think it has.

Question—What is the per cent. of loss?

Mr. Goodrich—About eight per cent., when the conditions are the very best.

Mr. Convey—What is the per cent. of loss in corn fodder?

Mr. Goodrich—As farmers usually do it, there is a loss of fully half. It can be put up so that the loss will not be nearly so great, but I see lots of shocks

of corn standing out in the field now, and the good of the fodder is practically all lost

Mr. Convey—Suppose this corn is cut at the same time that you cut it for the silo, bound, properly cured and stacked, or housed, and then cut the same as you cut it for the silo; is it equal to ensilage?

Mr. Goodrich—No, not for milk cows, because we all know that succulent feed is good to stimulate the flow of milk. There is nothing in the world so good as fresh, succulent grass. We cut that grass and dry it into hay ever so carefully, and it will not produce milk nearly so well as grass. You say nothing has gone out of it but water, but all the water in creation will not make it grass again,—the natural juice of the grass has gone out of it. It is just so with corn fodder. If we can preserve that, we have preserved something that cannot be preserved in dry corn fodder.

Prof. Henry—We have experimented at Madison upon the point with reference to the loss in curing corn fodder. We find that the loss reaches twenty-five per cent. easily, in well cured shocked corn. We have taken shocks of corn, carefully carried them to the barn, and put them in the barn standing there as shocks, and found that they lose a great deal there; just why is a mystery. It is probably a slow fermentation that goes on in that shocked corn by which the corn loses more than in the silo.

I wish to speak particularly upon two points in this connection. As we go south into the corn belt, the stalks of corn are closer, more woody, and less digestible when dry, and that explains why an Illinois farmer never likes anything but the leaves of the corn after they are cut and dried. As we come north we find the stalk softer, more digestible, and more readily eaten by the animals. The Wisconsin farmer, by using Flint and sweet corn, may have his cattle eat up all of the stalk, and that explains why Mr. Judd

does not care to have his cows eat corn stalks, perhaps.

It has been my lot to go pretty thoroughly into the subject of dry corn stalks versus silage, and I wish to say that silage shows a distinct advantage over dry fodder, the two conditions being as good as you can make them, and I suggest to you farmers of Rock county, who are trying to be first-class dairymen, that you take your cue from what is going on about Lake Mills. You can well afford to consider silage.

Mr. Hill—We are told that corn in the silo loses a percentage of its feeding value. Now, corn when it is ripe, just fit to shock, I suppose, has the most feeding value, and if you can keep it in that condition, the year around, you can get the most feeding value out of it, but we cannot do that. We can feed only a little while in that condition, and then we must put it either into the silo or into the shock. If it is put into the silo, we are told it loses eight per cent.; careful experiments show that when it is shocked and fed dry in the ordinary way it loses twenty-eight per cent., or twenty per cent. in favor of the silo. Now,

where has that loss gone? Hasn't a good deal of it gone into the woody fibre or indigestible matter?

Prof. Henry—I cannot fully assent to the gentleman's proposition that silage loses eight per cent. to the others twenty-eight. On the average, silage loses more than eight per cent., while twenty-eight per cent. is nearly an average on the fodder.

Mr. Judd—The loss on dried hay in the mow is twenty per cent., and fodder is only eight per cent. more.

Prof. Henry—I think twenty per cent. is a pretty high figure. I haven't those figures now.

Mr. Goodrich—A well balanced ration will take something besides corn fodder and timothy hay. If you can raise clover hay or pea vine hay, that will go with corn fodder, or bran and oats, or bran and gluten feed. The cows on my farm are now having ensilage, some dry corn fodder, some clover hay, bran, and gluten feed. They have had that now for three years, and it makes an economical ration. The protein is furnished cheaper in gluten feed than in any one thing we have tried.

MATING, REARING AND MARKETING THE COACH HORSE.

R. P. STERICKER, Springfield, Ill.

The mating of animals to produce uniform results has been a subject which 100 generations has exercised men's minds, and those who have attained the proud distinction of having achieved that end are in a small minority in comparison to the large number who have made dismal failures of the objects in view.

This is especially true in what may be broadly termed the half-bred horse, i. e., all horses of the coaching and

hunting types which have been without doubt, evolved through long and trying experiences from native stock, coupled, in the first instance with a thoroughbred or "running" sire, until by inbreeding and careful selection, a desired type has been so fixed that the members of certain families can be relied upon absolutely to reproduce themselves with certainty.

It is, therefore, just as easy, when

you have animals of both sexes containing the same characteristics and the same blood, to produce a coach horse, as it is to produce a Clydesdale, or a Percheron, i. e., when you have full-blooded mares and stallions of the same breed to rely upon.

Different Authorities.

But we are confronted here with an entirely different problem, and want to get at the best way of producing a uniformly good coach horse by the use of full-blood sires on the ordinary mares of the country. Almost everyone has a pet theory of his own on this subject, and it is surprising to see how widely many of the largest handlers and showers of coach horses differ on this point. As New York is the largest and best market for coach horses in the United States, it certainly can not be out of place to quote from recent utterances of such eminent New York horsemen as F. M. Ware, managing director of the American Horse Exchange, Chas. F. Bates, President of the N. Y. Coach Horse and Cab Co., one of the most successful dealers and showers in New York, and Dr. Geo. S. Gagnon, a very successful exhibitor at the eastern and also at the late Chicago Horse show.

What Mr. Ware Says.

"Did my means permit, I would start tomorrow—not next month—in the absolutely safe and profitable business of breeding heavy carriage horses, and no business that a farmer can engage in today offers anything approaching the profit from a similar investment. To insure this end, I should prefer to buy French Coach mares of the right sort; but their original cost with keep, losses, breaking, etc., would make my four and five-year-old offerings too costly when laid down in the city sales stable. Setting them aside, therefore, I would buy Percheron or Percheron grade mares (from much the same strains, possibly, as the French Coachers), all of a height, all of a

color, and all of a type, especially selecting those often found, with fine head and neck; round compact barrel; smooth hips, full quarters, well set tail, ample bone, with lack of long hair about the fetlocks, denoting, with a fine coat, the possession of a drop of blood from somewhere; and with all the intelligence, speed, action and activity possible. These mares should weigh about 1,400-1,500 pounds. For a sire I would procure a trotting-bred horse, who was himself, and whose forebears were—the sires, at least—large, 15.3 to 16 hands; this animal possessing, of course, the color and the same general type as the mares selected. He must be a free, fast roadster, a great walker, with speed up to at least 2:40, and ambition enough to trot in two minutes if he could; with all the true and even knee, hock and stifle action possible, the more excessive the better. His disposition must be perfectly gentle, and his brain power and intelligence most marked—full of individuality.

"The females of this line of breeding I should regard as my rock of hope, and retaining only the finest individuals, I should breed again to another sire of the same type as my first; but even from the first cross I should confidently expect good results. One outcross to a family like the Percheron for size and substance—the points which our average trotting-bred horse lacks—is most essential, I think, and even the poorest animals so bred, lacking the quality for fine carriage work, would find their places with the express companies at good prices.

"The matter of similarity of size, color and type in the mares, while the keystone of the whole edifice, is the one point to which few breeders of the horse, if any, have yet paid attention. By this means one may figure with some degree of confidence upon a fair percentage of the produce being of the sort to make matched pairs,

which is the most remunerative form of marketing the raw material. Naturally a feature of such a style of breeding should be the possession of a farm or other business where the mares and some of the youngsters could earn at least a portion of their keep."

Another Opinion.

Chas. F. Bates is more patriotic in his views, and wants the large sized, smooth trotting horse as a park or coach horse. He claims he is the best and still goes on to say:—

"Nearly all of the trotting-bred park horses which I have owned and exhibited were what might be termed short-bred on one side or the other. Most of them were non-standard, or, if standard, they had a cold cross not far away in their pedigrees, so that I have come to believe from this experience that a dash of cold blood is a good thing. The high-bred trotting horse is likely to be too high toned in temperament, too rakish and narrow in conformation, with low, sweeping action, which will not do at all in a park horse. When you get outside of the best families of campaigners you will find shorter legs, bigger bodies, more substance and greater docility, as a rule, but in all families of trotters there are too many horses with ewe necks, coarse heads, long backs, light, flat-ribbed middle pieces, loosely coupled, narrow, weak looking hind parts, drooping rumps, low-set tails, crooked hind legs and shuffling gait.

"It is a difficult matter to describe the points of a high-class park horse, but he must be free from any and all the defects just mentioned as being common to the trotting horse. Action counts for more than anything else in the show ring and in the sale ring, and a horse must have naturally showy action, or he will never be a high-class horse, no matter how long or how carefully he is trained at the high-stepping game. Bitting and shoeing will sometimes work wonders

in developing and improving action, but it must be there naturally for the trainer to work on, just the same as speed must be in a trotter intended for the turf."

Dr. Gagnon's Idea.

Dr. Gagnon deprecates the trotter alone, and he says:

"I think that the trotting-bred high-stepper can be made the best in the world, but he cannot very readily be bred from the trotter alone, for the reason that the trotter has not substance enough, and except in the instance of stallions permitted to remain entire for, say five years, not neck enough for use in heavy leather.

"Now we may think what we may, but the fact remains that the supply of high-steppers is now so limited that we might as well call it exhausted, and be done with it at once. What we are going to do for recruits during the next five, perhaps ten years, I do not know—I do know, however, that I have no horses for sale, except at prices representing what they will surely be worth three or four years from now. Of course, a lot of bad ones will be fitted and placed on the market, and the same old claims made for them. The best will be none too good and the worst ones fit only for delivery wagons or work of that sort.

"Naturally, once in a while a real good one will be discovered, but they will not be numerous enough to cut any figure whatever. I believe, therefore, that it will pay better to breed carriage horses in the next ten years than it will to breed any other sort of horse.

"You never can do anything with the horse that lies down on the bit or pulls your arms off. A puller is not fit for a man to drive, and he will never look well. But get your horse so he is playing with the bit continually, just enough pressure on to keep the connection between him and his driver perfect through the reins, and the restraint will direct the force that would

make him go fast toward making him raise his knees and hocks—make him a high-school horse if necessary.

"No, no one need be afraid to begin breeding these horses. The shortage is going to be tremendous, and for the good ones competition will be very keen. No, I don't know to what height prices will reach, but, I believe they will go 'out of sight.'

"Don't try to breed them too flashy in color. A quiet, solid-colored horse, bay, brown or dark chestnut, without any white, are the best colors, and sell very well. Of course, very flash-colored ones, bright golden chestnut with four white legs and big blaze, for instance, will sell well enough, but to a different class of trade. A gentleman does not wish to be known by his horses; he prefers that his horse should be known by him."

Now, you see that the three authorities whose views I have just given, do not agree, the first arguing that the trotter-Percheron cross is the thing—the second advocating the trotter with a cold out-cross, and the last named does not state how to breed, but admits there is need of something outside of the trotting horse.

My Own Experience.

In adding my own views on the subject, I want it distinctly understood that while I have my preferences for certain breeds, I have no ax to grind, and come here to tell you what I know from long and actual experience in horse raising of the type we have under consideration, and I am of the opinion that an ounce of practice is worth a pound of theory, and while the trotting horse produces once in a while a beautiful coach horse, he does not do so with any degree of uniformity. All the authorities quoted from agree that there must be a cold cross to obtain substance, and by this is meant width and depth, or greater weight. I maintain that recourse to the Percheron or any other draft cross is fatal to the production of a high-

class coach horse, i. e., unless a thorough-bred sire is used. By this I mean a running horse, in which case I have known numbers of good coach and hunting horses raised from "drafty" mares.

The Percheron Cross.

Speaking of the Percheron cross reminds me of what an eastern gentleman said who had tried it. He said: "I could get along all right if I could only manage to breed that darned Percheron rump off my horses, but it will 'crop out,' and spoils everything." It is an acknowledged fact that nothing enhances the value of a heavy harness or coach horse, more than a long, level quarter, i. e., a quarter with the tail set high or as nearly on a level with the back as possible, and consequently a drooping, or as it is termed in England, a "carty" quarter, is most undesirable and often spoils the contour of an otherwise beautiful horse. You may have a lovely head and neck, fine, sloping shoulders, and a good back, but if you have not a nice, level quarter you cannot have a high-class coacher.

The question is, how are we going to get this desirable feature. Without being egotistical, I think I can tell you. First, be careful in selecting your brood mares, and take only those free from any admixture of draft blood. Get mares of good conformation, standing from 15-2 to 16 hands high, showing evidences of good breeding, which may be largely either trotting or running blood. Such mares should have clean, hard, cordy legs, and sound, open feet, long, arched necks, well set into deep, oblique shoulders; the heads should be clean-cut and bony, wide between the eyes and small at the muzzle; eyes clear and bright, denoting mildness and intelligence; back and loin should be stout and well coupled, with as long a quarter as possible. If you get these kind of mares and get them absolutely sound, or at any rate, free from hereditary blemishes, and breed for the pro-

duction of a large, handsome coach horse, standing 15-2 in. to 16-1 in., I would strongly advise the use of a good Cleveland Bay stallion, and for the following reasons:

Cleveland Bay Cross.

First, there is no breed which has such uniformly lengthy quarters, and reproduces them, nor which reproduces its color in so many cases, both very valuable points in "mating" up pairs. Second, no other breed produces so many fine, stately animals, with long, arched necks and lofty style. Third, no other breed produces as much size from mares lacking in this particular. To sum up, by the Cleveland Bay cross we obtain uniformity of style and color, the quarter we want, and good size without coarseness, these points making them the most easily matched horses in the world.

But, to produce the smaller, snappier coacher, standing from 15 hands to 15-2 in., or even 15-3 in. (and which must have lots of action), I would advocate the use of a good Hackney stallion on much the same class of mares as before described. My reasons for using the Hackney are as follows:

The Hackney Cross.

First, in a majority of cases you get good action, i. e., free play of knee and hock, without which a small horse is today practically unsalable, and with it, he can command most any figures. Second, we get a quick, sound, sprightly horse, with smooth, round body and well sprung ribs, an easy keeper, an animal of good disposition, and one that is usually very showy and attractive. Third, in most every case you get a horse that matures early, and sells on sight, at the best prices going.

When a man goes to buy a horse now-a-days, the first question he asks after looking the animal carefully over for blemishes or defects, is, "What can he do?" Now, I claim that the Hackney gets horses that can "do" some-

thing,—in other words, he gets a large proportion of good actors and at the same time animals of excellent conformation, just what people are looking for every day. Some point to our great horse shows and claim the trotter takes the bulk of the ribbons. I admit there are a few phenomenally good, high-acting trotters being kept for show purposes, but start out to find such, and where can they be got? These show horses represent less than one per cent. of the trotting horses annually put on the market; they are almost as rare as the horse that trots in 2-10 or better. Who can afford to breed horses on such slim chances? A



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HACKNEY HORSE.

man does not expect to find "Prodigies" by the score or even by the dozen, but he ought to have a reasonable assurance of getting a fairly good all-around selling coach horse very much oftener than that, and he can do so. If he will follow the crosses I have advocated he will find they are safe ones, and will give satisfactory results by producing good, salable coach horses nearly every time. The Hackney for the smaller and sprightlier type—the Cleveland Bay for the larger.

Feeding Our Horses.

To rear a horse to the best advantage he must be well fed from the time he is old enough to eat, i. e., as a colt he should have free access at all times to a little bruised oats and bran until weaned, when he will soon learn to forget his mother and eat anything else which may be given him. On no

account must be allowed to go back at this stage, and in fact he should be kept going all the time and more especially until two years old, as the first two years of a colt's life determine his form in after life. After he gets to an age when he should be broken, say at three years old, he should be still more generously fed, and although some soft feed is desirable, he must not be fed entirely on it. Boiled feed, although a very rapid fattener, should be used very sparingly and at intervals, otherwise serious results may ensue through the weakening of the digestive organs, partial paralysis, and sometimes death is the direct result of the injudicious use of boiled feeds. I prefer to stick to cut hay, with bruised oats and bran fed damp, at least once a day. Oats should generally form the staple diet of the horse although a little corn can be fed to good advantage in winter, it is desirable to feed only clean, bright hay. A mixture of timothy and clover strikes me best; bright, well cured corn fodder makes a very good substitute for hay once in a while, and is a nice change.

Getting Ready for Market.

Most every person has his own methods of feeding, and no fixed rules can be laid down, but it is essential that horses be well fed; before they can be marketed to the best advantage they must be in good condition, or in other words, fat, their coats or hair must be smooth and glossy, and they must have good manners to recommend them. Nothing is more conducive to this end than an hour's exercise daily, in box stall or paddock, with breaking bit and dumb jockey, or some other kind of sensible biting rig. Then they should have a short, steady drive every day, around town, if possible, so they will get accustomed to the sight of steam and electric cars and the thousand and one other things a horse seldom sees in the country. Horses that are bitted prop-

erly drive much more pleasantly than those which are used promiscuously; they have softer, lighter mouths, and flex their necks so much better and are more easily controlled, showing all their style and action in a natural manner, going along well within themselves, and not pulling and tearing like they would pull the driver off the box. Besides driving well up to, and not lugging on the bit, and being in good condition, a coach horse must be properly shod, perfectly sound and of the proper age, i. e., not younger than five nor older than eight years.

Where to Market.

If a man has horses with all the before named qualifications, he will find it is not difficult to sell them, and if they cannot be sold at home, most any of the large cities have some good, reputable firm of commission men, who hold regular combination sales, where the best buyers come and buyer and seller come together. This may not always be the best mode of marketing but there does not appear to be any alternative, except selling at home, and that is not always feasible. Great distances cannot be traveled with profit to look at one or two horses unless they are exceptionally good, and therefore the export and other buyers stay in such places as Chicago, St. Louis, Indianapolis, and others, where they can see several hundred horses per day, and generally pick out a few they want. The seller is of course placed at some disadvantage when he ships to market, as horses get temporarily sick, etc., etc., all of which operates against him, but if he has really first class animals, that fill the bill, he will usually get a fair price at such sales. The export demand is one well worth catering to and is what has kept up the little life there is in the trade. I feel quite safe in saying that no horses sell better for this trade than the Hackney and Cleveland Bay crosses. I speak from actual experience, when I tell

you I can sell as many good half blood Hackneys with action, and as many big, stylish, long-necked half-blood Cleveland Bays, as I can find, and at prices which will pay any man to raise them. When I make this statement I only tell you the plain truth. We want more good ones, and now is the time to start to breed. There is no doubt the supply will run short, in a year or two, and the man who commences now and goes at the thing in a systematic manner, and is careful to begin with a definite object in view and on a right basis,



CLEVELAND BAY, "HIGHCLIFF."

will be ahead when his colts are ready for market. I venture to predict that there will be no difficulty in marketing them at that time. Now the trouble is, we have more horses than the demand calls for; in four or five years from now, with the return of prosperity which, by the way, is a little slow in coming, there will be, we hope, a continued and increasing demand, with a very much smaller stock to select from, and consequently better prices for the producer.

I shall be glad to answer any questions which may be asked, and give any information in my power which may be of even the slightest service.

DISCUSSION.

Mr. McKinney—The speaker has quoted from C. F. Bates. Mr. Bates was the first man to present to the

American people the trotting-bred coach horse and to make him prominent as the coach horse of the world.

Mr. Stericker knows where the majority of all the prize winners come from. We have not been obliged to go outside of the horse that we have at the present time. We have got the size; we have got the beauty; we have got the intelligence; we have got the grace of carriage, and we have got the speed. In our American trotting horse today we have got the grandest horse of the world. There isn't a place in the world he cannot go and all we have to do is to stick to size and there is no better horse in the world.

Mr. Stericker—The bulk of the horses that Mr. Bates has been handling have been "studs." Now, the supply is gone. Where is he going to get them in the future? The trotting horse is a good horse, I wouldn't say a word against him. I could give you an instance where a man gave 40,000 for a stallion and sold him in Chicago for \$800, and he never raised a \$75 horse from him. By his own admission he lost \$150,000 but got five years' experience.

Mr. McKinney—There is no doubt about that. I know a great many of the stallions of this country have been taken by these parties. Today Mr. Bates has 300 coach horses from fourteen up to sixteen hands. Tichnor & Co. of Chicago have 150, and I know the Wares of New York have 150. When you say there are none left, I can tell you there are a good many left.

Mr. Stericker—What I am advising farmers to do is to breed so they can get a good horse every time, and not one that won't bring \$25 when it is four or five years old.

Mr. McKinney—I understand that. No farmer should breed to a small horse, but neither should he change his breed at the present time.

Mr. Galbraith—Mr. Bates has one good horse named "Coxey." He is

by a trotting bred horse and his dam is a pure coach mare.

Mr. Stericker—I think probably Mr. Galbraith is confounding the name of "Coxey" with that of Mr. Hamlin's "Cogent;" the latter is bred as Mr. G. says. I do not know how the former is bred.

Mr. McKinney—The pick of England was brought to the New York Horse Show, and proved to have been developed from the American horse. There is no horse on earth that can compete with them.

Mr. Stericker—Mr. McKinney can scarcely call one small consignment the pick of England and he should remember these horses showed at a great disadvantage having only recently arrived in New York. Many good horsemen who were present at the New York Horse Show and saw the awards made have expressed their opinions that "Storm King" in their estimation should have ranked higher in the awards. Mr. McKinney is not correct in stating the animals in this consignment were descended from the American horse, those that won prizes being largely or entirely of Hackney blood.

Question—Is the Hackney as pure a bred horse as the French or German coach horse?

Mr. Stericker—I should say that there is not the slightest doubt about the Hackney being ten times better bred than either one of them. If you will show me a French coach horse pedigree that runs back five generations that has not a cross of English thoroughbred or an English Hackney in him, I will give you the best horse in my barn.

Question—Is a large, finely built, sixteen hand horse, with poor action, preferable to a small horse, with a high, nice action?

Mr. Stericker—No; I should say that the small horse was decidedly preferable. Action will sell any horse, if he has any kind of conformation. Good action is the article

most sought after and brings the highest price of anything going, to-day.

Mr. Chadwick—With a fifteen and three-quarters' hand Hackney, will his progeny show as good offspring as any other class of horse?

Mr. Stericker—I think you will get more salable horses from a good Hackney sire, those that are built more on the lines of the Hackney, with good, round barrels and well sprung ribs, than from any other breed I know of in the world.

Question—What do you think of the Cleveland Bay?

Mr. Stericker—I have had a life-long experience with Cleveland Bays, and I like them so well that the very last time I was in Wisconsin I paid \$200 for a four-year-old, and he went to France and sold for — I don't know how much.

Question—What is good weight for a Hackney?

Mr. Stericker—From twelve to thirteen hundred pounds.

Question—What about the Cleveland Bay?

Mr. Stericker—They will run a little more than that.

Mr. Scott—Is the Cleveland Bay horse as well pedigreed as other horses of the driving strains that are imported?

Mr. Stericker—Quite as well. They are better than a good many.

Mr. McKinney—What is the average size of the Hackney horse in America?

Mr. Stericker—I should say from fifteen hands to fifteen-three, and all the way from 1,100 to 1,400 pounds. I am speaking of the grades, the half-bloods.

Question—How do you get the best results with these imported horses, Hackneys or Cleveland Bays? On what class of mares do they cross the best?

Mr. Stericker—From the kind of mares I described, pretty well-bred; say, for instance, thoroughbred or trotting blood, if you like; something

of that kind, something that has size and quality.

Question—What weight of horse sells best for a coach horse?

Mr. Stericker—From 1,200 to 1,300 pounds.

Question—What is your method of rearing and caring for colts, these high-stepping colts, and especially your method of preparing for market? that is where the farmer lacks.

The Chairman—He gave that pretty thoroughly in his paper.

Mr. Moseley—If you had a dam that had a colt by her side this coming spring, how would you get the colt to feed?

Mr. Stericker—I would let the colt learn to eat by feeding it where the mother couldn't get at it. It will soon learn.

Mr. Goodrich—I have lived in Rock county for fifty-nine years, and they are all talking about raising horses to

sell. I have a horse that stands seventeen hands high, a bright bay, nice color, that can haul a surrey with four in it a mile in three minutes, but I wouldn't dare sell him because I never could live long enough to get another one that suits me as well as he does. I say that the farmer in Wisconsin who has a horse that fills the bill and suits him, should keep him for his own use and ride out with his own wife and let the Chicago men buy their horses where they can get them.

The Chairman—I am going to take part with Mr. McKinney in a certain sense. I say that if Americans would give the same attention to breeding for quality and size as we do for speed, we would be wise. We have too many horses with a speed pedigree that haven't anything else.

Mr. McKinney—The great trouble is that the good ones have been sold and we have too many culls.

THE BEST HORSE TO RAISE.

J. S. COOPER, Union Stock Yards, Chicago, Ill.

Mr. Chairman and Members of the Convention:—

I wish to thank you for the courtesy of extending to me an invitation to address this honorable association on the important question of the best horse for the farmer to breed. I make no pretensions to oratory and, like Mark Antony, am only a plain, blunt man with neither words nor power of speech to move men's minds. I shall only show you the condition of our domestic and foreign trade and let you draw your own conclusions. Like Patrick Henry, I have no guide for the future except the experience of the past.

Early History of the Horse.

The period when the horse was first subjected to the use of man extends

so far back beyond the origin of written history that no mention is made by writers of the native country of this noble animal. That his native territory was the hill and plain regions of tropical or sub-tropical Asia, there is, however, little doubt, since it is in such regions the world over that this animal upon regaining his freedom and becoming semi-wild, soonest multiplies into vast herds.

In none of the most ancient inscriptions is the horse found represented in a wild state, but always in connection with man. The fabulous stories of the centaur, a creature half human and half horse, arose from the imagination of those savage tribes, who were conquered by more enterprising and partly civilized foes who had ac-

quired the art of subjecting the horse to use. It is stated that a Thessalian tribe, the Lapithae, first subjected the horse and hence acquired the name. But the horse was known in civilization far anterior to that of this Thessalian tribe, though no record is made of the horse in a wild state even by his earliest masters. Hence, we infer that the horse was not a native of Egypt but was introduced from some other country into the civilization of that land, the earliest on record except that of China.

Later History.

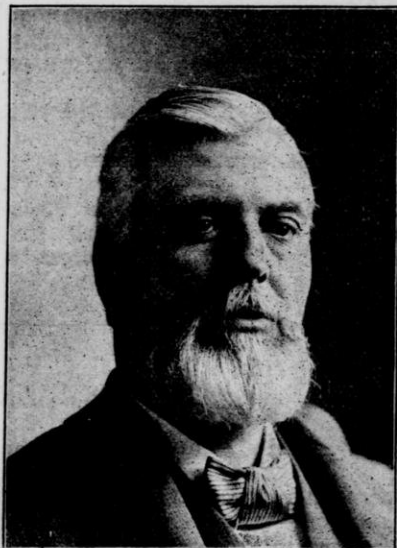
The first record of the horse made in sacred writings is in the time of Joseph in Egypt, at which period the horse had been subjected to harness. At the time of the Exodus under Moses the horse was extensively used in war. The Grecian mythological stories give accounts of the use of horses in war, particularly at the siege of Troy, but they seem to have been confined only to the use of heroes. Coming down to the true historical period, we begin to find the use of horses quite universal, for pleasure as well as for war, and as civilization began to colonize the earth the horse closely followed. Where the original country of the horse was matters little except as an interesting fact, whether in Asia or on the soil of Africa, to which his near relations, the zebra and quagga, are certainly indigenous. It is certain, however, that in Media and Persia, and the fertile plains of Thessaly and Thrace, on the great meadows of the Danube, in the Ukraine, on the banks of the Dnieper and the Don, and other of the great grazing grounds of Europe and Asia, the horse found congenial soil and early became semi-wild. So, after the conquest of America, transplanted here he became semi-wild and soon occupied vast tracts on both sides of the tropics in countless herds.

The Horse in Civilization.

In extending civilization the horse has always occupied a place next to

man, carrying him quickly and safely on long journeys, aiding him to explore new regions or bearing him beyond the reach of savage foes. In the early days of civilization oxen tilled the fields while sheep furnished clothing and food, until latterly the labor of tillage has been almost entirely transferred to the quicker and more intelligent horse.

Among the nations which flourished between ancient and modern times,



J. S. COOPER.

the Arabs seem to have regarded the horse with the greatest esteem and kindness. Among no people were more care and attention bestowed upon his breeding, and nowhere else was the horse so made the companion of man. Hence, in no other country, from the seventh to the seventeenth century after Christ, were horses found combining such high intelligence with great speed and lasting endurance in travel. The Arabs were thus enabled to furnish the infusion of blood that has resulted in the English and American thoroughbred, that has

stamped its measure of value upon nearly all of the more highly prized of the modern sub-families of horses. Yet, neither the English horse, nor the American horse, nor indeed the so-called wild horses of America retain any characteristics of an aboriginal breed. They are, all of them, purely artificial in their breeding, or the descendants of horses artificially bred.

A Large Experience.

In elucidating my theme I shall draw largely on my personal observation extending over a period of more than a quarter of a century as a breeder and dealer in all kinds of horses. There is probably no firm in the commission business that has handled more horses than the house which I represent, having sold during the past twenty-five years from ten to twenty-five thousand horses annually. To keep abreast of the times and to handle skillfully the large consignments with which I have been favored it is important and in fact highly necessary, that I should, not merely be posted on the demands of the market, but more particularly on the fluctuating values, in order that the best interests of my customers should be conserved and jealously guarded. If anything I may say on this occasion shall assist a fellow breeder to improve his circumstances in life by showing him how to achieve signal success in raising horses, I shall be well recompensed for my labor.

It must have impressed this association that this is an age of phenomenal concentration of forces. It is an era characterized by invention and progressive economics. The progress of cheapening transportation, the production of our manufactures and agricultural commodities is engrossing the profoundest attention of the leading statesmen and philosophers of the day. It is a spontaneous inspiration which has taken root in the educated minds in all parts of the world and its progress cannot be stayed until shelter, work, food and raiment are provided for every person created in the

likeness of God on this globe. To obtain this state every able bodied citizen must be willing to work and apply his energy to those pursuits that will yield the best returns for his labor.

Depression in Horse Business.

You well understand that the horse breeding industry of this country has been in a very depressed condition during the past six years. The causes which precipitated the enormous depreciation in prices were overproduction of worthless horses and the adoption of electric power as a motor on the street car railways. The new force displaced nearly two hundred thousand useful horses which were thrown onto an already glutted market. The principal domestic buyers became the largest sellers until there was practically no standard of values. The countless hordes of range horses also swarmed in all the small inland towns of the eastern and middle states and were offered at any price or traded for anything that had intrinsic value. The cheaper animals sympathetically depreciated the price of the choicer offerings and universal prostration and discouragement pervaded the industry. Breeders became alarmed and threw their choice studs on the market at closing out sales in all parts of the country. It was a wild, disorderly scramble to get out of the horse business from 1892 to 1896 when the general range of values touched its lowest point.

Our Export Trade.

The low values of American horses attracted European fanciers in 1894 and a few trial consignments were exported. The eminent satisfaction, in docility, courage, soundness, size, endurance and freedom from fatality in acclimation made our domestic horses universally popular in all foreign markets. The export outlet came at an opportune period and the increased foreign movement has nearly eliminated the surplus in the hands of the breeders.

I will not indulge in voluminous statistics, but will state the volume of our export trade for the fiscal year ending June 30, 1897, was 39,532 horses. The United Kingdom of England, Ireland, Wales and Scotland imported 19,350, Germany 4,897, Belgium 4,213, France 4,000 and even the republic of Mexico took 1,884 American horses. These animals were valued at \$4,769,265. The volume of exports this year is phenomenally increased, there being shipped direct to the various foreign countries from the Chicago market in January 2,500 horses, and in February 2,934 head, making a total for the first two months of 1898 of 5,434 horses from the Union Stock Yards market alone.



DRAFT HORSE.

Profitable Breeds.

There are three distinct types of horses that are profitable to breed, namely: The heavy draft horse, the American trotter and the modern coach horse. It has been said by a worthy contemporary that the country is threatened with a horse famine. This is only true as applicable to fine horses as the country is still flooded with scrubs, inferior animals whose only recommendation is their cheapness, and glutting the market, they pull down the price of good horses.

It is only the breeding of good horses that offers profitable investment. The best draft horse specimens have been selling in the Chicago market this year

from \$200 to \$300, while big scrubs have been sluggish at \$80 to \$125. It does not take a college education to determine which would be the most profitable kind to breed. Full bred sires must be used to obtain the best results and the breeder needs to study his whole market to ascertain whether to select a Norman, Percheron, Clydesdale, Shire or Belgian sire for service. It is the heavy weights that are in urgent demand and the stallion should be a model in size, bone, conformation and action, and weigh 2,000 pounds and upwards to produce the ideal high-priced draft horse. There will be plenty of diminutive animals to supply the demand for Boston and export chunks if the larger types of sires and dams are used for breeding purposes.

High Priced Teams.

With accumulated wealth come expensive luxuries, foremost among which are high-priced coach teams and turnouts. There were two teams owned by Chicago dealers exhibited at the late Coliseum horse show in the coach horse class that won blue ribbons which have since sold for \$4,600 and \$2,500, respectively. These were fancy, well matched pairs and touched the highest points of values. A good coach horse will sell any day in the Chicago market for \$200 to \$1,000 and some fancy specimens have sold as high as \$1,600, but the range in prices warrants the coach horse as a profitable type to breed. Many of the best coachers are large sized, trotting bred animals. The coach horse is produced by the imported Hackney, French coach horse, German coach horse and the American trotter. The best type is an animal standing sixteen hands, of breedy appearance, elegant style, good substance and high, all round action. The coach horse is of commanding presence and capable of pulling a heavy coach from eight to twelve miles an hour.

Speedy Trotters.

The American trotter, including the

popular pacer, is also a profitable type to breed. If speed alone is the object, size is immaterial as extreme speed appears in horses of all sizes and shapes. But a high rate of speed is a quality that has never been produced with uniformity and if the failures are handsome, good sized animals they will command paying prices for gentlemen's drivers.

Star Pointer, 1:59¼, Joe Patchen, 2:01¼, are sixteen-hand horses so that the highest flights of speed are not incompatible with size. Prices are largely governed by racing ability, ranging from \$300 to \$20,000, and the foreign demand for the American trotter for both racing and breeding purposes is heavily increasing.

The European record for all distances by a harness performer is held by the standard bred trotter. Among the best performers exported are Trevillian 2:08¼, Bravado 2:10½, Col. Kuser 2:11¼, and Monette 2:14¼, all trotters with good reputations as race horses. It is useless to attempt to explain how to breed for speed farther than to say that the best types are the result of methodical selections and development. Heredity is the sum of inherited qualities and speed will most uniformly come in the line of racing ancestors. To one who has plenty of capital combined with an intelligent understanding of the laws of breeding, raising trotters is a pleasant and profitable enterprise, but it is not well adapted to the ordinary farmer of limited means.

Ready for Market.

When the horse is of the proper age to market he should be put in good condition and well mannered. Horses thin in flesh or unbroken are always poor sellers. The entire profit of breeding is frequently sacrificed by shipping a horse to market out of condition or but partially harness broken. For the west the best place to sell horses is the Chicago market. It is the chief center of the domestic and

export trade of the United States and leads all the domestic markets in prices for good offerings. There were handled at the Union Stock yards in 1897, 111,601 horses and prices ranged all the way from \$10 for a plug to \$15,000 for Joe Patchen.

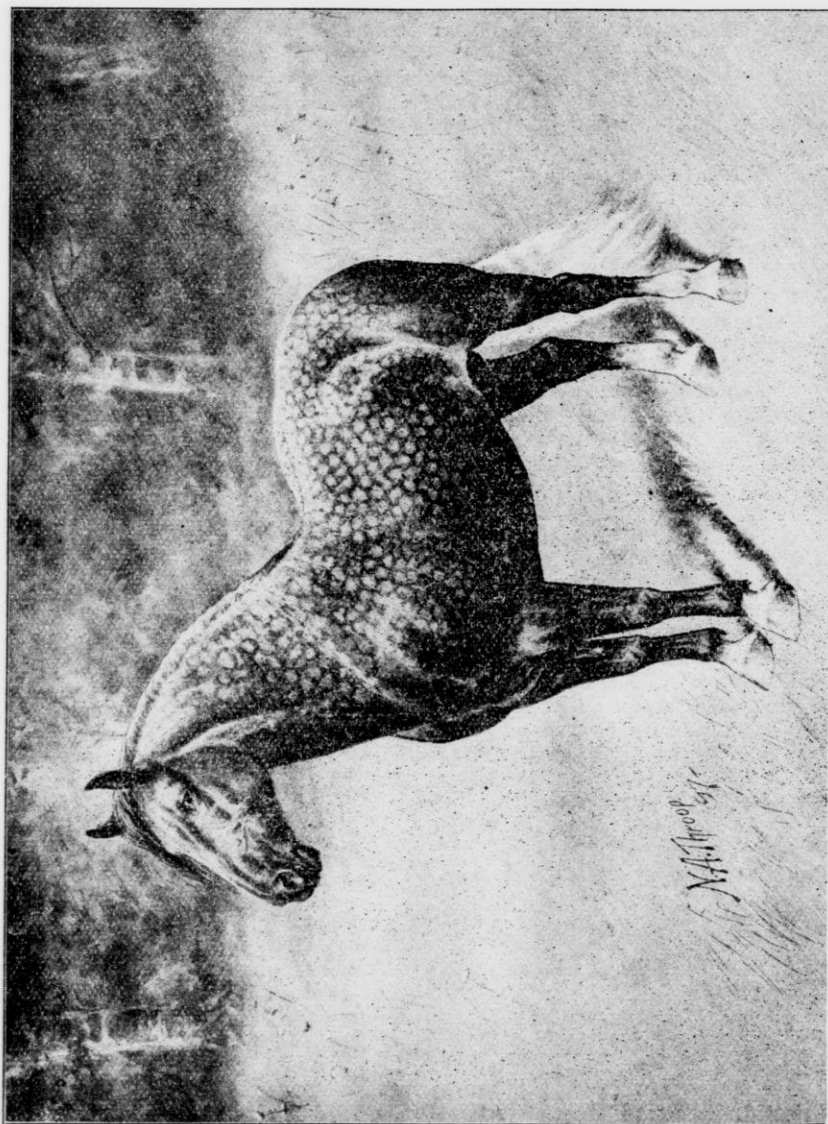
The Horse for the Farmer.

If asked what horse I would advise the farmers to raise I would answer that it is a subject that each individual must solve according to his circumstances and tastes. Last season I bred 70 mares to the very best draft stallion in the country. I showed four drafters at the Coliseum horse show which were awarded first prize. I afterwards sold the exhibit to J. Phillip, a London dealer, for \$1,000 for exportation to England.

My partner, Mr. A. McDonnell, has stocked his 500-acre farm with heavy draft mares and stallions and French coach horses. Everybody knows that I am an ardent admirer of the trotter and have campaigned a stable a number of seasons. At the late Splan & Newgass sale I had such a violent attack of speed fever that I let go of \$1,250 for Regret, 2:13¼, for a road horse, but when it comes to making a reasonable profit on raising horses, personally I am going to breed the heavy drafters. To my mind the draft horse offers the greatest number of chances to prove a winner, being easily raised, early matured, freer from accidents and blemishes, with a certainty of a permanent market at good prices.

"Blood Will Tell."

Time, intelligence, patience and perseverance are necessary to achieve the largest measure of success in horse breeding. Do not return to your farms and say, "There is no use in our trying to raise the typical drafter, coacher or trotter, as such specimens are accidents in breeding." There is no such thing as accident in the principle of methodical selection, as they are sure to produce size, action, strength, endurance and beauty of



A WISCONSIN PRODUCT.—PERCHERON STALLION, MAJOR 18142, WINNER OF 1ST PRIZE AT MINNESOTA, WISCONSIN AND ILLINOIS STATE FAIRS OF 1896. BRED AND OWNED BY H. A. BRIGGS OF ELKHORN, WIS.

conformation. Everything in the universe is under the control of immutable laws and the axiom that "like will produce like," or the likeness of some ancestors, is as inflexible in its operation as the revolution of the earth on its axis or the course of the planets in their orbits. Faith is the confidence in things hoped for, the evidence of things not seen, and what breeders most need is confidence in the future prosperity of the country, faith in the unchangeable laws of reproduction, of fixed types in the animal kingdom, and action on the courage of their convictions that when the harvest comes they may receive their reward, as whatsoever a man sows, tares or wheat, that also shall he reap.

DISCUSSION.

Mr. Gilbert—What weight of draft horse will sell best on the Chicago market?

Mr. Cooper—From 1,650 to 1,900; the heavier the better.

Question—How many horses are there which come on the Chicago markets in chunks and drafters that are in fit condition for the market?

Mr. Cooper—Not over twenty per cent.

Mr. McKinney—Will not a 1,700 pound, stylish draft horse bring more than a 2,000 pound draft horse, if he has an ill-shaped head?

Mr. Cooper—I am looking for weight.

Mr. McKinney—Which sells the better, if one is stylish and the other lacks style?

Mr. Cooper—Oh well, the draft horse has got to have quality. If he weighs 2,000 pounds and has quality he is better, and will sell for more money than a 1,700 pound horse with or without quality, because, all other things being equal, weight with quality will command the higher price.

Question—What is a 1,500 pound horse worth with an equal amount of quality?

Mr. Cooper—They will bring all the way from \$125 to \$150.

Mr. Moseley—Isn't it almost impossible for the ordinary farmer to produce a 2,000 pound horse?

Mr. Cooper—It is not outside the province of any farmer to raise a horse weighing 2,000 pounds. If they will select the biggest draft mare that they can get and breed her to the heaviest and best horse, and proper care and nourishing food is given to the colt, there is no great reason why any farmer and every farmer should not be able to raise a horse at maturity to 2,000 pounds.

Mr. Moseley—Wouldn't we have to have pure bred stock on both sides?

Mr. Cooper—Yes. I spoke of that in my paper.

Mr. Moseley—Won't you point out from that chart the qualities or defects of that horse?

Mr. Cooper—I would call that a pretty clever horse myself. All the fault I have to find with him is that he has too many white feet.

Mr. Goodrich—What harm do white feet do?

Mr. Cooper—They are not salable for a draft horse, not so much so as a horse that hasn't as many white feet. It is the same with the white marks on the face.

Mr. Galbraith—I was on the Chicago market a few weeks ago and they sold a gray horse with white feet for \$500.

Mr. Cooper—We are short on those horses at the present time, but when we had plenty it did cut a figure, I think. I sold a number yesterday for \$125, gray horses.

Question—Do you find much objection to the gray-colored horse?

Mr. Cooper—Not only is there no objection to a gray colored horse, but in the case of a draft horse it is probably preferred to any other color, especially so when it is a dark dapple or steel gray, but it is slightly different in the case of a gentleman's driver, commonly called a light har-

ness horse. Then grays are objectionable and do not sell nearly as well as one of equal quality and merit of a better color, and any solid color is regarded as better than a gray for a harness horse.

Question—What about a white horse?

Mr. Cooper—A white horse is a little objectionable.

Question—Which is the better seller, the Norman or the Clyde?

Mr. Cooper—You will have to excuse me, I am not here to injure my business.

Mr. Convey—What class of heavy horses are you breeding?

Mr. Cooper—I am breeding from the Belgian.

Mr. Convey—Why do you use those?

Mr. Cooper—I got him cheap.

Mr. Convey—Would you recommend the average farmer to breed to a sire because he was cheap?

Mr. Cooper—No, sir; this was a sire that nobody wanted and I bought him; he was a good one, and he is a good one yet. I am sorry to tell the ladies and gentlemen here that I only gave \$50 for him; it is a shame for the farmers to bring horses in and sell them for that money.

The Chairman—Hasn't that state of things grown a good deal out of the panic to get out of the horse business?

Mr. Cooper—It was a panic because they got frightened; they thought the railroads and the bicycle were going to eat them all up.

Mr. McKinney—In your experience do you find a pretty high percentage of good horses in all these draft breeds?

Mr. Cooper—Yes, I do. They are all good, if there are no blemishes. That cuts a good deal of figure. I want to say to the farmers that wire does more harm to the horse market than anything else. The least little bit of a wire mark on a horse takes off the price to an extent that you would not believe, unless you were there to see. A wire mark will take

off \$25 or \$30 and they will use that for an excuse to get a horse cheap, when it is a good one. I think the farmer ought in some way to protect his pasture to keep the horses out of the wires.

The Chairman—The main trouble is with their sticking their feet through the lower wire.

Mr. McKinney—What class of coach horse sells the best?

Mr. Cooper—A coach horse of symmetrical build, of breedy looks, good head and neck, solid color and high knee action, no matter what his breed may be, will sell for big money. There are several breeds of coach horses, any one of which I think is good, and there are some notable ones that are natural actors and produce in kind. If you can picture to yourself which one this is (and certainly they have carried off a higher per cent. of prizes in all the principal show rings in the country the last five years than any other) then this is the breed to select.

Mr. McKinney—Don't you think we have the best horse in the world in the state of Wisconsin?

The Chairman—That would be asking a man to run down his own state. I won't ask him that.

Mr. Convey—Is there any objection to finishing up a horse on corn to get him in market condition?

Mr. Cooper—I don't know much about feeding, but I buy one sometimes that is brought in not in fit condition to sell, and I let him out; that is the only way of handling a horse. I am strictly a commission man. If you ship me a horse that is not in condition, I will say, "I don't want you to lose money on him." I take him to my barn and feed him corn four times a day. I can put fat on him faster than I can in any other way by this.

Question—In consignments made to you, what proportion of these coach horses are high steppers?

Mr. Cooper—Oh, about one in five hundred,

The Chairman—About how much will every hundred pounds that the farmer puts on his horse bring him? That is, if a horse weighs 1,500 pounds, if he puts on another hundred pounds, how will it affect his price in the market?

Mr. Cooper—It ought to bring him \$25.

The Chairman—Then the feed that he puts into him to produce that one hundred pounds brings as much as anything he can put it into.

Mr. Cooper—Yes; the trouble with the farmer is he will have a horse on his place that he will partially break; he will drive him two or three times and consider him broken. He comes to Chicago and acts like a horse that never had a harness on; in other words he is not broken, and it takes off money. If farmers would hitch their horses single and break them, they would get money for it. A horse should be broken double and single, and he will bring more money every time.

Question—Is there a good market for 1,500 and 1,600 pound horses?

Mr. Cooper—Yes, sir.

Question—At about what price?

Mr. Cooper—Prices for a 1,500 pound block vary from \$75 to \$150, the lower range being for blemished or ill-shaped or thin ones, while the higher prices will be for perfect models, sound, in finished condition, not less than five nor over seven years old.

Mr. Convey—How do horses average on the market at the present time, compared with two years ago?

Mr. Cooper—I think there are more on the market.

Mr. Convey—Is the quality gradually getting better?

Mr. Cooper—I think it is, but there are a great many small, inferior horses on the market.

Mr. Convey—How do prices compare with a year ago?

Mr. Cooper—They are better,—I should say fifteen to twenty per cent. better.

Mr. Convey—On what class has this increase been greatest?

Mr. Cooper—On the draft horse, and the extra chunk. There has been the biggest run of horses lately at the Union Stock Yards that there has been for five years, and a bigger demand also, with prices well maintained.

Mr. Moseley—With the idea that horses are going to be scarce in the near future, would it not be well for a man to hold to solid colors as much as possible?

Mr. Cooper—I think so.

The Chairman—And discard the grays?

Mr. Cooper—The gray is a solid color with me, a good iron gray.

Mr. Moseley—With a good, well formed horse does it make any difference what color he is in selling?

Mr. Cooper—My old father used to say that a good horse never had a bad color.

Mr. Convey—What does the market say?

Mr. Cooper—In a previous answer to a previous question I think I fully covered the condition governing colors, that a drak gray, either steel gray or dark dapple, in the draft horse or chunk would command as high a price as any other color, and that in the light harness horse the bays, browns, and chestnuts were preferred. This is what the market says, and it is really what the world says on the question of colors.

Mr. Moseley—Is it not true that a gray and a chestnut, or a bay being put upon the market, equal alike in conformation and other things except color, is it not certain that the bay or chestnut outsells the gray by far, generally speaking?

Mr. Cooper—You are trying to get me into a little trouble, my friend. I think I won't get tangled up in that.

Mr. Moseley—We are asking for information that we may know what line to follow.

Mr. Cooper—The line that I tell you to follow, in my judgment, is to breed

draft horses. I say nothing about the color-breed draft horses.

Mr. Moseley—Well, we want to know about the color of our horses the same as the color of our butter.

Mr. Cooper—You can't change the color of your horses as easily as you can your butter.

The Chairman—It doesn't make much difference what color your draft horse is as long as he is not white.

Question—Will it pay us to breed horses of any kind on ordinary mares?

Mr. Cooper—No, sir. You must have size now. The horses that were bred from common, ordinary mares, were used as street car horses.

Question—Do you expect a scarcity of horses?

Mr. Cooper—Well, no, I don't, but I expect a scarcity of good horses.

Mr. McKinney—From the conditions of the market, does it not appear that more horses are being bought by farmers than a few years ago, and that a country demand is beginning to spring up?

Mr. Cooper—I think so, because the farmers sold them all off and they have got to have something to get them back with.

Mr. McKinney—And they are not breeding?

Mr. Cooper—They are on our market every day buying horses and taking them back on the farms.

Mr. McKinney—You say it won't do for a man to breed from his ordinary mares. I say that if any farmer has a sixteen hand mare, it is all right.

Mr. Cooper—That is the trouble, though. Everybody has been breeding something that is good for nothing. I would have them breed something that is good for something.

Question—What heft of mare would you consider right to breed from?

Mr. Cooper—A 1,300 or 1,400 pound mare with a little specific draft blood.

Prof. Henry—Are the western ranches going to breed and raise the proper quality of draft horses so that

Wisconsin farmers can have no hope for the future from competition between the western ranches and Wisconsin?

Mr. Cooper—I don't think the western ranches cut any figure at all with our work. Last summer I had a man traveling out west four months through the different ranches looking for draft horses, and he failed to find any. He went as far west as the railroads and stages would carry him.

Mr. Thorp—I had communication with a Montana horse breeder and they were selling horses at four years old that weighed 1,350 pounds, all right in every way and shape, and they can be bought very reasonable.

Mr. Cooper—It is with those people as it is with a good many people in front of me. They will write me and tell me what a nice pair of horses they have, and when these horses get to market they are not at all what is needed—not draft horses at all.

Mr. Thorp—I did not mean to be understood that I spoke of draft horses, but as horses to work on the place, or, to use for breeding purposes. A mare 1,300 or 1,400 pounds, well put up, is a good one to breed from.

Mr. McKinney—I had some experience in Montana breeding last spring. A party there thought he knew what a cavalry horse was, and he took a contract for 150 cavalry horses at Deadwood. I went out there, and of all the mongrel, nondescript horses I ever saw, brought into one bunch, they took the "cake," but in Montana there are three or four breeders that do breed good horses.

Mr. Cooper—But they put a brand on them, and that spoils them.

Mr. Convey—With higher prices prevailing, are we not likely to lose a large portion of our export trade?

Mr. Cooper—No, they need them over there.

To summarize briefly answers to the various questions just propounded to me, I would say, as I have already said in my paper proper

read to you this afternoon, that there are but two classes of horses for the farmer to raise with any hope of profit or satisfaction. One is the largest and best type, no matter what his breed may be, of a draft horse. The other is a coach horse with as much action as he can possibly have, standing between 15.2 and 16.1, hands and weighing between 1,100 and 1,300 pounds. In the former any good color, and any color is good except it be a light or flea-bitten gray or a dun, but in the coach horse, bays, browns, roans and chestnuts are given all preference.

In the next three or four years there is bound to be a scarcity of horses, especially of the better ones, as farmers

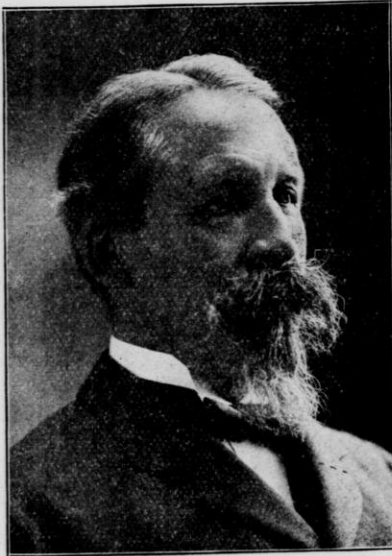
all over the country discontinued breeding from the years '93 to '97, inclusive. The large foreign demand together with the equally large or still larger domestic demand and the innumerable uses to which horses are put on the farm, must of necessity create a shortage, but there never will be a time when the branded horses of the ranges will come into competition or find an outlet in any market at anything like remunerative prices except when such a pronounced shortage will advance prices to double their present figure and by this means create an artificial demand for a something that may be taken as a substitute when nothing else presents itself.

EVENING SESSION.

The Institute met at 7:30 P. M. Hon. Ogden H. Fethers in the chair.
Music by Y. M. C. A. orchestra.

FARMING IN SCOTLAND IN THE DAYS OF OUR GRAND-FATHERS.

HON. JOHN JOHNSTON, Pres. of the Board of Regents, Milwaukee, Wis.



JOHN JOHNSTON.

Citizens of Janesville, Farmers of Rock County, and Friends of the Farmers' Institute:—

It gives me very great pleasure to visit once more this beautiful and thrifty city, and especially upon such an occasion as this. My former visit here was on the anniversary of the birth of the farmer of Mossgiel, Scotland's peasant poet, Robert Burns, who

walked "in glory and in joy behind his plough upon the mountain side." On that evening

"As bees flee hame wi' lades o' treasure
The minutes winged their way wi' pleasure,"

and songs, speeches and recitations delighted and amused an enthusiastic audience of over a thousand people.

Tonight we may not witness the exuberant flow of soul which marked that Burns' anniversary, yet when I see the distinguished speakers who are to follow me I feel safe in assuring you that we shall have a feast of reason of the highest order.

A Farmer by Birth.

I am not unaware of the fact that some of our very practical farmers are quite skeptical as to the propriety of having this grand series of Farmers' Institutes closed by the speakers of the evening. They have a natural suspicion that we can tell them but little which will be of any use to them in the barn, the hen-house, the orchard or the field, and they may be right. Still, there is one thing of which my associates and I may boast and which cannot be gainsaid, and that is that each one of us was raised on a farm; and I feel sure that if a boy has had his home on a farm for the first nineteen years of his life, he must be very un-

like the gentlemen who are to follow me if he cannot say something about farmers and farming which shall be worth hearing. He may have taught school or attended the university, yet if on his return home during vacation he had to "buckle down" to work in the barn or the harvest field, impressions were made upon him mentally and physically which he will not forget while memory endures.

Looking Backward.

I appear before you tonight with less hesitation from the fact that my subject does not call for any "up-to-date" knowledge of the science of agriculture in any of its branches.

When we were boys and had a long journey before us, we would run part of the way, and then, having reached an eminence, we would stop and look back to see just what progress we had made. This represents somewhat the task I have undertaken tonight, viz., from the high ground on which we stand today to look back to the condition of farming in my native land in the time of our grandfathers.

I had the good fortune to be born on a farm in Buchan, the central portion of the county of Aberdeen, Scotland. I hold in my hand the receipts for rent of the farm from 1759 to 1802. The first receipt runs to my great grandfather, John Johnston, and I regret that no sum of money is mentioned. It reads, "Received full and 'compleat' payment for the crops of 1756, 1757, and 1758," from which I suspect that the rent was not paid so promptly as it might have been; still, it is satisfactory to know that at last it was "full and compleat." The receipts run to my great grandfather till 1782, when my grandfather, William Johnston, appears as tenant, and he occupied the farm till 1832, being a term of fifty years, when my father took it. My grandfather, however, continued hale and hearty till I was a large boy, and I had many conversations with him about farming when he was

young. In this country there are but few instances where we can compare the condition of a farm at the present moment with its condition one hundred years ago, yet from what I have been told, I can picture the appearance of that farm one hundred years ago and compare it with what it is today. The changes have been most remarkable, and I believe I am correct in saying that by far the greatest of them have taken place within my recollection.

Old Methods.

The farms in our neighborhood in my grandfather's time were divided into the "intown" and the "outfields." The former was about a third of the farm around the houses. All the manure was placed upon it, and it, of course, was the richest land, but that is not saying much, for the manure amounted to but little. They would always plough the land in the same direction, and in time the ridges became like small hills with valleys between them. There was no such thing as rotation of crops, and turnips, clover and potatoes were unknown. Oats, peas and barley were the chief crops; and after the "intown" had been cropped for years and would not produce more than about twice the seed, part of it was given a rest—that is, was not ploughed. Thereupon, it produced a bountiful crop of wild grasses, thistles, "skellochs," sorrel, rushes and tansies. If this was the treatment of the "intown" you can imagine how the "outfields" looked. I remember that our "outfields" on the hill were largely covered with heather, and on the low and wet ground with rushes, for drains were not thought of. I need hardly say that the use of artificial manure was wholly unknown, although they did treat the soil once in a while to a little taste of lime.

You can well imagine there were many years of great scarcity and even famine. The year 1782, when my grandfather took the farm, was a year of famine. The rents paid were mere-

ly nominal, but, small as they were, they could never have been paid from the land. It is interesting to know that almost all the money the farmers received came from the knitting of stockings. Instead of women working in the fields, the men worked in the house; and the old men and boys spent their evenings, and in many instances their days also, in winter, spinning and knitting. The stockings were sold to the merchants in Aberdeen who sent them to London, Holland and Hamburg. A traveler through Scotland at the beginning of the present century records it as a noteworthy fact that not a single woman was to be seen at field labor in the county of Aberdeen.

Old Time Implements.

You will be curious to know what sort of implements they used. Well, the Scottish plough in Aberdeenshire in the days of our grandfathers was probably not so good as that used by the children of Israel in the land of Canaan three thousand years ago—certainly it was not so good as that described by Pliny as used by the Romans in his day. It was a large and coarse implement, all made of wood except the colter and the sock, and the whole was so primitive that an expert wright could make three ploughs in one day at a cost not to exceed forty cents each. It was drawn by from eight to twelve oxen. Besides the man who held the plough, there was the "gaudman," who walked alongside carrying a long stick with a sharp point for pricking the lazy oxen, and his shouts were so loud and emphatic that compared to them the "geeing" and "hawing" of today would appear tame and uninteresting. I remember there lay around our barn for years, part of a great iron chain which grandfather called the "soam." This chain ran along between the six pairs of oxen and was the only remnant left in my day of the "twal' owsen" plough. The traces were made of dried rushes

or twisted fir roots, for ropes were almost unknown.

There was no such thing as a cart or wagon on the farm, and they would have been of no use for there were no roads. All the carrying was done by "currachs," or large baskets hung from a crooksaddle, one on each side of the horse. The crops were all brought home to the corn yard, and even the dung was carried to the fields in this fashion. It is not surprising that the "outfields" got but little manure. The horses went in single file, the second horse being tied by its halter to the tail of the first horse, and so on. Sometimes there would be a dozen horses in line, especially when going on a long journey—say to or from the meal mill or the peat moss.

Condition of Roads.

I have said there were no roads on which a wheeled vehicle could be used. There were the remains, even in the north of Scotland, of a few Roman roads and there were the military roads made by General Wade through the Highlands. The latter were of so great advantage to the localities through which they passed that an enthusiastic native exclaimed in language worthy of his neighbor across the Irish channel,

"Had you seen these roads
Before they were made,
You would lift up your hands
And bless General Wade."

In our part of the country, however, there were only the footpaths made by the "shelties," traveling in single file. These paths, generally avoiding low ground because of its being too soft, went in a straight line over the tops of hills. The first roads were made on these absurd lines, but were after a time abandoned, as heavy loads could not be drawn up such steep grades.

Then, the crops were all cut with the sickle and threshed with the flail. I remember when the small farmers around us threshed with the flail. From four o'clock in the morning till

eight o'clock at night we could hear the thump, thump, of the flail, with only a short intermission for breakfast and supper and an hour for rest at the "twal' hoors." There were no fanning mills, but the grain was winnowed by being thrown up into the draft between two open doors in the barn. On the introduction of the fanning mill there was quite a discussion as to whether it was not sacrilegious to use it. Was it not a usurpation of the Divine prerogative? Does not the bible say that "He causeth the wind to blow," and "He bringeth the wind out of his treasuries?"

Another curious discussion may be mentioned. After the introduction of turnips, they became, when boiled and seasoned a favorite dish. By and by bone manure was introduced and used in the turnip field. It was generally suspected that many of the bones were human, and whole districts were agitated with the question as to whether it was proper to eat turnips which had been manured with human bones.

Grandfather's Cattle.

I need not say that the cattle were a small, scraggy, ill-shaped, ill-fed lot, and pure black. My father was wont to tell us that when he was a small boy a pure white ox was exhibited at the markets, to see which they paid a small admission fee. A pure white ox, or even a partially white ox, had never been seen in that part of the country. The horses were no better than the cattle.

Then there were no fences. Many a weary day have I herded the cattle when a small boy. I believe I should have gone crazy if it had not been for the company of the dog. He stayed by me when all others seemed to have forsaken me. The dog has been called the friend of man. I know he is the most steadfast friend of the herd-lad-die.

Social Enjoyments.

Notwithstanding the poor condition of agriculture, the rural population

was as great a hundred years ago as it is today. The inhabitants of Scotland are two and a half times as numerous as they were in 1800, but the increase has all been in the cities. The population of Glasgow was then 77,000, while now it is 700,000; the population of Edinburgh was then 80,000, now it is 300,000; the population of Aberdeen was then 26,000, now it is 130,000. The farming districts were as populous then as now, and with such a lack of roads and conveyances, with no newspaper, and with a postal service which charged thirty-five cents to carry a letter from London to Aberdeen, it would be interesting, if time permitted, to inquire how the people occupied themselves, and what were their social enjoyments. Of course, in Scotland they always had the school and the kirk, together with marriages, christenings and funerals, but their social gatherings were confined to narrow neighborhoods. My grandfather often boasted that he had brought his bride home riding behind him on horseback, after the fashion of young Lochinvar. Indeed, that was the only way a young man could treat his sweetheart to a ride in those days. They so seldom came together in large gatherings, that when they did so, they never failed to make those gatherings very festive. Even funerals were no exception, and, Sydney Smith to the contrary notwithstanding, there was often a vein of the best humor to be found in their most solemn occasions.

In case of sickness it was hard to reach a doctor, and so every neighborhood had its "wise woman" who could administer home-made medicines. The minister's and the laird's wives generally took the lead in this, and their gardens had many medicinal herbs. One laird's wife who was in the habit of collecting medicinal herbs for the use of the sick upon her husband's estate, being asked if she was not afraid of poisoning some of the poor people, as the herbs might be poison-

ous, replied, "There is nae fear o' that, for I aye try them on the laird first."

Food and Raiment.

The usual food was mostly oatmeal made up in different ways—pottage, sowens and brose; there were also kail or greens, and their favorite drink was home-brewed ale. Tea was beginning to be used, but many denounced it as both extravagant and effeminate. Claret was more common than whisky, for whisky was not the ancient drink of the Scots. I have been told that the servants near the rivers Dee and Don stipulated that they should not be compelled to eat salmon oftener than three times a week. That was before the days of railways, and I need hardly say that they are not surfeited with salmon now.

The news of the outside world had to reach the household of the Buchan farmer by the pack-merchant or the beggar, and I could tell many stories about those characters, for not a few of them continued to come around even in my school days.

The clothing of the people was plain and simple as their food. They hated all pretentious display, but were remarkable for their genuine hospitality, and above all they prized education. It mattered not how poor the home, how hard they had to work for a living, the children must be taught to read and write. They were very independent in their feelings; sycophancy could never flourish in such a soil. Burns expressed it well when he wrote:

"What tho' on hamely fare we dine,
Wear hodden gray and a' that,
Gie fools their silks and knaves their wine,
A man's a man for a' that."

Reading Matter.

The weekly Aberdeen Journal figures among my earliest memories. Some half a dozen farmers subscribed for a copy, each keeping it two days. By the time the last one

read it, it was twelve days old, but the information was just as new to him as if it had been an extra edition got out to contradict "the extra" which had just been published an hour before.

From what I have said it will be seen that the life of the farmer in northeastern Scotland was very primitive in the days of our grandfathers, and that agriculture was in a most barbarous and depressed condition. There were no roads, no drains, no fences, no rotation of crops, no wheeled vehicles, no clover, turnips nor potatoes, while the cattle and horses were most miserable creatures. Is this to be wondered at when we consider that that land of rocks and bens, and hills and glens, lies under the North Star between the shores of Norway and Labrador, and that it is only half the size of the state of Michigan, and that only one quarter of its soil is fit for cultivation, and much of it is so poor and rocky that the farmers of Wisconsin would not consider it fit to be ploughed?

The Changes Time Has Made.

Yet if we take a survey of Buchan today we shall see a most remarkable change. The Encyclopedia Britannica says there is no country in the world where farming is carried on with more skill and enterprise, and that the average number of cattle to the acre of cultivated land in Scotland is about a third more than in England, and of sheep more than double as many. Johnson's Universal Cyclopedic says that the Scottish farmers enjoy a high reputation for the intelligence which they bring to bear on the cultivation of the soil, and Scotch beef from Buchan and Highland mutton are highly esteemed in London. This must be true, for Johnston's Cyclopedic was fortunate in having for its editor our friend Dr. Adams from whom we expect to hear this evening. John Hill Burton in his history says that Scotland shows

to the traveler's eye the cleanest and most systematic cultivation in the world—the best example of scientific husbandry.

On the farm I have mentioned, the heather hill has been trenched, and the quaking bog has been drained, and both smile with the finest crops, the fields are all fenced, and there is hardly a weed to be seen, while the most scientific rotation of crops and the free use of commercial fertilizers keep the soil in excellent fettle. From this farm of 160 acres, 70 head of fat cattle were shipped last year, averaging in price \$90 per head. Not only the turnips produced on the farm but a large quantity of artificial food, such as cotton cake and oil cake, contributed to this result. The county of Aberdeen is today unsurpassed in the breeding and unrivalled in the feeding of cattle, and 40,000 fat cattle are annually sent to the London market.

The roads throughout the country, instead of being mere paths, are nearly as substantial as the boulevards in Chicago; and the farmers, instead of knitting stockings in the winter evenings, ride to rousps and markets and political meetings in their gigs, and never put a hand to spade or plough.

The mean, scraggy, ill-fed, diminutive, black cattle have given place to the short-horn or the mammoth polled Aberdeen and Angus, while the little shelties have been displaced by the noble Clydesdales.

Twenty-five years ago there were no more prosperous men than the Buchan farmers, but the importation of foreign beef in recent years has affected them very adversely, and it may be that they may by and by have to do some hard work themselves.

Education and Co-operation.

It may be asked how has such remarkable advancement been brought about during so short a time? I answer, by some such work as is being

done today in Wisconsin, viz., the organization of farmers' clubs for the discussion of farming questions, the holding of fairs in every neighborhood where prizes are given for the best live-stock, roots and grain, the encouragement given by the landlords, especially in regard to draining, the use of fertilizers, and the rotation of crops, and the practice of making leases for nineteen years instead of yearly, as is the case in England; but over and above all, as the most influential factor in the advancement of agriculture in Scotland, I think may be mentioned the rapid dawning upon the minds of the farmers of the fact that scientific farming is the only farming which pays. As early as 1723 there was organized "The Society of Improvers in the Knowledge of Agriculture in Scotland," and in 1730 was instituted a local society which called itself "A Small Society of Farmers in Buchan." They published an essay whose preface sounds very strange today, for they disclaim anything purely experimental or speculative and express the design of confining themselves to such practices as they have learned from tradition.

The Highland and Agricultural society which was organized in 1783, gave, and still continues to give, the greatest encouragement to the advancement of agriculture. Its annual show is the great event of the year in agricultural circles, and it has so encouraged local shows that not only every county but almost every parish has its annual exhibit of live stock, roots and grain. During recent years the Scottish farmer has been well supplied with agricultural periodicals where everything pertaining to the farm is discussed in the most progressive and intelligent spirit.

I should say that the Buchan farmer today is ahead of the Wisconsin farmer in almost everything except in dairying. Wisconsin is away ahead in that branch of farming. I believe that Wisconsin is behind in the drain-

age of land, and certainly very much behind in the matter of roads.

I think that Dean Henry and the other experts present will agree with me in saying that it matters not how much you plough and harrow, how much you apply manure and sow the best seed, it is all in vain if your soil be sour and wet.

We Need Good Roads.

Then, I am strongly of the opinion that nothing will add so much to the comfort and pleasure of farming in our beautiful state as the improvement of the roads. Complaint is often made that it is becoming more and more difficult to keep the young folks on the farm, it is so lonesome, tame and uninteresting. With agricultural implements which now do so much of the work and thereby shorten the hours of labor, if the farmers of Rock county had roads like those in Scotland, farm life would be much more enjoyable for the young. Your boys, and girls, too, for that matter, could jump on their wheels and take a run into Janesville and back almost any evening and they would not feel that they are isolated from the great world of affairs outside. In a few years electric roads will join our smaller towns; and with good roads to the various stations, country life will cease to be secluded, but will become part of the life of the towns. The greatest need of rural life in Wisconsin today is good roads; and to secure them the first thing we must do is to make our road tax payable in money and not in work. The way the road taxes in Wisconsin are worked out is a first-class farce.

With the tendency all over the world to crowd into cities and the constant proportionate decrease of the agricultural population, I believe there are many in this room who will live to see the day when farming, from a business point of view, will be the most independent and lucrative of all occupations. No one certainly deserves good fortune more than the farmer.

"God bless the man who sows the wheat,

Who finds us milk and fruit and meat;
May his purse be heavy, his heart be light,

His cattle and corn and all go right.
God bless the seed his hands let fall,
For the farmer, he must feed us all."

The Triumphs of Agriculture.

I often wonder why the immense progress made by the farmer is so little appreciated and so seldom mentioned. When the boastful orator of the Fourth of July undertakes to expatiate on the unprecedented progress of the nineteenth century, he speaks of the wonderful advances in manufactures, transportation and commerce; he tells how immense trains day and night rush across the continent at the rate of fifty miles an hour laden with merchandise and men; he mentions the mighty machines we make, which, with a fulcrum, could easily move the globe on which we live, and he bids us listen to the messages from far distant continents which have traversed quicker than lightning the dark depths of the ocean. Such things strike the eye of the most casual observer, but it takes some thought to appreciate the triumphs of agriculture.

If a Vanderbilt increases the speed of his trains from thirty to fifty miles an hour, the nation holds its breath in wonder, but if Farmer Fethers, by draining, good ploughing and manuring, makes a field produce thirty bushels per acre which formerly produced but fifteen, no one regards it as especially wonderful or praiseworthy, yet the farmer's triumph is perhaps the greater of the two. I venture the assertion that the progress from one of George Stephenson's first locomotives to that on the grand Omaha train which daily leaves Chicago, is no such triumph as the progress from one of those scraggy, diminutive, black cattle of Scotland to the grand polled Angus, or from the little sheltie to the magnificent Clydesdale.

Let us consider this proposition a little. If we enter one of our great machine shops, we find the workmen manipulating inanimate matter, passive and obedient to their every touch. All its powers and properties they know exactly. The farmer deals with life, not only with vegetable life, but with animal life. He works on a higher platform than the machinist; he must force from nature some of her most mysterious secrets, the secrets pertaining to life and growth. Even in raising his crops he must not only woo the earth, but the air and sky and sun must smile on his efforts.

An Earnest Wish.

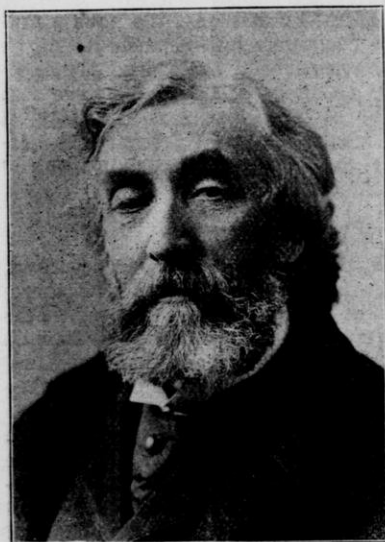
Ladies and Gentlemen, I must make way for the eloquent speakers who are

to follow me, but I cannot close without mentioning a wish which often comes into my mind, and probably it comes into the minds of others here. It is, that before I finally lay my head on the lap of Mother Earth for my long sleep, I may have the happiness to go back on a farm again and there live for a few years "unvexed by the unholy strife that in the city frets and fevers life."

"Back on the farm again! I hear no more
The din of trade with its tumultuous roar,
The landscape glows with color, and the trees
Wave 'palms of joy' in every passing breeze."

THE FARMER IN THE UNIVERSITY.

PRES. C. K. ADAMS, University of Wis., Madison.



CHAS. KENDALL ADAMS.

Of all the institutions of human society a great university is unquestionably the most democratic. It is more democratic than the church, for the reason that within the church, as we all know, the very rich and the very poor seldom meet on the same terms. It is more democratic even than the penitentiary, for although all can enter the penitentiary on the same terms, it is not true that all have the same chance to get out.

Within the university, on the other hand, the rich and the poor meet on precisely the same terms and occupy precisely the same standing. It is true that the rich have some advantages over the poor. They can buy more books. They can join more societies. They can have more of fashionable social life. On the other hand, the poor have some advantage over the rich. They are tempted into fewer distracting influences. They have no allurements to

take them away from that absorbing devotion to study which is the most potent element of success. They are constantly inspired with the idea that their future depends upon their own effort and consequently they work harder and more seldom fail in what they undertake. These advantages, as experience has abundantly shown, more than counterbalance the advantages possessed by those who are relieved of all anxiety in regard to the future.

Merit Wins.

Among students themselves the democratic spirit is a predominant force in all the walks of student life. They meet in the class room on precisely the same terms. They are required to do the same tasks. They work together in the gymnasium. They go into the same sports and into the same bathrooms. If they excel, they have precisely the same chance of getting on the football team or into the crew, or to be chosen to represent a society in joint debate. Of all classes in society students are the most intolerant of snobbishness. The student community respect and applaud genuine merit wherever it is found.

This might be illustrated in a hundred ways. Every one that has long been acquainted with university life knows that the steady advancement of genuine merit over fictitious advantage is one of the most interesting and frequent occurrences of student life. A poor boy comes to the university without money. It may be that he has had so poor advantages in the way of preparation that the faculty hesitate long whether to admit him. When admitted, however, his ability and industry often begin to give him an advantage. He applies himself with desperate earnestness and forges ahead. He is apt to approach and finally pass those who have less anxieties in regard to their future, and finally perhaps graduates at the very head of his class, and when he goes out into the world to enter upon the activities of

life—whatever those activities may be—he finds the world ready to welcome his ability, his industry, and his integrity. If we analyze the motives of students we shall see that, on the whole, those whom the world calls poor have a very considerable advantage over the rich, and consequently they are more likely to be crowned with a larger success.

The same conditions are likely to be found if we look into the staff of instruction. Often, perhaps generally, a majority of those who are called to the highest places in our institutions of learning were once poor boys on the farm, or elsewhere, who had to support themselves, and, who without any assistance whatever, raised themselves to positions of influence and power. In view of these facts, it is not singular that a very large share of those found in the various departments of the university, whether as teachers or as students, come from the farm.

How many farmers are there in the university. It is not easy to answer this question with precision. As you are aware, the university would not be a university unless it devoted itself to universal knowledge. We have a College of Letters and Science, a College of Agriculture, a College of Engineering, a College of Law. We have also a School of Pharmacy, a School of Economics, Political Science and History, a School of Music, and a School of Education.

Farmers in Our University.

In the College of Agriculture, with its 275 students, or thereabouts, I suppose about nine-tenths are farmers. In the College of Law no exact census has been taken, because our methods of admission do not make inquiries in regard to previous vocation. The same is true in regard to the School of Pharmacy. But in the College of Letters and Science, including the School of Economics, Political Science and History, and the School of Education, as well as the School of

Music, and in the College of Engineering exact figures are obtainable.

For the purpose of ascertaining the vocations from which our students have come an examination has been made of the records of the students admitted within the last four years and these interesting results have been obtained: In the Colleges of Letters and Science and Engineering during the past four consecutive years 1,541 students have been admitted. Of this number, 96 students failed to report any occupation of their parent. These were chiefly adults, who, for some years have been self-supporting. One hundred and eighty-nine students reported the death of their father, so that more than 12 per cent. of the students entering these colleges have a widowed mother. Seventy-four students state that their fathers have retired from business. Making the necessary deduction, we have 1,180, of whom the occupations of their fathers are known. These occupations are classified as follows:

- 21.9 per cent. are sons of farmers and dairymen,
- 19.5 per cent. are sons of merchants, including grocers, meat-market men, apothecaries, lumber merchants, drygoods, hardware, clothing, and other sellers of manufactured articles.
- 7.6 per cent. are sons of manufacturers,
- 6.6 per cent. are sons of mechanics,
- 6.5 per cent. are sons of employees, other than those working on railroads. These include traveling salesmen, bookkeepers, superintendents, secretaries, and clerks.
- 3.9 per cent. are sons of railroad employees,
- 5.4 per cent. are sons of lawyers,
- 4.8 per cent. are sons of physicians, including dentists,
- 3.0 per cent. are sons of clergymen,
- 4.3 per cent. are sons of teachers, including librarians,
- 3.0 per cent. are sons of bankers and brokers,

3.1 per cent. are sons of real estate and insurance agents,

3.2 per cent. are sons of public officers, including officers of city, county, state, and the United States.

1.8 per cent. are sons of journalists, including printers and publishers,

1.7 per cent. are sons of hotel keepers and liverymen,

1.2 per cent. are sons of contractors,

0.9 per cent. are sons of engineers, civil, mechanical, and electrical,

1.4 per cent. are of vocations that are miscellaneous and are not easily classified.

Thus we see that the sons of farmers (and in saying "sons" throughout this enumeration I include daughters as well), even in the College of Letters and Science and the College of Engineering have a plurality of all the vocations. This percentage of farmers would, of course, be very greatly increased if the College of Agriculture were to be included. If the 250 sons of farmers in the College of Agriculture were to be added to the 259 sons of farmers in the College of Letters and Science and the College of Engineering, we should find that not far from 33 per cent. of all the students in the university come immediately from the farm.

I imagine that not a very different result would be found if we were to take a census of the staff of instruction. Certainly it is true that many of the most eminent of our professors were farmers' boys.

Our Professors.

Now, what is the life of a typical university professor? He is partly a teacher and partly an investigator. This latter part of his work is so important that I am free to express the opinion that no professor fills his place worthily unless he attempts at least to add to the general stock of knowledge already possessed.

This work of investigation is often overlooked. The opinion is more or

less prevalent that a professor's duties are limited to the work of instruction during two or three hours a day and that for the rest of the time he is a gentleman of leisure. Nothing could be more fallacious. Even if a professor were to do nothing more than to bring to his classes the ripe results of all the investigations that have been carried on in the subject in which he is called to teach he would find enough to occupy all his energies, all his abilities, and all his time. But there is far more than that to do. How vast is the debt which civilization owes to the investigations that have been carried on in the professors' laboratories! Think what has been done in Germany within the past few years. It was recently stated that the discovery of the processes by which aniline dyes are made from coal tar—a discovery made and developed in the university laboratory—brings annually to Germany a larger revenue than the current cost of all the German universities put together. Think of what resulted from the investigations of Professor Helmholtz in the laws of the transmission of sound. I have heard Professor Bell describe how he was reading the great work of Helmholtz when the idea of the telephone came to him and from the results of those investigations we have the means by which all people in the world now are made near neighbors. Think of the results of the investigations carried on by Professor Koch in bacteriology, by which it was discovered that many of the diseases which swept away thousands of people every year may be cured and perhaps ultimately altogether prevented. These same investigations made antiseptic surgery possible, by which such marvelous advances have been made within the present generation.

Discoveries Made at Our Agricultural College.

Now, similar, if less striking results have been obtained in the University of Wisconsin. I need scarcely remind

you that the effort to obtain an easy and simple method of determining the quality of milk resulted in the invention of the Babcock milk test, by means of which I suppose it is no exaggeration to say that the dairymen and farmers of this state save as much annually as the entire tax paid for the university. Perhaps you have also observed that during the past year investigations carried on by Professor Babcock and Professor Russell for two years or more, in regard to the causes of the changes which take place in the flavor of cheese, have completely overthrown the old notions, and have revealed the causes of the changes that take place and the nature of the various flavors that are produced. It is unquestionably one of the important scientific discoveries of the present day. Moreover if we leave the field of these most brilliant discoveries and descend to matters of less general importance, we shall find that here also important results have been obtained. The work just published by Dean Henry on "Feeds and the Feeding of Animals," the work of Professor Woll on the analysis of beet sugar; the work of Professor King in investigating the action of underground water in the supply of the nutrition of plants; the work of Professor Goff in determining the fruits that can be profitably raised within this state; the work of Professors Craig and Carlyle in determining and teaching the methods by which stock can be properly judged; the work of Mr. McKerrow in co-ordinating these various results of investigation and taking them to the farmers;—all taken as a whole, constitute a body of information, the importance of which it would be extremely difficult to exaggerate.

If I were not speaking to a body of farmers, and on the subject of "The Farmer in the University," I could point out how similar investigations are carried on in other departments; but for such a description this is neither the time nor the place. It is

enough to show that what the university is doing directly for the farmer is far more than a compensation for all that has been done for the university.

An Aid to Our Farmers.

Moreover, it ought to be said that there has never been a time when science and experience had so much to reveal to the farmer as they have at the present day. There is not a single subject with which the farmer has to deal which has not been in some ways enlightened by the scientific and practical experiments that have recently been going on in the agricultural colleges and the agricultural experiment stations. It is scarcely too much to say that the application of these results is absolutely necessary to the highest success. It is brains, and cultivated brains,—that is to say, brains that have been trained and that are acquainted with the best experience of modern effect, that are needed in order to make farming successful in the most comprehensive sense. The conditions have become far more complicated and difficult by the extension of modern methods of transportation and the fact that in many ways all parts of the world are competing with each other. Nothing is more fallacious than to suppose that the simple and unaided experience of the individual farmer can insure him any success. To aid him in all of these ways, to carry to him the results of all these investigations and experiments, the agricultural college and the experiment station have been established.

Money Well Spent.

We are now hearing much in regard to the subject of taxation. I read yesterday with the greatest interest the very admirable and wise observations of the governor in reference to the necessity of revising our taxation laws. Sometimes it has been claimed that taxation in this state is excessive, but in regard to that sub-

ject one or two observations may not be out of place even here. In the first place, soon after this state was organized the policy was adopted of selling the lands that had been given for school purposes and for the university, in order to increase immigration into the state. This policy was deliberately adopted, as the reports of committees and the messages of governors show, for the purpose of attracting immigrants into Wisconsin. The policy was adopted with a full understanding that it meant forever larger taxation for purposes of education than otherwise would be necessary. Taxation in this state has indeed for purposes of education been considerable; but if there were time I could show, from the reports of the Commissioner of Education, that the amount of money annually devoted to education in this state is less at the present time than that devoted in other states adjoining us in proportion to their wealth. These conditions should not be forgotten and when we consider that of the aggregate amount of taxation paid an overwhelming preponderance is for local purposes, and not for education, we shall probably conclude that reduction in taxation, if it must be made at all, should be made in local rather than in state affairs. How much does a tenth of a mill tax for the university amount to? A tenth of a mill on one dollar is one mill for every ten dollars. It is one cent for every hundred dollars; it is ten cents for every thousand dollars and I am tempted to remark that when I was explaining this to a committee of the legislature some years ago, one of the members observed: "Then for every thousand dollars on which I am taxed I have to pay to the university the price of a glass of beer and a five cent cigar;" and I said: "Yes, that is just what it amounts to, if you pay at the rate of a tenth of a mill." It is infinitesimal compared with all these advantages that the people of the

state are receiving, for it should never be forgotten that the university belongs to the people of the state; in a very large sense, to the farmers of the state; that it is their institution; that it is for the education of their sons and their daughters; and that the future welfare and wealth and greatness of the state are in some large sense dependent, not only upon the wisdom with which the affairs of the university are administered, but also upon the means on which the university is to live and do its work.

RESOLUTIONS.

The committee on resolutions submitted the following report, which was adopted on motion of Mr. Convey:

Whereas, The great trans-Mississippi International exposition to be held at Omaha during the summer of 1898 is now in such form as to assure a successful exhibition of the complete resources of this country, therefore

Be it Resolved, That we believe that Wisconsin should have a share in the benefits to be derived therefrom by exhibitions of our products, as far as possible, and that our citizens should take advantage of this great exhibit.

Resolved, That in view of the painful accident recently sustained by Mr. W. C. Bradley, which has detained him from taking his part upon the program, we hereby express to him our sympathy and the sense of the loss we feel in his absence.

Be it further Resolved, In due appreciation of the successful results of their efforts, that the twelfth annual closing Wisconsin Farmers' Institute express its obligations to the good citizens of Janesville for the lively interest shown at each successive stage of

the undertaking, and their hearty cooperation in making it a final success, commending them for their enterprise in bringing together in their Mid-winter Fair so rare a collection of the products of the soil and of human ingenuity, making a display of which any state might justly be proud.

Resolved, That thanks are especially due to all who have assisted in filling that essential requirement in any complete program, viz., the literary and musical part. We have listened with pleasure to the exceptionally fine recitations by Miss Mabel Taylor and Mrs. O. H. Brand, as well as the several musical numbers all well rendered, not forgetting the young orchestra of the state institution for the blind, whose sweet strains will remain long upon the ear, ever lifting the soul upward.

And, be it Resolved, That expressions are due and extended to our invited guests from abroad, for their wise words of counsel. May a long life and prosperity attend them.

Laurens E. Scott,
H. C. Taylor,
Geo. C. Hill, Committee.

COOKING SCHOOL

Held in connection with the Twelfth Annual Closing Institute,
Janesville, March 8, 9, 10, 1898.

Conducted by MRS. JENNIE A. JAMISON, Neenah, Wis.
Stenographic Report by MISS IDA HERFURTH, Madison, Wis.

FIRST LESSON.

TUESDAY AFTERNOON, MARCH 8.

Mr. Briggs—This is the first time in my life that I have had the privilege of opening a ladies' meeting. I did not expect this and only came in to look on. I have the honor to present to you today, Mrs. Jamison, who will instruct you in the cooking school.

The cooking school is a part of the Farmers' Institutes. The farmers learn about feeding the animals on the farm to keep them thrifty, and Mrs. Jamison will instruct you how to cook to keep the children in good health and the men good-natured. In our regular Institute work the principal part of the meeting is in the discussion, and Mrs. Jamison will outline the topic she is working on and will expect you to ask questions.

Mrs. Jamison—I do not come before the Janesville audience as an entire stranger, because some of you will remember that it was my privilege to be here two years ago and give you some talk about cooking. I was made aware then and have had the impression increased since that time, that the Janesville ladies are excellent cooks, and this makes it very much more pleasant for me, I can assure you, because the good cooks are the kind I enjoy talking to. While

those who are not so well up in the science may be the ones who need the most instruction, they are not always the ones who most appreciate it.

The work of the institute is to gain a better knowledge of the daily life and work that the farmer has to perform, and in this branch, the cooking school, the motive is to promote and raise the standard of the work the housekeeper has to perform, and also to increase the value and appreciation of her work to such an extent that she may realize that while she is mixing the bread, paring potatoes and preparing meals three times a day, though the work becomes so monotonous, she is working for the uplifting of her own family, and so of the world. I think we cannot say too much in favor of the work of the housekeeper in this direction. It is sometimes thought to be mere drudgery, and the world has looked upon it in that way too long. It has been thought that a person could cook without any special training, or without very much brain power, but if that has ever been the case it is not so at the present time, because the grade of cooking throughout the civilized world is of the order that calls

for an intelligent knowledge of the laws of heat, and the composition of the food and its action upon the human body.

The idea of the cooking school is not to produce fancy and elaborate cooking, but to produce that which is nourishing and at the same time not too laborious and expensive for the average American family. Professor Atkinson, who is a well-known authority upon economic topics, says that the family of the average American spends one-half of the entire income for food; and where so much of the money is going for the one thing, certainly very much care should be taken in the expenditure of that amount that it realize the highest possible good. I think with a little more thought and a little more study and care in these matters, and especially in the detail, that the expenses may be reduced, and it need not be said that the ordinary American working man spends half or more than half of his income for food. This does not apply so strictly to the farmer's family, for he produces much of his own food, and to that extent reduces the expenses very much below what the city man with the same income would need to spend. I have it from reliable authority—the example of a farmer in our own state whose household consists of himself, his wife, and a hired man,—where the actual expenditure is only ten dollars per month, besides what is raised in the home garden, the butter, milk and eggs which are used in abundance. So the problem is much more simple to the farmer's wife than to the average city housewife.

The lesson for this afternoon is the preparation of the following dishes:

Corn Chowder,
 Cream of Cheese on Toast,
 Plain Potato Salad,
 Boiled Cream Dressing,
 Gingerbread,
 Coffee, Potato Yeast.

Potato Salad, Boiled Cream Dressing.

I will begin with the preparation of the salad, in fact I have already begun by cooking the potatoes. They were pared and put to cook in boiling water. The reason for the boiling water is probably very well understood. The potato being a starchy substance, requires the most intense heat possible, to burst the starch grains and produce a mealy potato. The paring of a potato is very largely a matter of appearance, but much of the mineral of the potato is lost in paring. The question is often asked whether the potato should be pared thick or thin; of course the thicker it is pared the more mineral is lost. In this country, however, we have such an abundance of food and we find the mineral in so many other foods, such as cereals, meats and eggs, that we need pay less attention to the economical use of the minerals than some countries where food is not so abundant or so various. Perhaps it would be an encouragement to a busy housekeeper to know that it is mainly for looks that potatoes are pared, and that first class hotels are serving them on the table with the skins on. It seems to me that it would be a help to a housekeeper if she could think she was not doing anything much out of the way, if she sometimes served the potatoes in the skins.

Potatoes should be cooked long enough to thoroughly burst the starch grains and make the potato tender almost to the core; then drained and the moisture evaporated as much as possible. They finish cooking in their own steam. They are then ready to be mashed or served in any way desired. Where they are to be eaten hot they should be served as quickly as possible after they are cooked; some other dish of the dinner can better afford to stand than the potato. It is one of the important foods because it furnishes starch—some of the car-

bonaceous food we need—in a more digestible form than many of the other starch foods. It can be prepared in so many different ways that it is one of the most useful vegetables, and should be given a high place. While the potatoes are cooking I will prepare the salad dressing.

For this dressing I use one cup of cream, the yolks of three eggs, one-fourth cup of vinegar, one teaspoonful salt, one scant teaspoonful of mustard, one-eighth teaspoonful pepper, and six to eight drops of onion juice.

In putting this dressing together I will first heat the cream, beat the eggs, add the vinegar, and then pour the heated cream over the eggs and vinegar. I will heat the cream over hot water because it is not then likely to stick or burn, and the dressing can be left without constant attention to better advantage than if cooked directly over the fire. I prefer a double boiler for this purpose but I find it a rather inconvenient utensil to carry with me because of its shape; I must carry those that fit in well together. I substitute a double sauce-pan.

In making this salad dressing there is no advantage in using the whites of the eggs; the dressing is hardly as smooth if they are used, and they can be saved for some other purpose. I shall use these whites that are left for the apricot puff that I shall make tomorrow. Sometimes the whites of the eggs may be used, if cream is not convenient, to finish the salad, being whipped light and added to the dressing after it is made. The recipe I gave you is supposed to be enough for an ordinary family of six.

If this were eggs alone it would not be safe to stir it into the hot cream, but being mixed with vinegar it can safely be stirred into the cream without fear of cooking the eggs, then cook until thick. I mix the seasonings together, adding them after the dressing is made. There is no advantage in cooking the seasonings, and

unless it is of the very best quality and fresh, mustard sometimes tastes rank if cooked. The made mustard, if good quality is nice for salad dressings, and is more easily mixed than the dry mustard. The fashion for mustard in salads is somewhat going out; it is not considered quite so necessary to season with mustard as at one time, and I think it is very reasonable, as it is not very wholesome.

For cabbage salad I like to use a little sugar in the dressing, but in this potato salad I use a little onion juice, and so different salads can be seasoned in different ways according to the material of which they are made, or according to the taste of the cook. There is no dish in which there is more chance for individuality of taste than in the making of salads. If milk is used in making this dressing, as sometimes seems necessary, great care must be taken that the mixture does not curdle, but if solid cream is used it will not curdle if cooked a considerable time, for there is no casein in the cream, or very little. But with care, milk can be used with the addition of butter, in place of cream, when cream is not at hand.

Let me say right here that I hope if there are points which are not clear, or which you do not quite understand, that you will feel free to ask questions, and make the meeting of as much benefit as possible. I do not think of all the things that might be said on these points, and will be glad to have you ask questions that will draw out points not made clear. I have been asked so many times about printed recipes that I have prepared a little book containing all the recipes I shall use here and quite a number besides, which I sell for ten cents each. If the ladies wish them they can get a copy at the close of the lesson.

Question—Do you use sweet cream or sour?

Mrs. Jamison—I have never used sour cream in a cooked dressing. It is

used in uncooked dressing, but if only slightly sour I think would make no difference in the cooked dressing.

If you use milk, cook a very short time, long enough to thoroughly heat the milk, vinegar and eggs. If the water is boiling rapidly it takes only two or three minutes if only eggs are used, but with the vinegar it requires more time because the vinegar needs to be heated; I let it cook about eight minutes. In making it with milk you would need to take the same precaution as with soft custard. If it curdles a little you can restore it to almost the original smoothness by beating it with a Dover beater. If milk is used and butter it is best to add the butter the last thing before the mixture is taken from the fire; then it does not have a boiled appearance, or taste.

Question—Does it make any difference if you have the cream from the deep setting or the old-fashioned thick cream.

Mrs. Jamison—No, but the richness of the cream makes considerable difference, and for some salads it is a good plan to add a little butter.

This potato salad is better put together warm. It is contrary to the rule for salads in general, but the potato is so dense that it seasons better if both the potato and dressing are warm, and then the mixture can be cooled and served cold, as all salads should be. I like to cut the potatoes into cubes for this salad rather than to slice them. I think it is important in the appearance of the salad and it can be done very quickly; hold the potato in the hand and cut into two or three slices according to the thickness, cutting parallel to the hand, then lengthwise at right angles, then across. Potatoes that do not cook very mealy make a better looking salad than those that do, though for most purposes we prefer the mealy potato. I like to cut the potatoes this way for warming over, especially in warming over with

milk, as the pieces preserve their shape better than slices do.

Question—How many potatoes do you use?

Mrs. Jamison—I think I had about eight or ten potatoes—I looked to the bulk rather than to the number. Four or five good-sized potatoes will make about the amount that one recipe of the dressing will cover.

Ginger-Bread.

The next thing that I will prepare is the ginger-bread, which is made after the following recipe:

One-half cup of molasses, one-half cup of sugar, two teaspoonfuls of shortening, one cup of sour milk, one tablespoonful of ginger, one-half teaspoonful of salt, one teaspoonful of soda, and two or two and one-fourth cups of flour. This is a very plain recipe, and may perhaps appeal especially to the town housekeeper because there are no eggs in it. It makes a wholesome, sweet cake, with very little trouble to the cook.

It is not necessary to use butter for the shortening, in fact, I think a softer fat makes a rather better shortening than the butter, and in using lard in such a dish as this, or cottolene or such a substance for shortening, the flavor is destroyed by the flavor of the molasses and ginger.

Question—What molasses do you use?

Mrs. Jamison—New Orleans molasses; sorghum is also very good for gingerbread.

Question—Do you like the flavor of the sorghum better than New Orleans molasses?

Mrs. Jamison—Yes, I do. It is not quite so acid as the molasses, so does not require quite as much soda.

Question—What kind of sugar do you use?

Mrs. Jamison—Granulated sugar produces the best texture in the cake, better than brown sugar.

I put the ingredients together after the manner of a cake, creaming the

shortening and adding the sugar and molasses; then add the liquid and flour, dissolving the soda in a little cold water, and adding it with the molasses or with the sour milk. The soda is used in definite proportion; that is not always understood, and is one of the hard things for an experienced cook to impart to a learner. Use soda according to the acidity, realizing that the process of the leavening of the dough is a chemical process, and for this reason the chemicals should be put together in certain definite proportions. It has been found by careful experiment that one teaspoonful of soda will equalize the acidity of one cupful of molasses, or one-half teaspoonful will equalize the acidity of one cupful of sour milk of ordinary acidity, that is, milk that has not stood sour more than twenty-four or thirty-six hours. If it is more sour than that, a trifle more soda is called for, but only a trifle. In this recipe calling for a half cupful of molasses and a cupful of sour milk, the required amount of soda is just one teaspoonful, because each requires one-half teaspoonful. The measure varies sometimes with housekeepers according to the size of the cups they have been provided with, but the accurate measure is quite necessary for uniform results. A half pint cup is what is called the standard measure, and the teaspoonfuls and tablespoonfuls can be measured somewhat from the cup, a half-pint cup equaling sixteen level tablespoonfuls. The measure of a teaspoonful is not quite so exact a proportion; a tablespoon holds nearly but not quite three teaspoonfuls.

Question—Did you warm the molasses?

Mrs. Jamison—No, I did not warm it at all. It is sometimes necessary, in using a hard shortening, to warm the ingredients a little, but if the shortening is soft enough so that you can cream it, I think it is rather better cold than warm.

In using eggs in a cake it is better

to add the milk and flour alternately, but where there are no eggs the mixture does not curdle as a butter, sugar and egg mixture is likely to. Soda may be mixed with molasses or with sour milk, or it may be dissolved in hot water; but a little of the gas is lost in that way, and the soda does not dissolve so quickly in milk or molasses; the most satisfactory way all around, is to dissolve it in a little cold water. "A little" here means a tablespoonful.

Question—Do you prefer the sour milk in the condition that you have used it?

Mrs. Jamison—This is buttermilk. Sour milk I would rather have thick.

Question—Do you need as much soda with buttermilk as with sour milk?

Mrs. Jamison—Hardly; but it varies in its action, according to how the buttermilk is manufactured, whether it is made in the old-fashioned churning, or by the separator process, and I never feel quite sure of it unless I know just what it is.

The proportion of flour given was two or two and one-fourth cups, the amount depending upon the quality of the flour. The hard, grainy bread flours thicken more than the soft flours, and so a smaller quantity is needed. If you use a hard flour two cups are sufficient. If the soft flour is used, a little more is required.

Question—Should the flour be sifted?

Mrs. Jamison—Yes, always sift flour before measuring it.

It is not worth while trying to beat a flour mixture smooth until it is fairly thick, because it is hard to get the lumps out of a thin batter, and where it is to be thin finally, it is safer to add the liquid to the flour rather than the flour to the liquid, and use only part of the liquid at first until the batter is made smooth.

Question—Do you use ordinary ginger?

Mrs. Jamison—Yes; this is lighter than some I have used. It varies in

color. The color does not always tell the strength either. I think the lighter gingers are as apt to be strong, and even more so, than the dark ones.

So many housekeepers use these little thin palette knives, lately, that it is probably not necessary to speak of them. It cleans the bowl out so quickly, easily and perfectly, that it soon pays for itself.

Potato Yeast.

For the potato yeast I use the proportion of six potatoes boiled and mashed, one quart of flour, three quarts of boiling water, one cup of sugar, two tablespoonfuls of salt, and three cakes of dry yeast, or from a cup and a half to three cups of the old potato yeast, using in proportion to the age of the yeast, more of course, if the yeast is quite old.

Pouring boiling water onto the flour makes a very lumpy mixture, but the lumps come out in the fermentation of the yeast, and need cause no uneasiness. It is not necessary to put the potatoes through a sieve, but I find it rather better, for then no small lumps of potato appear in the bread. A potato ricer is rather more convenient, but as I do not have one with me, I use a strainer.

Question—Could you use compressed yeast to start it?

Mrs. Jamison—If you start the yeast with compressed yeast you need not use quite so much. I do not think it would be any better but it might hasten the process. This will rise quickly enough so that I can set bread with it tomorrow morning, though it is not in as good condition then as after it is forty-eight hours old.

Question—What age would it be if you called yeast old?

Mrs. Jamison—Three or four weeks. If kept in a cool place, air-tight, I would not call it old under four weeks. The chief advantage of this yeast is not only that it can always be on hand, but it works more quickly than dry yeast; it works nearly the same way

as the compressed, which makes bread of a little different texture, but this is more convenient for the farmer's wife, and makes a better bread than the dry yeast alone.

Question—How much yeast do you use for bread?

Mrs. Jamison—Use one cup of yeast to a quart of liquid if you want the bread to rise in four hours. When you set the bread over night, half as much yeast or less, is sufficient.

Question—Which makes the best bread?

Mrs. Jamison—I like the compressed yeast, because it raises quickly and is so sure. This potato yeast makes very good bread, also; it has a little more moisture. Some like the bread that raises longer. I think, however, that the scientific cooks are giving the preference almost entirely to the six-hour bread. That question will be discussed tomorrow in making the bread. There is less nutriment lost in the quick rising, and a better flavor and more nutriment in the finished bread. If you wish to finish the bread inside of seven hours from the time it is set, you can use more yeast than that, and hurry the matter more. I have baked bread three hours from the time it was set, using a large quantity of yeast, but I do not think it makes quite as good bread, it is not so wholesome, and has not the best flavor.

Question—Is it not likely to taste of the yeast?

Mrs. Jamison—Not if the liquid is used tepid, rather cool than warm. Sometimes in hurrying the bread we think it will save time if we have the liquid quite warm, and then there is a taste of the yeast.

Corn Chowder.

The next thing on the program is the corn chowder. To prepare it I use one quart of potatoes cut into slices or cubes and par-boiled, the fat extracted from a two-inch slice of fat salt pork, and a small onion sliced

and browned in this fat. When the potatoes have been par-boiled, to take away the greenish color and bitter flavor, strain the fat from the pork and onion onto the drained potatoes, and add a quart of milk. When the potatoes are nearly done a can of corn is added, a teaspoonful of salt, and a tablespoonful of butter, and just before serving, or long enough before to have the crackers thoroughly soaked, six or eight crackers or a cupful of oyster crackers are added to the chowder, and more seasoning of salt and pepper, if necessary, and the chowder is ready to serve.

The addition of salt depends somewhat on the saltiness of the pork, and the measure cannot be given exactly. As the object is to extract the juice from the pork we can put it into the frying pan while the pan is cold, and put it over the fire to have the juice drawn out slowly. Where the juice is to be kept in the meat we have the frying pan very hot before the meat is put in, so that the outside may be well seared, and retain the juice.

Perhaps this chowder hardly comes up to the ideal of the New Englander as to what a chowder should be, and yet it is considered a very palatable dish, especially for a man who comes home tired and hungry for supper. It is rather too hearty a dish for dinner, with meat and vegetables to follow, but makes a very nice supper or luncheon dish. It is not only nutritious, but it is wholesome because it is palatable, and palatability is a factor that cannot be overlooked in aiming at the best cooking.

Question—Do you break the crackers for chowder?

Mrs. Jamison—No, they are put in whole. In the regular down-east chowder the small round Boston butter crackers are used, but for this Institute work, where it is to be served to so many people, I find it more convenient to use the oyster crackers, though I do not think they are quite

so much in keeping with the chowder idea.

Question—Would bacon be good in this chowder, in place of the salt pork?

Mrs. Jamison—Yes, I think it would, but I have never tried it.

Cream of Cheese on Toast.

The next thing I will prepare will be the cream of cheese on toast. Make a cupful of thin white sauce; have ready a cupful of grated cheese and six slices of toasted bread. Moisten the toast with a little hot milk, season the cheese with half a teaspoonful of salt and a speck of cayenne pepper; turn the cheese into the white sauce and when melted spread the mixture on the moistened toast.

This dish brings up the subject of cheese, which is one of great interest to Wisconsin people because Wisconsin cheese is so rapidly coming to the front; it is also of interest to the economical house-keeper because it is one of the most economical of the muscle-making foods. Its only objectionable feature is that it is indigestible and sometimes positively harmful otherwise, to some people. It is found to be rather more digestible if cooked than if raw, and by being well cooked I do not mean that it must be cooked very much, but just enough to melt the cheese. The antipathy to Welsh rarebit gives the idea that cooked cheese is not digestible, and it comes from people who are anxious to use only the most digestible and wholesome foods. The rarebit is a very popular dish, and if well cooked should not be indigestible. But, it is often overcooked, or served at unseasonable hours, or with other things which interfere with the digestion of cheese.

Question—Is it essential to use beer in making rarebit?

Mrs. Jamison—Perhaps the name always implies the use of ale or beer, but you can make a very good dish by using milk instead. You want a full cream cheese that will melt readi-

ly, and it will make a very palatable dish, preferable, I think, to the rabbit made of ale or beer.

This cream of cheese is made with the white sauce as a foundation, which is probably very well known, and which is used for so many different purposes that it does not seem worth while to say a word about it. The proportion that I use is a tablespoonful of butter, one tablespoonful of flour, and one cup of milk. This means a rounded tablespoonful each of butter and flour, and you can use a larger proportion of milk, but the proportion of butter and flour should usually be kept about the same, as more butter is liable to make the sauce oily. It is put together in various ways. The most satisfactory method seems to be to melt the butter, add the flour when the butter is bubbling, and then stir in the milk. The milk may be either hot or cold; if cold, it is well to draw the sauce-pan away from the fire while the milk is being added, and then it can be put back to boil.

This method of putting the sauce together makes it perfectly smooth without the appearance of oil. If the flour is stirred with the liquid it is not cooked as rapidly as in the hot fat, because the fat is so much hotter than the liquid can possibly be, and the thorough cooking of the flour increases the flavor of the sauce. For the cheese sauce about half this amount of butter and flour should be used for one cup of milk; then add the grated cheese and the cayenne pepper, which is more acceptable with the cheese. Probably the cayenne also helps slightly with the digestion of the cheese, as does the Hungarian red pepper, which ranks the highest, and is rather a milder form than the cayenne.

It takes but a short time for the cheese to melt. Old cheese is better than very fresh cheese. This mixture is spread over slices of toasted bread that have been dipped into hot salted water to soften them; or the bread

may be prepared by soaking in hot milk and putting it on a buttered platter into the oven to dry the outside. This makes a good foundation and one I have found convenient in using a gasoline stove, when it was found almost impossible to toast the bread. Toast is always to be recommended over untoasted bread, however, because of its digestibility.

Question—What do you think of aluminum ware for cooking utensils?

Mrs. Jamison—Using it, as I have, in different parts of the state, I have changed my opinion. I like it in the western part of the state, but not in the eastern part. The water in the western part is generally soft, and in the eastern part it is hard, and hard water does not have a good effect upon aluminum. I have a dish here that is badly discolored from hard water. It can be scoured out by using Sapollo and "elbow grease," but every time it comes in contact with hard water it will discolor again. I was talking with a gentleman who is manager of a hotel in the northern part of the state where the water is soft, and he said they had supplied the hotel with aluminum almost entirely. After I had examined the water and found it was soft I knew why he liked the aluminum ware. I like it because it is light, and because milk and things of that sort do not burn readily, and butter is not easily browned. If it was not for the discoloration it would serve admirably for cooking purposes. I liked it when I first heard of it, and thought it was the coming metal, but I think now, it will have to be limited to the parts of the country where the water is soft.

Question—That black does not come off on the next thing you cook, does it?

Mrs. Jamison—No, it does not. I would not like to cook apples or tomatoes in it after it has been discolored, though the claim is made for aluminum that acids do not affect it,

but acids do affect the tarnish. I have only my own experience to govern me, but if any of the ladies present know more about it I would like to hear their opinions.

A Lady—I have used an aluminum dipper in a water pail for a year, and five holes have come in it, and cannot be mended; it was not very economical.

Mrs. Jamison—That is quite similar to an experience at my home at Neenah, with a family who used a dipper in hard water; they found it corroded and did not wear very well. There is no doubt a great difference in aluminum. There is certainly a distinct difference in the two varieties, the cast and the spun.

Question—Do hard and soft water affect the food?

Mrs. Jamison—Food will cook very much more quickly and more evenly and nicely in soft water than in hard. My attention was called to that not long ago by a New England woman in Wisconsin in the hard water district, who was in despair over her baked beans, until she learned that if she used rain water the beans were more like New England baked beans. She did not cook them twenty-four hours, though, which is really the New England fashion.

Coffee.

The best and cheapest coffee is made in a drip coffee pot, and a cloth bag is to be preferred to a wire strainer. The coffee should be finely ground but not pulverized. Use the proportion of a level tablespoonful of coffee to one cup of water. Put the coffee in the bag which should be suspended from the top of the coffee pot, and pour boiling water through it. Let it drip slowly through and then it is ready to serve. If wished stronger it may be poured out and turned again through the grounds.

I make the drip coffee because I believe it is preferable to boiled coffee for three reasons. First, I think it is

rather more wholesome; second, it is more easily made; and third, it requires less coffee for the same strength. The coffee pot I am using is one of the simplest I have seen. It is made from a teapot or some such receptacle where the spout comes from the bottom, because the bag or strainer interferes somewhat if the spout is at the top; then there is fitted to it this tin rim, which fits into the top of the coffee pot, and is held by a groove from going too far in, and into which the cover fits. Inside of that is another rim to which wires are attached to hold the cloth bag, which is simply of unbleached cotton. This is not my own invention at all, but was gotten up by a grocer who found it convenient in his business in advertising coffee, and I think he would have made a small fortune if he had patented it, because of its simplicity. In that respect it is ahead of anything I have ever used. I used one last winter that is sent out by the Sprague-Warner Company, and with which they advertise their coffees, and that is good, but this has the advantage of being more easily cleaned. The bag in theirs is on a wire and is harder to wash. About two-thirds the usual quantity of coffee made in this way will answer the purpose quite as well as the full quantity boiled, and of course it also saves the cost of the egg which is often used in boiled coffee.

Question—What quantity of coffee would you use for a quart of coffee?

Mrs. Jamison—The usual rule is five tablespoonfuls. Of this coffee I used eight tablespoonfuls for a two-quart pot. The proportion depends somewhat on the fineness of the coffee. You do not get so much value from the coarser ground coffee as from the finer. But pulverized coffee does not seem to give satisfaction because it deteriorates so quickly; it does not hold its flavor.

Question—Do you use hard or soft water for coffee?

Mrs. Jamison—If we can get pure filtered soft water, that is better than hard water, and it is probably better for the health generally, though I understand in some parts of the country where the water is very soft, that the children suffer from poorly developed bones more than where the hard water containing lime is used; and so we find there is something to be thankful for in all conditions, and in all parts of the country.

The Physiology of Digestion.

In our endeavor "to keep the children well and the men good natured," as Mr. Briggs who introduced the subject this afternoon suggested, we aim at good cooking, because health and good nature depend on nutrition, nutrition on digestibility and digestibility depends somewhat on palatability. It is a well-known fact, and a common statement, that certain foods "make our mouths water" even to think of them, and the reason is that the very thought of palatability promotes the secretion of saliva, one of the digestive juices. This should not lead the housekeeper to think that she should cater to the perhaps depraved taste of the family, but let her realize that she can cultivate a taste for wholesome cooking, so that food that is not naturally palatable may become so.

The cultivation of taste is a matter that is less considered than it might be, from the fact that it is a worthy part of our nature to cultivate, and from the fact also, that the cultivation of the taste is really an easy matter if we set about it; perhaps more easy if we set about to train our own than the taste of others, but I think that also can be managed with tact and care, and the end is certainly very desirable. We are willing to give considerable time to the training of the eye and ear, and now it is becoming more and more the proper thing to have the hand also trained for the

everyday duties that come to the man or woman, and it seems to me that a part of the cook's business is to help train the taste as well. The recipes in the old-fashioned cook-books very often read "flavor to taste," and perhaps it has not been considered that the taste needs to be trained before we can follow the recipe properly. Of course tastes differ very much; much more than they should, especially in the way of seasoning. The safest rule is not to season too highly, and in time people will get to liking the more mild seasonings, especially if they understand that it is a matter of health and so of vital importance. Wholesome food, well cooked, does not demand an excess of spices and condiments to make it palatable to a healthy appetite.

The spices are not to be recommended because the taste for them grows with their use just as surely as the taste for alcoholic drink grows with its use, and the result is certainly not beneficial to the majority of people. Men who engage in the business of tea and coffee tasting, who are required to develop certain flavors in mixing teas and coffees, are not permitted the use of any kind of stimulants, alcohol or tobacco in any form, or the excessive use of salt, because they all tend to deprave the taste. And so it seems to me that if we are really in earnest about cultivating a fine taste we will realize the desirability of doing away, in a measure, with the highly seasoned food.

The laws governing digestion are becoming more generally understood, and certainly should be understood by the housekeeper and mother before she can put before her family the best food for individual use. The digestibility and wholesomeness of food depends not only on the palatability, not only on the condition of the digestive organs—though that is a very large factor—but also on the environment, on the amount of exercise, on

the amount of fresh air, on the season of the year, the climate, and all those things, the age, and the general health.

Briefly, the history of digestion is this:—The organs are mainly the mouth, the stomach, and the small intestines; the different classes of food are digested in these different organs, and by the fluids which are secreted in the organs or the glands of the organs, the saliva in the mouth acting almost entirely on the starchy foods, and being the chief agent in the digestion of starch. The protein foods, or such foods as meat, eggs, and the gluten of the grains, are digested in the stomach, the gastric juice containing the elements for breaking down the protein or nitrogenous compounds, and rendering them fine and soft for absorption by the proper organs. The fats are passed through the mouth and from the stomach with scarcely any change, into the small intestines, where they are very finely divided, emulsified and carried into the circulation. The fats are changed less than any other food because they are more in the condition in which the body requires them. The small intestines have the duty not only of digesting the fat, but of completing the digestion of the starches and proteins. The secretions of the small intestines are the pancreatic fluid and the bile, and these, acting upon the different foods help finish the digestion. The greatest amount of indigestion arises from the imperfect digestion preceding the passage of the food into the small intestines, and must pass under the name of intestinal indigestion, because that poor organ is so frequently overworked.

We do not chew our food enough, and we hurry it too rapidly into the stomach, and sometimes in too great quantities for that organ to care for, even if the food is properly cooked; it goes into the intestines in an un-

finished state, and there the digestion must be completed to the detriment of that organ, which is in that way overworked. We might very well follow the example of Gladstone, who not only does it himself, but instructs his family to chew each mouthful of food thirty-two times. I do not know how long it would take the ordinary American to eat his dinner that way; as a people we would probably eat less. I do not say that Americans as a rule eat too much, but probably that is one tendency of the hurried eating which so many are obliged to follow day after day, because of the limited time they have for their meals. A dinner eaten in twenty minutes is very likely to prove disastrous sooner or later, because it is not properly masticated in that length of time. Then, hurrying from dinner to work again gives the stomach a poor chance, whether the work is manual or mental, because the blood and the fluids needed in the stomach for digestion, are being used in the other parts of the body for the work that is being done by the arms or the head, and probably there is no one thing more to blame for the common disease of dyspepsia than hurried eating.

I was very much interested and pleased to learn that the high school of Janesville is furnishing lunches to the pupils who have to stay through the noon hour. I think it might serve two classes—not only those who cannot go home, but also those who live at such a distance that they must hurry home, eat their dinner in a hurry, and hurry back again. It seems to me that it would be for the welfare of both teachers and pupils, and I hope that this endorsement of it will not put too much work on the teacher of the cooking department who has charge of the noon lunch. I feel, however, that too much can hardly be said in favor of it, for both the stomach, and the brain can

do their work very much better than after a heavy, hurried dinner. The matter of fresh air is one that should be taken into consideration, and the pupils should be urged, if they do not take the interest themselves, to get plenty of out-door air during the intervals.

SECOND LESSON.

WEDNESDAY AFTERNOON, MARCH 9.

Mrs. Jamison—At no time in the world's history has more value been put upon woman as a housekeeper than at the present time, and yet we find writers for generations back who have held the same high estimate of the work of the housekeeper and the cook, that the world in general holds today. There were those who saw further into the future and lived beyond their own time, but today we are finding the general public supporting the work of the housekeeper more thoroughly than ever before. Frances Willard stated as her ideal of womanhood, a woman who should be a homemaker, and many others of our thinking men and women are bearing the same testimony. George Eliot and other literary women who might be named, pride themselves upon their household duties. And Owen Meredith told his idea of the value of cooking, in words like these, in which sense is blended with the nonsense:

"We can live without poetry, music and art,
We can live without conscience, and live without heart;
We can live without friends, we can live without books;
But civilized man cannot live without cooks."

This afternoon the following bill of fare will be prepared:

Different Ways of Cooking Beefsteak,
Potato Yeast Bread.

Apple Fritters Apricot Puff,

Tea.

Bread.

We begin the lesson this afternoon with one of the most necessary of all the things we eat, what is called "the staff of life," bread. In this potato yeast bread we use the following proportions:

Scald one pint of milk to which add one pint of water, and when the temperature is about 70 degrees add two teaspoonfuls of salt, two of sugar, and one cup of potato yeast. Then stir in enough sifted flour to make a batter; beat well, and add more flour, not using more than three and a half quarts altogether. Turn it out on a floured board and knead twenty minutes, or until it does not stick to the board, and is smooth and elastic. Put it back into the bowl, cover it closely and set in a warm place, about 80 degrees, to rise. In four hours it should double in bulk. Then form into loaves and bake about an hour, having the oven pretty hot at first.

The white bread that we use so much is not as truly a "staff" as it might be if it retained more of the best elements of the wheat. Every element that is required for the growth of the body is found in the wheat kernel, but in the manufacture of white flour very much of the nutriment is lost. We are glad to welcome the more wide-spread use of the whole-wheat flours which are being manufactured now, in such good qualities, that it becomes an easy task to make bread that is wholesome, nutri-

tious, and acceptable in flavor, out of the whole-wheat flour; the main difference is in the color, and the housekeeper who looks to the wholesomeness of the food is not as anxious to produce a loaf of white bread as formerly, it being realized more and more that the yellow bread that is almost brown is the best for nutriment.

In this bread that I will make this afternoon, I will use the potato yeast, made here yesterday afternoon, and it will be just the common every-day bread, though the same proportions with the addition of shortening and sugar if desired, can be used for all sorts of fancy bread, rolls, etc. Bread made with water has been called the ideal bread, but I think housekeepers generally recommend the superiority of bread made with milk; it seems to keep moist better and is certainly more nutritious because of the nutriment in the milk. In this bread I make sort of a compromise and use half milk and half water, though the liquid can be what the housekeeper finds best suited to her purpose or convenience, or to the tastes of her family. Sour milk and buttermilk can be used by being scalded first, and they produce very good results; and sometimes the whey of sour milk alone is used.

Bread is one of the oldest of the foods, but that of the olden times was not raised, and it remained for modern science to explain the philosophy of the leavening of the dough. The reason for making the dough light is that it may be more readily moistened by the digestive fluids, and more easily digested. Different methods have been employed, but at this time we have come to consider that yeast is the most wholesome, the most convenient, and as giving the best results in the keeping qualities and flavor of bread. So, in making bread we have to take pains to accommodate the conditions of the bread to the nature of the yeast, and we have come to understand through

the study of the chemistry of yeast, the reasons for some of these processes. We have known that the temperature of the bread must be tepid, that it must be sufficiently moist, and that other conditions need to be observed, but we have hardly realized why. When we have learned that the yeast is a plant and that its treatment should be similar to other plants, when we realize that it needs moisture and a moderate degree of heat, and that it needs food in order to grow—and the food we find it obtains from the flour—we will realize more and more that bread-making is a scientific process.

We find also that a certain amount of yeast will produce certain effects, in certain definite time, under certain conditions, and that given the right conditions the yeast will do the very same thing in the very same time; this is one of the reasons for calling cooking a science, for it is subject to scientific laws. It is no longer a matter of guess-work.

We use the salt and sugar in bread partly for the flavor, but more especially because the body needs salt and because some of the sweetness of the flour is lost in the fermentation. In using this proportion of yeast we expect the bread to rise in four hours from the time set, ready to be molded into the tins. If longer time is given a smaller quantity of yeast can be used. By setting the bread at rather a low temperature it will not taste of the yeast and we can use a large quantity. This same process can be used with compressed yeast, using one cake softened in a little water instead of the potato yeast. The dry yeast will not do the same work in the same time. It is much slower, and it is better to make a small sponge if the bread is to be made of the dry yeast.

After one has made bread by this method it is not necessary to measure the flour because you can tell very accurately when the dough is of the right consistency; but even when one

who is accustomed to making bread is making it by this process for the first time, it is wise to measure the flour and even then some judgment must be used, for you must know what the flour is you are using, whether hard wheat or softer flour, for the softer flour will not stiffen so much, and more is necessary.

Question—How much flour do you use?

Mrs. Jamison—About three times as much flour as liquid.

Question—Do you recommend patent flour for bread?

Mrs. Jamison—I think the patent flour makes good bread more easily, with less trouble and with surer results than the "straight" flour, but it is not so wholesome. What I do recommend above everything else is the whole-wheat flour. In using the whole-wheat flour you need about the same quantity; the dough gets somewhat stiffer, and yet it seems to be required. There are a number of different brands and they need a little different treatment. I have used some kinds of it in the same way I am making this bread, and have had very good results using the same quantity of flour and kneading it the same. But some brands need to be made softer.

Question—What is the difference between the feeling of the hard and soft flour?

Mrs. Jamison—The flour made from the hard wheat has a more sandy feeling, and is also slightly more yellow. Wisconsin soil no longer grows the best wheat for it has been somewhat impoverished. I might speak of what is sometimes called the standard bread flour, because it is so well known, and can be found in almost every place, and that is Pillsbury's Best. I speak of it merely as a standard flour so you can compare it with yours and know what you are using.

Question—Is there any advantage in kneading on a board?

Mrs. Jamison—No; it is a matter of individual preference. I prefer knead-

ing it on a board, but I know nice housekeepers who make good bread and knead it in the pan. Bread should be kneaded at this stage about twenty minutes, and it takes no longer to knead a large amount than a small. It requires about the twenty minutes to thoroughly blend the liquid, flour and yeast, and put the dough in such condition that no more flour is necessary. The dough should be spongy; little bubbles or blisters will show themselves on the surface—it will have a smooth, velvety touch, and will not stick to the hands or the board.

Question—Do you time yourself while kneading?

Mrs. Jamison—No, I do not; I know by the appearance of the bread when I have kneaded it enough.

Question—What kind of dry yeast do you recommend?

Mrs. Jamison—I have used Yeast Foam but there are other kinds of yeast just as good. Given the conditions which I said were necessary for the growth of the plant, the yeast in the dough grows, producing by fermentation the gas which makes the bread light, and in making this gas some of the starch of the flour is changed into sugar and the sugar thus made is converted into the carbonic acid gas and alcohol. The gas lightens the bread, both the gas and alcohol passing off in the baking. The fact that in this process some of the material in the flour is destroyed, is one argument for the quick raising of the bread, and for its being raised only twice instead of three or four times, as is sometimes done. The bread will be whiter and lighter if it is raised more than twice, but it will not be so wholesome, nor of as good flavor, so the process is not to be recommended.

Bread in the condition in which this will have to be served to you this afternoon, is of course very unwholesome. No one, however, will get so large a quantity as to cause any serious effects. One of the sins we have thrown up to us so often is the use of

fresh bread. It should be about twenty-four hours old to be in the best condition.

The baking of bread is quite an important part, the intense heat serving two purposes: It cooks the starch which is an absolute necessity for digestion, and it kills the yeast plant, which otherwise might carry the fermentation into the stomach. In order to thoroughly cook the starch the temperature of the interior of the loaf should be 212 degrees. This requires a high degree of heat on the outside, and the oven should be about 450 degrees. We have no practical method of testing it, however, other than its effect on the loaf, and the oven that is hot enough to brown the bread in the first ten or fifteen minutes gives very good results. Then the temperature should be lowered in some way and the bread finished at a lower temperature. This quick heat also stops the fermentation, and the bread is more even in texture. It also produces the sweet crust on the outside of the loaf, which is the most wholesome part of the whole loaf because the intense heat changes the starch into a form of sugar, which is always the first process of the digestion of starch in the mouth or other digestive organs, so the process of digestion is hastened and the digestive organs are relieved of some of the labor. If we confined ourselves to crust or toasted bread we would put less work on the digestive organs.

Question—Do you always set the bread hard at first?

Mrs. Jamison—Yes; it is to lighten the work and make less care. It does not rise any quicker, but saves handling the mixture so many times. Even if it is set at night it may be set hard in the same way, less yeast being used. Bread should rise in about an hour the second time after being put into the tins, and then it requires from forty-five to sixty minutes to bake a fair-sized loaf. Biscuits do not require so long a time because they are smaller.

The preference is to be given to tins which hold one loaf, rather than the long tins that hold a number of loaves. The bread gets more thoroughly baked as the heat penetrates better to the center of the loaf.

Stuffed Beefsteak.

Get a round steak and remove the bone, drawing together the cut thus made with wooden toothpicks. Make a stuffing of one cup of bread crumbs, one-half a teaspoonful of salt, a saltspoonful each of thyme and sweet-majoram, a teaspoonful of chopped onion, and half a saltspoonful of pepper. Spread on the meat; roll up and tie to secure the stuffing; dredge with salt and flour and brown in hot fat in a frying pan. When well browned remove to a braising pan or kettle with a tight cover, half cover the meat with boiling water and put into the oven. Let it cook slowly for an hour, turning the meat over in the gravy when half done; thicken the gravy by stirring a tablespoonful of flour with a little cold water until smooth; cook eight minutes. Serve the gravy in a separate dish. More stuffing should be made if the steak is large, and any preferred seasoning may be used. This is good either hot or cold.

The program today calls for beefsteak cooked in various ways, and this is one of the ways which makes a nice variety from the ordinary fried and broiled steak; it is also a good way to use a steak that is tough. It is sometimes thought that it is not wise to buy round steak, the housekeeper thinking so because the wealthier neighbor buys the sirloin, not realizing that there is just as much nutriment in the round as in the sirloin. A chart showing the composition of the different food materials, issued by the government at Washington under the direction of Prof. Atwater, Wesleyan university, one of the ablest authorities on the food question in the United States at the present time, states the composition of round steak to be

slightly superior to that of the sirloin, the latter being only more fat. As a rule I think Americans do not eat much of the fat meat; the round steak has the most protein, and less waste matter. Even at the same cost it would be less expensive than the sirloin, and where we get it at from two to five cents a pounds less it makes considerable difference in the meat bill.

The object to be attained of course, is to make the meat tender so that it can be easily masticated and digested, and in cooking sirloin steak we do not aim to make it tender because it is already tender, being taken from the part of the animal where the muscles are not exercised. The round steak is more tough, but the exercise not only develops the toughness but also the elements which make the meat more nutritious for our bodies.

Question—Do you use butter in the stuffing?

Mrs. Jamison—No, not with beef. If the stuffing is for fowl it seems to require more richness, and we add butter or salt pork, or some kind of shortening. It can be added to this, if desired, but it is not necessary. This makes a very good stuffing, and it seems to be very suitable for the meat.

This dish is not to be recommended for the semi-invalid, because of the seasoning, and possibly also the treatment on the outside makes it rather more unwholesome. Those who have trouble with digesting meats should consider it economy to pay a high price for the tender meats to be roasted or broiled. For people in ordinary health, meat prepared in this manner makes a palatable and very acceptable dish, and it is not unwholesome. The seasoning can be changed and other herbs substituted. I used three cups of stuffing and there are about three pounds of steak. Tie a string around the steak, using sort of a buttonhole stitch to carry the cord from one end to the other, and then brown it all around in a little hot fat. At home I use a little beef dripping.

Question—Do you use the chopped onion or the juice?

Mrs. Jamison—The chopped onion for this. The onion juice might be used, though it is not necessary in a mixture like this because there are particles of other material besides the onion to show themselves. The browning on the outside is similar to the frying of steak, which is so much condemned. Where it is fried so much that it is brown way through or colored way through, by the heat, it is liable to harden the fibre somewhat. This is not continued long enough to harden the fibre.

The browning of the meat in the first place is for the purpose of closing the pores, so that the juice does not escape, and for developing a different flavor in the meat. Then it is put into a pan and cooked in water and steam—the upper part cooks in steam and the lower part in water. The action of the steam helps to soften the fibre, and the result is a tender, juicy piece of meat, from a piece that is quite inexpensive to begin with. This method of cooking is called braising; the water should come up only about half the height of the meat and then the dish be tightly covered. The result is much better if the meat is cooked slowly. This is true always of meat that is tough; nothing is gained and much is often lost by cooking tough meat too rapidly.

Question—How long should that roll bake?

Mrs. Jamison—About an hour.

Hamburg Steak.

Tough meat may also be rendered more digestible if finely chopped; season the chopped meat with salt, pepper and onion juice; shape into flat cakes and broil in a hissing-hot frying pan. To obtain the onion juice press the cut side of an onion against the grater with a twisting motion until the juice flows.

There is another method of making meat tender. The process in the

stuffed beefsteak consists in softening the fibres by slow, moist heat, and in the Hamburg steak the fibres are softened by chopping. This brings us to the question of pounding beefsteak, regarding which I am sometimes asked. Pounding meat does make it more tender, providing the fibres are cut, but you must cook it quickly and carefully so as not to lose the juice. I think that experience and careful observation will bear out this statement. So in this chopped meat or Hamburg steak, it is made tender by having the fibres finely divided, and this can be done at home if you have a chopping machine, as many housekeepers have. There are one or two kinds manufactured in sizes and at prices that bring them within the reach of many housekeepers; or you can have the butcher chop it for you. This meat can be cooked by exactly the same method as we would cook tender steak, either by broiling over the coals or in a frying pan without any fat. Meat prepared in this way is not only palatable and easily prepared, but it has the double virtue of being cooked quickly, and is wholesome even to those who have digestive troubles.

The newspapers have a great fondness for hitting the young, inexperienced housekeeper. She has always been supposed to be ignorant of all cooking and housekeeping rules. I think, though, that this will be a thing of the past before very long, because the young, aspiring housekeepers are making a strong effort to learn for themselves, and certainly more effort is being made to educate them along this line. But the newspapers are telling a story which perhaps some of you have read, which comes to mind in talking about this meat ball, of a young housekeeper who went to the market to get some round steak to make a meat ball, because her husband was so fond of it. She told the butcher she wanted round steak to make meat balls. She was disappointed when it came, but cooked it the

best she could, and then at the table she told her husband why she did not serve it as she had hoped. She said "I ordered a round steak, but when it came home it was not round at all; it was just as flat as my hand."

Apricot Puff.

The next dish I will prepare will be the apricot puff. Use dried apricots. Soak the apricots, stew them down rather dry and put them through a sieve, adding sweetening, as required. Beat the whites of four eggs until stiff and dry, and then beat in a little at a time the sifted apricots. Put this in buttered cups or into a pudding dish and bake like a meringue, slowly at first, letting it brown at last. This may be served either hot or cold, but it settles a little as it cools.

For this puff I shall use the whites left from the salad yesterday, which are not spoiled by standing. Egg whites that are beaten stiff enough for a cake may not be stiff enough for a meringue, which depends entirely upon the eggs for its lightness. If the eggs for a meringue are beaten not only stiff, but dry, so that a knife may be cut through the beaten white and come out clean, the meringue will hold its shape; even after cooling it will settle but very little. I like a whisk better than a Dover beater where it is desired to get as much bulk as possible. In such a dish as this the bulk is desirable.

Question—Do the whites beat just as well after standing?

Mrs. Jamison—Yes, I think they do. I have made angel food of whites after they have stood twenty-four hours, and think it was just as good. Yolks do not keep as well, but if they are not broken they can be covered with cold water and they will serve just as well for some purposes.

Question—Could the canned apricots be used?

Mrs. Jamison—Yes; these are the dried, a little less expensive, probably.

Question—Would the fresh apricots be just as good as the dried?

Mrs. Jamison—The fresh are best of all in their season. Apricots are a very good fruit for this puff. They possess acid enough so that no other acid is needed. In using peaches or some fruit not so acid it is well to add lemon juice. Canned pears or peaches with the juice turned off and sifted, and other fruits are very nice for this puff. It is not a hearty dessert. This amount is supposed to serve six people, so there is a very small quantity of egg to each person. It is not necessary to serve any sauce with this, but whipped cream is very nice with it.

Apple Fritters.

Beat one egg, add half a cup of milk; sift together half a cup of flour, a scant level teaspoonful of baking powder and a speck of salt; turn the egg and milk mixture into the flour, beating it smooth; then add two chopped apples. Cook on a buttered griddle until brown on both sides.

Fritters are of two classes—those cooked in deep fat and, those cooked in a frying pan, and the mixtures are quite different. The batter for fruit fritters to be cooked in deep fat must be made with more care for no baking powder is used. If the apples are juicy you sometimes need to scant the amount of milk or add more flour, but you can easily tell when you begin to fry the fritters. I always chop the apples when cooked by this method.

The proportion of baking powder is as definite as the proportion of soda spoken of yesterday, though we measure the baking powder according to the amount of flour, and use a level teaspoonful to a cup of flour. In this recipe the quantity of baking powder is increased a little because of the apples, as they make the mixture a little heavier. The best way to add baking powder is to sift it with the flour two or three times to get them thoroughly mixed; it is a very easy way and accomplishes the purpose admirably.

These fritters are to be fried in a frying pan, in a mixture of lard and butter, because the butter, which gives the best flavor, is likely to burn, and the lard is used to prevent it. It is a very good combination to use for frying anything that needs delicate treatment, like oysters, which need a small amount of fat. I use a granite frying pan because of the acid.

Question—Of what benefit are the wooden spoons you use?

Mrs. Jamison—One reason why I use them so much is because they do not make so much noise, and then they are easier on the hand. They are also nice to be used on the stove because they do not get hot, and they are especially nice for preserving because they do not discolor and make the fruit taste as a metal spoon is likely to do.

Tea.

There is probably little more to be said about making tea than every housekeeper knows. In making it, I first scald the teapot, which should be earthen or granite and never tin, put the tea in the hot pot and allow a teaspoonful or less for each cup of water, according to taste. Black tea may steep four or five minutes but green tea generally requires but one or two minutes. Tea is more wholesome if turned from the grounds into a clean hot pot before being served.

The qualities and flavors of teas differ very much, not only in the different countries from which they come, but also on account of the method of curing the leaves when picked. We get tea from China, Japan, India and Ceylon, and tea drinkers give a preference to teas from different countries, or bearing distinctive names which mark their flavor. There are two classes which come from one and the same plant. We know them by the general names, as black and green teas, and they produce rather different results in use, and also require rather different

treatment. The difference in the color of the tea is due to the difference in treatment in the curing of the tea. The green teas are cured very quickly and the color retained, while the black teas are cured slowly and also undergo a slight fermentation which destroys some of the simulating properties, so that the black tea is rather the more wholesome. For medicinal purposes the green tea is to be preferred.

While tea and coffee may have medicinal properties which are of value under certain conditions, they may produce bad effects on some individuals. They have qualities which make them very objectionable to very many people, and certainly very harmful under certain conditions. They should never be given to children, and should not be used by an adult if found to disagree. The addition of milk to tea and coffee makes them more objectionable than without. As a rule I think most of us are too sensible to use those things that are harmful to us knowingly, especially when there are other things to take their place. The cereal coffees which are being used to some extent and increasing, are to be recommended because of their harmlessness, though they probably have no special food value though made from cereals which contain different food elements. The co-coas do not have the harmful effect of tea and coffee and are also a food.

The black teas are the better for every day drinking, for they are less stimulating, but require a longer time for steeping than the green teas. The teapot should be hot—it can be made so by scalding with hot water—and dry tea put in according to taste. Boiling water is then poured onto the tea leaves and allowed to stand the required length of time. It should never be boiled, because the boiling draws out more of the alkaloid, which is so harmful, and it should never be made in tin because the action of this alkaloid on the tin produces a poison-carbon furnished by the carbonaceous

at once it is better to drain the tea from the leaves. The long standing of tea also extracts the alkaloid.

Question—Don't you like a drip tea like a drip coffee?

Mrs. Jamison—I have never tried the drip teas very extensively. They are served at the fashionable five o'clock teas very frequently; tea certainly must be more wholesome made in that way.

Food and Nutrition.

The object of digestion of which I spoke briefly yesterday, is to prepare the food for assimilation. This it does by converting insoluble substances into soluble form, by breaking up compound substances into simpler compounds or into elements, and then finely dividing and sub-dividing the particles of food until they are in condition to be absorbed. The digested food is absorbed from the stomach and intestine by minute vessels which carry it to a large duct near the spinal column, from which it passes into the blood. From the blood, as it flows through all parts of the body, the various tissues, organs and glands select those substances which they require.

Thus we depend upon the food which we take into the body for the growth and repair of every part, and also for the production of the heat and energy necessary to keep the body active and enable us to do our share of the world's work. But nutrition depends not on the amount of food, but on the amount of available material that the food yields; and this depends, not on the amount of nutriment in the food itself, but largely upon the cooking and upon the ability of the system to extract from the chemical compounds that are taken in the food, the right elements in the proper proportion.

In these operations heat is evolved which develops energy in a manner quite similar to the steam engine. The carbon furnished by the carbonaceous

floods in fats and sugars and to some extent also by the proteins which also contain carbon, is the fuel which by the aid of oxygen produces a form of combustion similar to, but very much slower than what we call fire, which keeps the body itself at a degree of warmth necessary for health, and at the same time gives it power to do its work. The amount of energy needed by the body is immense. To enable the heart to send the blood on its course through the body, and the other organs to perform regularly and frequently the function imposed upon each,—these involuntary actions of which we scarcely take note; besides the energy needed by the active brain and the muscles—the sum total is indeed great! And all of this is to be furnished by the food we eat.

This question of nutrition concerns not only those who are well, but still more those who are suffering from ailments which are influenced considerably by the kind of diet. Physicians and nurses are recognizing this more and more. In sanitariums the treatment of disease is almost entirely by means of exercise and food, bathing, etc., with scarcely any use of what we call medicines. An understanding of foods and their particular action on the organs will help the housekeeper to regulate the diet of her family, and thereby help them to avoid a tendency to some trouble which they are liable to from their work, or which is hereditary. An understanding of the laws governing the class of food that should be taken

by persons having much exercise, and those getting little exercise, and an understanding of diseases which persons of different occupations are subject to, gives the mother, if she will study them, a position of untold influence in the physical well-being of her family, and a position which it seems to me every mother should desire to attain as far as possible. Information on these subjects is coming more and more within the reach of the average housekeeper because books are being multiplied, and with good judgment a mother can inform herself very well on some of the simplest of these laws, and help materially in the well-being of her family.

The government at Washington furnishes free bulletins from the Agricultural Department, and they are also sending out from the other departments pamphlets which bear on the subject. Those that can be had from the Secretary of Agriculture give a clear and concise explanation, one on "Foods, Nutritive Value, and Cost" and one on "Meats, Composition and Cooking," and others are following. They are now at work with actual experiments with human beings, to determine the effects of different methods of cooking. Prof. Atwater with his able corps of assistants is at present engaged in studying out some of these problems.

A recent publication of special importance in the farmer's home, is on "Milk as Food."

THIRD LESSON.

THURSDAY AFTERNOON, MARCH 10,

The bill of fare for this afternoon is as follows:

Salmon Soup,
Mutton Stew, Egg Dumplings,
Cabbage with Cheese, Corn Cake,
Caramel Rice Pudding.

I will begin the lesson this afternoon by making the mutton stew, as that will take the most time. This is prepared in the same manner as a beef stew, and its superiority lies in the fact that it does not require as much time to cook, as mutton and lamb are not as tough as the parts of beef used for a stew. Dredge the pieces with salt and flour, and brown in drippings. Then pour warm water over to cover it, and stew until tender. Season with onion and turnip, and carrot if liked. Thicken the broth before adding the dumplings. Parboil thick slices of potato and add before the gravy is thickened.

Mutton is going to be more used each year, I think, because farmers are learning better how to select and feed sheep to make the best mutton, and people are learning better how to prepare it. It forms a very wholesome, nutritious meat, containing an amount of nutrition equal to beef, and, as I said, it has the advantage of not being quite as tough, and hence more easily cooked. For stew a shoulder piece may be used, or even a piece from the neck where the meat is in small or irregular pieces and not in good shape for chops or roasting. One precaution that is always well to take with mutton is to remove the outer skin. The objection to the flavor of mutton is largely because of the so-called woolly flavor, and most of the flavor is in this skin. It is not difficult to remove and as it is tough and has no special food value, we lose nothing. Where the fat is not relished part of that can also be removed with the skin.

This method of cooking is another way of making meat tender, and it seems to me that these are the methods that need the most consideration because of the cheapness and economy of the tougher meats, and because we are so situated at times that we cannot get anything but tough meat, and it is quite necessary to understand how to render them palatable and digestible. Variety in food is one of the things that the average palate seems to demand. There are, however, those who give so little thought to the taste of the food if it does not in any way disagree with them, that there is very little pleasure for the cook, in preparing fine concoctions for them. But the housekeeper must know something of different modes of preparing different classes of food so as to provide a variety that will help to keep up the appetite of the different members of the family, which is pretty sure to flag, especially at this time of year.

I fear sometimes, in this age when so much attention is being given to the subject of cooking, that there is a tendency among housekeepers to vie in the production of a great variety of dishes, and that this will tend to create fault-finding eaters in the family. If too much stress is laid upon the appearance of the food, upon its exact appearance, and upon its particular flavor, it is likely to breed discontent with anything that is not up to the mark, and it often makes it difficult for the mother to provide for the family where the tastes are different, and where there is an expectation that each individual notion will be gratified. It is said of Benjamin Franklin—I believe he made the statement himself—that he was taught to eat what was set before him and ask no questions. He laid to that fact his good health;

but undoubtedly there were some questions asked, and thought given to the preparation of the food by the mother. We know she must have been a wise woman to have had such a son.

I asked the butcher to crack these bones, but he did not crack them quite as closely as I wish he had. I cannot divide it in as well shaped pieces as I would like. I have removed a piece of the spinal cord that lies in the cavity of the bone, which must be taken out because it has a very disagreeable flavor which it will impart to the meat. I shall use the same method of improving the flavor of this meat that I did yesterday for the beef roll, browning it in a little fat. Meat drippings, which all well-regulated households are supplied with, is probably the very nicest of anything for such purposes as this. I will dredge the pieces of meat with salted flour before browning them, as they get seasoned a little more thoroughly in that way. The reason for adding the flour is because the salt tends to extract the juice. It should always be remembered in cooking meat that if it is salted while raw the juice is drawn out, and so it is very much better not to salt the meat until it is partly cooked, except in making soups.

In making this stew even if we do brown the meat for flavor we are not particular to brown it all, and not particular to have the water that is poured over it boiling hot, because then it hardens the albumen and closes the fibres up so tightly that very little juice escapes, and we wish a little of it in the gravy in which we serve the meat. The rule for cooking meat where the juice is to be retained is, when boiling the meat to cover it with boiling hot water, but where the object is to extract the juice and flavor, as in making soup, to cover with cold water, and where we want some of the juice in the meat and some in the gravy, it is better to have the water medium.

There is not very much use for mutton fat in cooking, though it is sometimes used for frying purposes mixed with other fats. It is hard and firm and is valuable for other purposes outside of the kitchen; as softening leather and things of that kind. It is also used in different lotions for the hands, having a healing tendency.

I cut the potato in thick slices and add to the soup, a little before the dumplings are put in. The potatoes are parboiled first to get rid of the greenish, bitter flavor that is not desirable. I think the meaning is well understood when I say, "greenish flavor," for things do taste green. To thicken the gravy I will first stir in a little water, stirring perfectly smooth, and then add enough water to make it thin enough to pour. In stirring I always have a preference for a round-bottom bowl, for the more closely the spoon touches the bowl the more easily you can make the batter smooth.

Egg Dumplings.

Now I will make the dumplings and the stew will be ready to serve. The recipe is as follows:

Two cups of flour, two teaspoonfuls of baking powder, two eggs, one-half cup of milk, one-half teaspoonful of salt, and one tablespoonful of melted butter. Mix the dry ingredients; beat the yolks and whites of the eggs separately and then together, add the milk and pour into the dry mixture. Add the melted butter, beat well and drop the batter by spoonfuls into the stew. Cover closely and cook ten minutes.

No one has asked me here during any of the lessons what kind of baking powder I use, and I am afraid you will think that I think the Royal is the only good kind, because that is what I am using. I am using this because it was given me; but I have found just as much satisfaction in using Dr. Price's, Andrew's Pearl, Sprague & Warner's, Ried, Murdock & Co.'s and the Star Crystal.

Salmon Soup.

The recipe for the salmon soup calls for one-half can of salmon chopped very fine, a slice of onion put in a quart of milk and heated in a double boiler; thicken with a tablespoonful of butter and a tablespoonful of flour, cooked together. Add a teaspoonful of salt and half a saltspoonful of pepper and the salmon, and when thoroughly hot it is ready to serve.

This soup is one of the milk soups, and many other soups can be made with the same general proportions and in the same general way, using vegetables of different kinds, and such seasonings as desired. It should not be a very thin soup; it is designed to be a little thick, and seasoned according to the vegetables used, with salt and pepper, and other seasonings if desired. The milder vegetables, like the potato, require a little higher seasoning; either onion or celery can be used with potato soup with good effect. The thin white sauce is used to give body and flavor to the soup.

Do not forget about chopping the salmon; it should be chopped quite fine to get the best results in the soup. With fish that lacks flavor it is sometimes desirable to use some of the water in which the fish was boiled, instead of all milk. That gives a strong fish flavor, where that is desired.

Caramel Rice Pudding.

The next thing I will prepare will be the caramel rice pudding. Wash one-half cupful of rice and cook in one cupful of boiling water in double boiler, till the water is absorbed. Heat one quart of milk and stir into the partly cooked rice. Cook thirty or forty minutes or until very soft. While the rice is cooking melt one-half cup of sugar in a frying pan without any water. When light brown and clear, pour into a heated pudding dish, covering the sides and bottom, if possible. Add one scant teaspoonful of salt to the rice, and just before taking from the fire add two beaten eggs. Turn the

rice into the caramel-lined dish, cover and set in a pan of hot water. Bake twenty or thirty minutes. Let the pudding stand for ten minutes and then turn it from the dish. The caramel in this pudding serves as a sauce.

I use a half-cupful of rice. I think it is often safe to take a little more, as the rice varies somewhat in the way in which it thickens, and the pudding should be thick enough so that it can be turned from the dish. To this amount of rice use a cup of water and add a quart of milk, which you see is a large proportion of liquid for the amount of rice. The rule is a half cup of rice in a cup of boiling water until the water is absorbed, and then add a quart of milk and let it cook until the rice is soft, which requires about three-quarters of an hour, the time varying somewhat with the age and quality of the rice. When the rice is soft, and just before taking from the fire, add two well-beaten eggs, and if the caramel is not used sugar may be added to the pudding itself, but where we use caramel, the sugar of which we make it, sweetens the pudding.

The caramel is made of half a cup of sugar, melted without any water, and poured into a heated pudding dish, covering the bottom and sides. When the pudding is cooked turn into the dish, and then cover and set in a pan of hot water in the oven, to bake twenty or thirty minutes, long enough to melt the caramel again. When it is taken from the hot water it should stand a moment or two, and then can be turned from the dish and the caramel will form a coating or sauce on the outside of the pudding.

Rice being a starchy food should be put to cook in boiling water. For most purposes the nicest way to cook rice is in the double boiler, cooking with enough water, at least $2\frac{1}{2}$ times the quantity of rice, so that the grains do not stick together, and without stirring, which keeps the kernels distinct. If there is plenty of water below it cannot burn or stick.

Question—What nourishing qualities has rice besides the starch?

Mrs. Jamison—The starch containing carbon, gives it its chief value in producing energy. It ranks with the potato and is superior to it in one respect, that there is less cellulose, or woody fibre, and the rice is therefore more easily digested. It is the energy producing food of the hot countries as butter or fat is for the colder climates. The fats are changed in the body with a more rapid production of heat than the starches, though they might not contain a much larger proportion.

Question—Is there any danger of burning the sugar in making the caramel?

Mrs. Jamison—Yes; a great deal of care must be exercised not to burn it. It needs a pretty good fire at first, but the latter part of the time the fire should be rather slow, and the sugar should be stirred all the time.

The caramel is getting brown enough—not quite all melted, but I shall have to treat it with considerable care, or it will get too brown. If it is poured on a cold dish it is impossible to spread or do anything with it, but if the dish is warm it can be spread about some, and I like to get it around the sides of the dish so that it will cover as much of the bulk of the pudding as possible. This is getting so cold that it will not spread any more.

This caramel is useful for other things beside rice pudding. It is good for flavoring custards and is sometimes used for coloring sauces, soup stock, and such things. I do not think it is used to good advantage for such purposes because it tastes sweet. To the younger people I might also say that it makes a very nice candy, by turning it over peanuts or other nuts, or by putting nuts into the melted sugar just before taking from the fire. It makes a very good syrup also, by melting the sugar in this way and adding boiling water; it becomes very lumpy, and unless you have had some experience you might be in despair, but with a little

simmering the lumps come out, and you have a syrup in flavor not unlike maple syrup. The degree of the browning makes a great difference in the flavor, and you must be careful not to get it too brown. Sugar is a very peculiar substance; wonderful things can be made of it, as any of you who have seen the spun sugar can testify. It is wonderful that so many kinds of candy are made without any mixture of anything else scarcely, but with different results produced by the manner in which sugar is cooked—whether it is cooked without stirring and cooled and stirred, or whether it is stirred while warm; different proportions of sugar and water and very slight additions of some other substances make a very great variety. It is almost pure carbon, and as soon as the water is cooked away it will burn very quickly.

Cabbage With Cheese.

For this dish we chop the cabbage and cook it in boiling salted water for half an hour, or until tender; put in layers in a baking dish with white sauce and grated cheese, and bake just long enough to melt the cheese. Cauliflower may be prepared in the same way only it should be boiled whole in plenty of salted water and broken into flowerets, before being covered with sauce and cheese.

I wonder if most housekeepers know that if cabbage, turnips, and other vegetables are not made to boil furiously there will be less offensive odor through the house. The water should be kept at as low a temperature as possible; the more steam the more odor. I will cook this cabbage in boiling salt water until tender and then finish it by making a white sauce and putting the cabbage in a baking dish, with a layer of sauce and grated cheese. It makes a very wholesome dish, though for digestibility raw cabbage excels the cooked, which is a peculiarity not found in many vegetables.

I am not using a wooden spoon to stir the cabbage for the reason that

wood takes odors and flavors more readily than metals, and it is more difficult to get it out; for that reason in chopping a small quantity of onions, I generally chop them on a piece of paper, and burn it, rather than use a bowl. The sauce I am going to make for the cabbage is the same sauce that I gave the recipe for yesterday, but there may be some here who were not here yesterday. The ordinary white sauce is made of a tablespoonful of butter, a tablespoonful of flour, and a cup more or less of milk, the sauce being made thick or thin according to the purpose for which it is to be used. Season according to the dish with which it is to be served. Pepper may be added whether it is to be served with vegetables or meat, but for toast, or anything of the sort, should be omitted.

I sometimes forget that I am cooking scientifically and do as the old, experienced cooks do, measure by judgment. I always feel as though I should apologize. It is not guess-work, however; you do not do it with your eyes shut, but you measure with a certain knowledge of how much liquid is required for the amount of thickening.

I use a cupful of white sauce to a quart of cabbage, and two or three tablespoonfuls of cheese to a layer. I spoke of cauliflower being prepared in this way, and I might add potatoes. When they are cooked with a white sauce we call them "scalloped," and when cheese is added we have still another dish which is quite a scientific combination, the cheese furnishing the protein that the potato lacks.

Corn Cake.

The recipe for the corn cake that I will now make is one cup of white flour, one-half cup of yellow cornmeal, two tablespoonfuls of sugar, one-half a teaspoonful of salt and two teaspoonfuls of baking powder, one cup of sweet milk, one egg, one tablespoonful of butter. Sift together the dry ingredients, beat the egg, add the milk and turn into the flour mixture, beat

thoroughly and add the butter melted. Bake about twenty minutes. This may be made with sour milk; in place of the baking powder use half a teaspoonful of soda; or using sour cream and soda and omitting the butter, it is delicious.

This is rather a delicate corn cake, and the proportion of white flour is in excess of the cornmeal, but it can be varied to taste. If you like cornmeal, use more of it and less flour. There are several varieties of corn meal, and for this preparation I would recommend the granulated yellow, as it keeps better than that ground by the old-fashioned process, and seems to give better results than the other, especially if the other happens to be a little sour. This kind will keep for a considerable time; I do not know for how long, but I know that I have used it when it was months old, and it seemed to be just as sweet as when fresh.

This recipe may be used either for baking powder and sweet milk, or soda and sour milk. I give the proportions for both, but the amount of flour, eggs, etc., is the same in both cases. If you are as fortunate as I am today, and have sour cream, use the same proportion of soda as for sour milk, but you can omit part or all of the butter, according to the quality of the cream. City housekeepers would think it very extravagant to use cream in breakfast cakes, but they are so delicious that I think they justify the occasional extravagance. If I were using baking powder I would sift it with the flour, cornmeal, salt and sugar. Put all muffin mixtures together after the same general rule, mixing all dry ingredients together, then beating the egg, mixing milk with the egg, pour the liquid on the dry mixture and beat it perfectly smooth. The butter should be melted and added last. Soda, however, though dry, should always be dissolved in a little cold water, because the grains are hard.

Question—Could you use molasses instead of sugar for the corn cake?

Mrs. Jamison—You could, but it makes a rather different texture to the cake; the molasses is rather more in accord with the New England corn bread.

Question—How many eggs did you use?

Mrs. Jamison—I have doubled the recipe, so used two eggs.

Question—If a cup of solid cream is used will it make the cake too crumbly?

Mrs. Jamison—It will not if you do not use butter. With this large amount of flour it does not make it too crumbly. The oven should be hot.

Food and Morals.

The topic announced on the program in connection with the cooking this afternoon, is the effect of food on morals, and perhaps it is a question that has not occurred to some. We think of food as affecting the physical health, and only perhaps within the last century has any serious thought been given to that aspect of the question. It has also been stated and borne out by evidence, that food has some effect on the intelligence of the people. We find the common food of the different nations to be the kind from which we would expect just such results as we see. The Italians and Chinese, and other nations which live on a diet which contains very little protein matter, are not as intelligent as the people of England and America, who live on a more mixed diet and one giving the proportion of the mineral and protein elements which are supposed to affect the mental capabilities in some degree. The effect of the food on the morals has perhaps received less attention, but there is no doubt in the minds of those having given the subject consideration, that to some extent it does. When cooking was first introduced in the public schools in Boston, there was a marked influence shown

in some of the poorer districts, in a number of cases of drunkenness; the policemen testified that after the cooking school had been in operation and the children attending learned to cook food in a nutritious manner, they noticed that there was less drunkenness than formerly, and they laid it to the better preparation of the food that had been furnished to these men.

I am surprised sometimes, to find how many people there are who are ready to express the conviction that food affects the morals, without special reading about it, but simply from their own observation. Only a few weeks ago a stranger to me, a man of considerable intelligence, who had traveled more or less, and seen a great deal of drunkenness—more than many men in the state reformatory institutions—said he was thoroughly convinced that poor cooking is to blame for very much of the drunkenness of the present day.

So we think that in urging good cooking and more attention to these points in detail—more thought and care—we are working not only for the better physical condition of mankind, but also for the better moral condition. Dr. Thompson of England, one of England's well known physicians, states that he believes that improper cooking and improper food has caused more crime than liquor has. So we find that when we begin to know the subject at all and give it any consideration, we can get testimony from all sides, and from different views and standpoints to the same effect.

It is not merely a saying without any meaning that good cooking makes people good natured. The gentleman who introduced the work here when we began, spoke of the desire of the women to learn to cook well, so that they could keep their husbands good-natured; it is a common saying also, that the way to a man's heart is through his stomach, not merely be-

cause in pleasing his palate we are keeping him good-natured, but in providing the sort of food that nourishes his body we are giving him more strength and ability for the work he has to do; he can do it more easily, more perfectly and in a better spirit.

There are certain foods that seem to have more effect in this direction than others. I remember hearing of a gentleman at the head of a reformatory institution who made it a rule to provide prunes for the children in the institution two or three times a week, because he said it kept them better natured and in better health; he claimed there was some property in the prunes that had an effect on the tempers of the children. I do not know how well that is borne out, but I do know of many people among my

acquaintances who are fretty and ill-natured, and I know too, that they are living on unwholesome food. I do not say that the food is altogether to blame, but I think it has something to do with it, and I think anyone can prove this from their own observation, if they will give the matter a little thought. We cannot prove it by scientific data at the present time, because the data has not been made; but we can, to the extent of experience and observation, say that the food question has even a higher position than has before been given it. And we can put into our mouths and the mouths of our children the simple wholesome material which at least shall not hinder the growth of healthy bodies, clear brains and pure souls.

THE FARMERS' FRIENDS.

STACIA LIVINGSTON, Supt. of Schools of Portage County.

Read at Farmers' Institute at Almond, Jan. 20-21, 1898.

When asked to speak this evening a friend suggested that I was expected to tell what I knew about farming. The telling of what I don't know might occupy a great deal more time. Still I have a most vivid remembrance of the first crop I ever helped to sow.

Chancing to find a patch of broad-leaved plantain we gathered our aprons full of seed and industriously sowed the door-yard. In the succeeding years, in obedience to the powers that were, with weary fingers and aching backs we harvested the bountiful crop. Even now I feel a thrill of pride that this first crop was well sown and well harvested and the seed of a reliable quality. What more can the best farmer ask?

The farm home is the ideal home for the child. Its woods, meadows, fields and buildings are full of pleasures for him; the games of hide and seek in the long rows of corn, the rides from the field on the loads of grain, the daring jump from the beams into the hay mow, the rushing, breathless slide down the sides of the straw stack, will after life ever duplicate their joys? Will any later achievements bring the sense of elation that the successful climb to the squirrels nest and safe descent with a tiny, furry ball brought to us, or any sorrow make our hearts ache worse than having to return the baby squirrel to its home, convinced that to retain it only meant its death?

With what delight we climbed to the crow's airy home only to feel too disgusted with his housekeeping to touch his bony babies. Later years have taught us his worth and that perhaps it is not necessary to be a good housekeeper to be useful in the world.

"The crow doth sing as merrily as the lark,
When neither is attended."

Few birds have more interesting characteristics than the common crow, being in many of his actions very like the raven. They are seen in single pairs or in little bands of four or five. In the autumn evenings they assemble in considerable flocks and make a wonderful chattering as if comparing notes on the events of the day.

The nest of the crow is placed upon the topmost branches of some tall tree. It is loosely made and saucer-shaped. Sticks and softer substances are used in its construction and it is lined with hair and fibrous roots. The eggs are individual in their markings and even in their size. The crow rarely uses the same nest twice, although he frequently comes to the same locality from year to year. And he lives to a good old age. Instances are not rare where he has attained the age of half a century without great loss of activity or failure of sight.

"Something glorious, something gay,
Flits and flashes this away
Thwart the hemlock's dusky shade,
Rich in color full displayed,
Swiftly vivid as a flame,—
Blue as heaven and white as snow,—
Doth this lovely creature go.
What may be his dainty name?
Only this—the people say—
Saucy, chattering, scolding jay."

During about three-fourths of the year the American blue jay, a member of the crow family, is an extremely tame, noisy, and even an obtrusive bird in its habits. He builds his nest in old and very shady trees, placing it against the body or on the large

limbs. The nest is formed of twigs or roots. The eggs are from four to six in number.

In the spring the jay consumes a large number of insects to atone for his sins of stealing fruit and berries in the autumn. He is a professional nest-robber and other birds are watchful of him. The jay remains with us throughout the year, the shyest of man, although seeing him most, and unless disturbed will live out his life close to his favorite haunts.

"We know not always
Who are kings by day,
But the king of the night is the bold,
brown owl."

Of all the groups of birds, the owl has the most decided markings and characteristic distinctions. There is a singular resemblance between the face of an owl and that of a cat, which is the more noticeable as both of these creatures have much the same habits, live on the same prey and are evidently representatives of the same idea in their different classes. The owl in fact is a winged cat, just as the cat is a furred owl.

The owl usually has a simple nest in a hollow tree but which seems seldom to be built by the bird itself as it prefers to take the deserted nest of some other bird and fit up the premises for its own use. They repair slightly from year to year the same nest. The eggs are white and four or five in number.

While the young are still in the nest the parent birds display a singular diligence in collecting food for them. All night long they pass to and fro with food, only ceasing their labors at dawn.

The hawk, like the owl, repairs and occupies the same nest for many years. The old saying that "a little knowledge is a dangerous thing" is exemplified in the way our hawks and owls are looked upon by a large majority of mankind. Birds of prey are condemned as a class and no opportunity is lost to destroy them and their eggs.

Even when the industrious hawks are observed beating tirelessly back and forth over the harvest fields and meadows or the owls are seen at dusk flying silently about the nurseries and orchards busily engaged in hunting the voracious rodents which destroy alike the grain, young trees, and eggs of birds, the curses of the majority of farmers go with them.

There is no denying that they do occasionally eat poultry, but the quantity is so small in comparison with the vast number of rodents consumed that it is hardly worth mentioning. They are both the genuine friends of the farmer catching for their larder so many of the small animals that prey upon his crops.

The Crow Bulletin published by the department of agriculture estimates that the eggs and poultry which they eat amounts to only a small fraction of one per cent. of their food. Formerly several states offered bounties for the destruction of the birds considered injurious to agriculture, such as crows, jays, owls and hawks. The division of economic ornithology in the department of agriculture has had the accused birds on trial and by careful examination of stomach contents has proved that although they may now and then kill chickens, pull up young corn or rob a hen's nest, this is more than counterbalanced by the good they do in destroying grasshoppers, cutworms and other harmful insects as well as field mice and other injurious mammals. Most of these laws are now repealed and the department urges the protection of these birds in the strongest terms. When we remember that mice are more destructive to the farmer than birds and that they multiply much more rapidly, we can begin to estimate what would be the consequences of the destruction of the crows, jays, owls and hawks throughout the country.

If there is so much to be said in favor of these so-called injurious birds, what can we say of the large number

of our common birds such as the robin, brown thrush, blackbird, bluebird, woodpecker, swallow and a host of others who live chiefly upon insects.

Our Quaker poet, Whittier, in this beautiful poem cites an interesting legend of the robin:

"My old Welsh neighbor, over the way
Crept slowly out in the sun of spring,
Pushed from her ears the locks of gray
And listened to hear the robin sing.

Her grandson playing at marbles,
stopped,
And cruel in sport, as boys will be—
Tossed a stone at the bird, who hopped
From bough to bough in the apple tree.

'Nay!' said the grandmother; 'have
you not heard,
My poor, bad boy! of the fiery pit,
And how, drop by drop, this merciful
bird
Carries the water that quenches it?

'He brings cool dew in his little bill
And lets it fall on the souls of sin;
You can see the mark on his red breast
still
Of the fires that scorched drops in.

'My poor Bron rhuddyn; my breast-
burned bird,
Singing so sweetly from limb to limb,
Very dear to the heart of our Lord
Is he who pities the lost like him.'

'Amen!' I said to the beautiful myth;
'Sing, bird of God, in my heart as
well;
Each good thought is a drop where-
with
To cool and lessen the fires of hell."

The American robin belongs to the thrush family, the mocking bird, catbird and brown thrush being other familiar children. In this family bird organization reaches its highest development. The robin courts the society of man, following close upon the plow and spade, often becoming quite tame. It destroys the larvae of many insects in the soil and is a positive blessing to

man. It is one of the earliest heralds of spring. The robin is not one of our most charming songsters, yet its song is sweet, hearty and melodious. Its principal song is in the morning before sunrise when it mounts to the top of some tall tree and announces the coming of day. The robin is not a skillful architect. The masonry of its nest is rough and the material coarse. The eggs number four to six and are greenish-blue in color.

"However the world goes ill,
The thrushes still sing in it."

The brown thrush has been called the mocking bird of the north, he arrives in May and may be seen perched on the highest twig of a hedge or on the topmost branch of a tree singing his loud and welcome song, that may be heard for half a mile. Few birds possess a more varied melody. His notes are almost endless in variety, seemingly uttered at the caprice of the bird without any approach to order. The site of his nest is a varied one, under a fallen tree or fence rail, or far up in the branches of a stately tree. There are three to five eggs of a greenish background thickly spotted with light brown, giving the whole egg a brownish appearance.

"Come, summer visitant, attach
To my reed roof thy nest of clay,
And let my ear thy music catch,
Low twittering underneath the thatch,
At the gray dawn of day."

Sure harbingers of spring are the swallows. They are very common birds and frequent the cultivated lands in the neighborhood of water, showing a decided preference for the habitations of man.

The swallow returns to its nesting site of the previous season, building a new nest close to the old one. His nest is found in barns, upon the beams of wood which support the roof, or in any place which assures protection to the young birds. It is cup-shaped and artfully moulded of bits of mud. The eggs, five or six in number, are of a

pure white color with deep brown blotches and spots. His food is entirely of insects. Swallows are on the wing fully sixteen hours of the day and the greater part of the time making terrible havoc among the millions of insects which infest the air.

"Not an inch of his body is free from delight,

Can he keep himself still if he would,
Oh! not he,

The music stirs in him like wind
through a tree."

The meadow lark is only a summer resident in the northern states, arriving in April and remaining until the latter part of October. It is a native bird and does not migrate beyond the United States. It spends the greater part of its time on the ground, its nest being placed beside a bunch of grass. The eggs are spotted and speckled with brown and purple.

The song of the meadow lark is not much varied, but its clear whistling notes are melodious and pleasing to the ear. It is decidedly the farmers' friend, feeding, as it does, on insects, caterpillars, moths, spiders, grasshoppers and worms.

Birds preserve the balance of nature; they are the natural check upon insects and the small, injurious animals. But when man steps in to destroy them the balance is disturbed and great losses result. It is estimated that they save to agricultural purposes alone in the United States \$100,000,000.

In many sections insect life is still so abundant as to make human life almost unendurable. In other sections it is only kept in check by birds, and there is no place in which were this check removed it would not greatly hold the balance of power. The number of flies, mosquitoes, gnats and other small insects destroyed in one day in a small area, by warblers, swallows and fly-catchers alone, is beyond computation. From daylight till dark all through the summer months the birds wage incessant war upon the enemies of man.

In speaking of this, the economic side of the question, one ornithologist says that the bird population has been so reduced that the insects threaten us with a plague like that of the frogs in Egypt. The increase and ravages of the pests are appalling. It is estimated that we already pay tithes to the insects, one-tenth of the agricultural products of the United States being destroyed by them every year. Michelet assures us that if it were not for the birds they would destroy every green thing so that the earth would become uninhabitable.

"Birds, birds! ye are beautiful things,
With your earth-treading feet and your
cloud-cleaving wings.

Where shall man wander, and where
shall he dwell—

Beautiful birds, that ye come not as
well?

Ye have nests on the mountain, all
rugged and stark,

Ye have nests in the forest, all tangled
and dark;

Ye build and ye brood 'neath the cot-
tagers' eaves,

And ye sleep on the sod, 'mid the bon-
nie green leaves;

Ye hide in the heather, ye lurk in the
brake,

Ye dine in the sweet flags that shadow
the lake;

Ye skim where the stream parts the
orchard-decked land,

Ye dance where the foam sweeps the
desolate strand."

"Whatever you would have appear
in the life of a nation you must first
put into its schools."

Bird day is worthy the thoughtful consideration of teachers and all others interested in protecting and preserving our birds. The object of the day is to diffuse a true knowledge of the aesthetic and practical value of birds and to arouse an interest in bird protection.

From all over the country come reports of a decrease in our native birds. In many places some of our sweetest songsters and most useful insect de-

stroyers have become very scarce or have disappeared entirely. The causes are many but the greatest is an inexorable thoughtlessness on the part of young and old.

The study of bird life is one of especial interest to children, and if properly pursued will develop in them sympathetic characters that should make them kinder toward their playmates now and toward their fellow men in coming years. Impress upon the child that,

"He liveth best who loveth best,

All things, both great and small," and you have built into his life something that will shine forth in good deeds through countless ages.

And how to go about this work,—Briefly—study the birds themselves. Get a boy aroused to a friendly protective interest in one bird and you have probably made that boy a friend of all birds. There is a strong necessity for teaching children the sacredness of life. Such lessons are not given by allowing him to play with toy pistols or cannons and, most dangerous of all, the air gun, that so many thoughtless parents too readily give into their hands. To suggest to a child that a pleasant holiday is time spent in the woods with a death-dealing toy—sport that means for the innocent birds suffering and death—is dangerous education for the young; it is an education that makes the boy hard, cruel, unfeeling—teaches him to look at the agony of a creature with an indifference that cannot but end in brutality. We want more kindness in the world, not less. We want to train our children into the belief that arbitration is better than war, honesty better than trickery, kindness better than cruelty. Work to educate the young in mercy, patience and kindness. Give your boy an opera glass and send him into the woods to learn the patience, ingenuity and industry of birds. Let him learn to distinguish the song and the flight of one bird from another. Arouse his curiosity as to their habits,

and give him the innocent delight that the study of natural history is sure to bring into his life and holiday pleasure. Teach him the cowardice of torturing helpless birds. Let him know their value as insect eaters and that we want a great many more birds in our woods and near our homes than we now have.

Even the sparrow has many friends among the naturalists who declare him to be a useful insect-eating bird, while others declare him a pest. If it is decided that he is a nuisance and must be exterminated let the work be given to some responsible person who will see that it is done with as little suffering as possible. The recent experience in Illinois resulting from offering a bounty for their heads is ample proof of the folly of such a course. The Humane Journal published in Chicago says of it: "Many cases of eyes partially or wholly destroyed by air guns were reported by surgeons in the first fortnight after the bounty was offered. Between a million sparrows or ten thousand boys armed with the air gun, any sensible two-eyed person will choose the sparrows every time." Jenkins Lloyd Jones, rightly says:

"It is the boys I am concerned about more than the sparrows," and he seriously objects to "this putting incipient murder into the hearts of our boys." Rather insist that the coming generation shall realize the sin of cruelty and the bad tendency of any act that gives the question of life or death into irresponsible hands.

The word cruelty is allied to the word crude. It is related to ignorance. Stupidity is the mother of suffering and thoughtlessness is the father of woe. If he thought of the suffering of the turtle the boy would not leave him on his back. If he thought of the starving birdlings in the nest of course he would not kill the mother.

President Angell of Ann Arbor said in his address to the National Association of Superintendents of Public Schools: "It is largely, if not wholly,

a question of education. Nearly all the criminals of the future, the thieves, burglars, incendiaries and murderers are now in our public schools and with them the greater criminals who commit national crimes. They are in our public schools now and we are educating them. We can mould them now if we will. We know that we can make the same boy—Protestant, Roman Catholic or Mohammedan. It is simply a question of education. We may put into his little hands, as first toys, whips, guns and swords, or may teach him as the Quakers do that war and cruelty are crimes. We may teach him to shoot the little song bird in spring time, with its nest full of young, or we may teach him to feed the bird and spare its nest. We may go into the schools now with book, picture, song and story and make neglected boys merciful, or we may let them drift until, as men, they become sufficiently

lawless and cruel to throw our railway trains off the track, burn half a city or involve the nation in civil war."

Is not the work worth doing? Let us take up this branch of it, the study and protection of the birds. Let the schools teach it, the press print it, and the pulpit preach it, but above all, in the home, call the attention of your children to the singing of their feathered brothers of the air. Teach them to notice their beauty and grace of form, plumage and movement, to watch them care for their little ones, to notice their nests, their happy little homes, and as you listen to their songs call to mind,

"'Tis always morning somewhere, and
above
The awakening continents from shore
to shore,
Somewhere the birds are singing
evermore."

EDUCATION OF FARMERS' DAUGHTERS.

GERTRUDE M. GIBBONS, Sharon, Wis.

Essay which won first prize at Delavan Institute, March 1, 1898.

"True education is the symmetrical and harmonious development of the various powers and faculties of the human body and soul. It influences action, saves us from evil, secures good, conduces to happiness and guides the ruling of conduct in all directions under all circumstances. It teaches in what way to treat the body and mind, to manage our affairs, bring up a family, utilize all sources of happiness, which nature supplies, and how to use our faculties to the greatest advantage."

Farmers' daughters should receive a good general education which will enable them to lighten the cares of the

farm, carry on the duties of the household, cheer the home, and live a pure life.

Let us consider their education along three lines: First, that fitting for a broad, general culture; second, for the practical; and third, that which gives broader sympathies and increases their power of enjoying life.

From the first they gain a foundation. Under the second comes the training of the housekeeper and mother. Success depends on the ability to manage and it must be an educated mind that can plan and calculate and be able to solve the problem of existence according to Carlyle's theory of

lessening the denominator rather than increasing the numerator.

It is very necessary that any girl should know all about the art of housekeeping.

Farmers' daughters may become farmers' wives and they should consider themselves as much responsible for the success of the family as their husbands. First of all, they certainly wish to understand all about the farm. Something of the construction and uses of machinery, which they will get in physics, and a knowledge of irrigation and fertilization is also practical.

What a pleasure it is to the parents to have their daughters add up their accounts, tell them the contents of a bin, the amount of fencing for a lot, or lumber for a building, helping them generally to brighten their lives.

From chemistry they will get a knowledge of the elements of the grains and soil; they will be able to tell what is best fitted for certain lands and what elements the various kinds of grain take from the soil.

That included under the third division naturally comes with a good education, but it is well to speak of it separately. The well-educated daugh-

ter will not think farm life dull and a life of drudgery for she will see much in her surroundings to enjoy.

We are all aware of the great influence the mother has on her children. We may say up to a certain age she has almost entire control over them. If educated she will know what the fruits of knowledge are and it will be her aim to educate them and know to what they are best suited. Children in the country do not have the advantage of the city, so they have more need of an educated mother, because with her help and the books she advises them to read their faculties will be developed. For, as Lowell says, "books are the key which admit us to the whole world of thought, fancy, and imagination. To the company of saint and sage, of the wisest and wittiest at their wisest and wittiest moment."

The value of a good education is apparent to all thinking people, when they consider how an education develops the faculties of the mind and better fits one for all the duties of life.

I therefore leave the question with you as to who has a greater need of a good education than the farmer's daughter?

THE FARMER AND EDUCATIONAL REFORM.

ANNA J. EVANS.

Read at Farmers' Institute at Bangor, January, 13, 14, 1898.

Mr. Chairman, Ladies and Gentlemen:—Although I am not a patronizer of apologies, yet it is nothing but justice to state that I have had but a few hours to prepare this brief paper. I deem it a high compliment to have the privilege on this interesting occasion to address such a deliberate and intelligent people—those who are able to distinguish between wit and argu-

ment, sarcasm and logic, sneer and evidence, eloquence and demonstration. It is a greater honor for a country school teacher to address this respectable and thoughtful audience on educational reforms, on the best methods and means to instruct country children in the path of a prosperous and noble life than to be a Robert Ingersoll before a half-full house in La

Crosse last Tuesday evening ridiculing and assaulting the bible, which is the very foundation of our grand republic, the genius of our modern civilization, the inspiration of our schools, colleges and universities, and the motive power to reforms, progress, and a higher and better life. But my question is educational reform which I consider the most essential and important of all reforms.

There are many things in this world that need amendment. We need better land laws, better revenue regulations, wider suffrage, closer sorting of officers, purer ballot box, and a higher type of citizens. We need reforms in drinks, diets, dress, recreations, social habits, labor and capital, church and state. The age demands improvements in all directions, in navigation, construction and government of railroads, public buildings, manufacturing, horticulture and agriculture. We need men of trained brains, who are close students and observers of nature, men of inductive methods, those who accumulate and classify facts as a result of practical experiments. Our idea is that the great agency which undertakes to prepare the public for their special work in life by awaking and directing their feeling, and by furnishing them with a thorough and accurate knowledge of things is the extreme need of a radical amendment. Because as men feel and think, so will they act; as are its constituents so will be society, and until people are better instructed in the things which pertain to their true welfare, all other reformatory schemes will yield but partial and unsatisfactory results.

By the phrase "educational reform" I mean reconstituting the general methods of study upon a scientific basis. What the people need is to know what to do and how to do it and the great means to this end must be found in comprehensive scientific education. But there is much misapprehension and some misrepresentation as

to what is properly meant by scientific education. It does not mean a protest against traditional studies—against knowledge of ancient classics, mythology and literature, against researches in the history of philosophy of Greece and the art of Italy, but it means that the unfolding mind of the age shall be put into more direct relation with the present realities of the world than our traditional culture allows; that our educational systems should be modernized, controlled by the scientific thought and methods of the times, that better opportunities to study modern literature, modern languages and modern history, and to learn how to utilize and apply the results of scientific experiments, to promote the welfare of society at large. The reform now required is to make available for society the stores of valuable applicable truth which is the latest and highest result of human thought. It is a notorious fact that a pupil can go through a course of so-called liberal study, and graduate with honor at the highest institutions, in complete ignorance of that vast body of facts and principles which has arisen in modern times under the name of science and the object of which is to explain the existing order of the world.

When an ambitious parent sends his son to have a liberal education, he is anxious to learn what will become of him. Will he be tinctured by the scheme of higher education in the ancient seats of learning, or will he be inspired by the influence of a reformed and scientific education? Will he be crammed with ancient classics and philosophies or trained in the arts and science of modern times? This is the query. Do not misunderstand me, it is not my intention to reflect upon the noble ancient institutions of learning, but to emphasize the importance of technical schools—schools to make practical men and women for all departments of life—schools to teach how to utilize physical and social forces, to

promote the welfare of the race—to build up better homes, superior society and a grander country.

Farmers as a class do underrate the full value of practical scientific knowledge, do not commonly endorse and patronize educational reforms, are satisfied with a smattering knowledge of newspaper reports. What per cent. of our farmers' sons are sent to state universities to study agriculture scientifically? How many of our farmers' daughters have opportunities to study domestic sciences and to cultivate taste for the beautiful in nature and art? When the American farmer will realize his responsibility to educate his children in scientific and practical institutions a new era will dawn in the history of agriculture.

You cannot make first-class musicians by beginning with adults, so you cannot make superior farmers from timber grown in foreign lands. Facts bear the same relation to principles in common life that they do in the higher departments of technical science. Training in observation should begin in childhood and become an early mental habit. There are native aptitudes in the departments of intellectual exertions and only by beginning

with the young we can find the natural bent of the youthful mind and whatever direction he takes he should be trained in that specialty. The farmers' institute is a final argument in favor of educational reforms—of the expediency and necessity to have a practical and experimental knowledge of things in order to enrich our country with progressive farmers. Mr. A. cannot learn how to improve the condition of his land and the blood of his stock by reading the history of Egyptian mummies. Mr. B. cannot tax nature to yield more corn and better wheat by conjugating Greek verbs. Mrs. C. cannot market better flavored eggs and higher grade butter by studying Latin inflections; neither can Mrs. G. understand the chemistry of fine pastry and advanced cooking by contribute a color to paint the picture of the heroes of Rome and Greece. I trust that the present Institute will contribute a color to paint the picture of an ideal farmer, that it will stimulate the community to advocate educational reforms, and inspire the representative farmers who are present to bless their sons and daughters with a complete course of scientific education.

SHEEP HUSBANDRY.

LOUIS KAMMERER.

Read at the Farmers' Institute at Brodhead, Feb. 17, 18, 1898.

In the commencement of this article upon sheep and their management, perhaps it is due that I say something by way of apology. The language I shall talk to you is not my native language and I may not give the proper accent and I may not give you the utterance that is plain to a clear and proper understanding; but this I will say, that whether it be English or

Dutch, whether it be Greek or Jew, I can pull sheep out of the mud in one language as well as in any other, or I can see him when he is there. By a proper arrangement of yards and shelter, with proper food and rations, they are enabled to do much of this work themselves.

It will not be our design to go into their very ancient history. It

is sufficient that we read in sacred scriptures that the Chaldeans watched their flocks by night, and to note from our own experience some of the very essentials why it is necessary to watch the flock by night as was the case with the ancient Chaldeans. Evidently the wolf, the real wolf, in his real individuality was a menace and constant prowler about his flock, now and then cropping off some of the selects of his fold; but to the flock-master in our own day the wolf comes in various forms, so that the shepherd must be ever on the alert. He must prepare his fences and folds so no untrained dog will invade their quietness by night and he find in the morning an indescribable stew of the best of his flock in the form of chewed up mutton, blood and wool, and all the essentials that go to make up a first class slaughter. Do not understand me in this as casting any disrespect upon the dog when trained and in his place. Far from that. Let me tell you that every manager of sheep, if he appreciates good help and faithful service, should avail himself of a good shepherd dog. Now after you have got him, it is with you the labor begins. First teach him you are his friend and he will soon know you as his only friend, to the exclusion of all others, by faithful and untiring labor well directed. How often has it been our lot, when tired and worn out from the labors of the day, to find the sheep in small bunches here and there, all over the pasture, and the tiresome job of rounding them for the night. But the recourse to the tired shepherd is in his faithful dog; to place himself upon some stump or log in commanding view, and rest himself, and give the command to his dog.

Now to the beginner in sheep husbandry, we would advise all such. First of all we would require aptness, desire and love for the business. These essentials being filled, it will be necessary for him to take into con-

sideration his surroundings and conditions; in short see if he has a farm suitable to sheep raising. He must not select low marshy ground. If he has such he better turn to cattle. He must not take them on the farm exclusively as scavengers, expecting that they are going to clear up the brush and weeds of the farm while he sits idly by, seemingly enjoying their relish.

Now what breeds shall I advise you to select? Let me tell you to take any breed which from a careful financial consideration and business point of view, coupled with your fancy or desire, shall dictate. Better start with a few, and grow up into the business, and as you grow in the business, if you are painstaking and thorough, your love for the business will not depart. As to whether you breed exclusively for mutton or for wool, or for both mutton and wool, you must take into consideration your nearness or remoteness from market. Of whatever breed I would select, whether of grades or pure bred, upon the sire I should expect my improvement in the flock. Consequently, I would advise always a pure bred sire, and in selecting, I would not go absolutely on pedigree. The simple fact of pedigree is not a proof of perfection, because he may have many poor points that do not meet your ideal of breeding. Pedigree is only your proof of his breeding. First see that the pedigree is all right, which is your proof of his breeding, then see if the sheep in your judgment possesses a good strong constitution, and possesses your ideal in form, with a good firm fleece and uniform covering. Never allow a few dollars to destroy your preference, and favor a poorer one.

If you decide to combine both mutton and wool, take some of the middle wools. Now here we come to a point where we may clash with somebody's adverse views. How often have I seen the senior member of our firm turn with longing love and admiration

for the grand old Merino as the source and foundation,—the corner stone to all his prosperity. How often have I seen when some favorite of the flock has passed in his checks and been laid away to rest and heard him speak of the hardiness of the grand old Merino. Let me tell you they are neglected to the rear, to the far off cheap lands of the west, where climate and soil and everything contributes to cheapness, where you can grow 15 cent. wool. There is where the Merino abounds in all his hardiness, and where cheap feed means cheap pay. Why is it that we advise and prefer the middle wools? Certainly it is because of more profit in the labor expended, as they are a close wooled sheep, quite equaling the Merino in hardiness, and the growing demand for mutton makes him a double source of profit, viz.: mutton and wool. Why is it so many farmers of Wisconsin are today expending so much energy and labor upon the hog, when they can raise 100 pounds of mutton almost as quickly as they can 100 pounds of pork with almost double the price in the mutton that they have in the pork? Besides, the fleece which goes to offset the keep, and the keep consists most of the year in the grasses, while with the pork it is made almost wholly on a grain diet.

Now after securing your flock how shall we advise you as to management? This we can only do by the relation of our own experience. We will suppose your flock has passed thus far through the winter in a thriving condition, well sheltered from the cold blasts and storms of winter. The season is now near approaching when you will begin to look for the lambskins of your flock. This is a time when your care and vigilance knows no slumber. You must ever be on the alert, in sunshine and in storm, in heat or in cold, by day and by night. Your presence should be with the flock, for upon your crop of lambs depends all your improvement of the

flock. How often I have heard the remark, "If I had been there I could have saved both ewe and lamb. Now both are dead." Better have some convenient spot in your building with a handy cot, so you can lie down and take a nap now and then; but you should always be there, that your timely assistance may be on hand with your flock, at this important period of the year. Do not understand us as meaning by vigilance and care that they are a panacea against all loss, for how many times has it been our lot with the most care to lose both mother and lamb. There are some cases that seem to be unavoidable. How many times have I heard the indifferent flock master say, "I have the very best of luck with my lambs, have not lost one, they came strong and healthy in the very coldest weather, and I don't have much bother with them." All such talk is far from our experience. Let me say there is no flock, however watched and cared for, but some dead lambs are there. There's no graveyard of your flock but some selects are there, and when you hear of a man who is indifferent and don't see any losses, don't have any—you will do well to record your unbelief, and wait for his further experience.

It sometimes happens that you have more lambs than mothers, and sometimes more mothers than you have lambs. It is always best to harmonize this matter as well as possible. It is well if you lose a lamb to preserve its pelt for a few days, and to preserve the ewe in flow of her milk. This can be done either by milking her three or four times a day, or having a few lambs to help you out. They will always be on hand to do the milking for you if you will only catch the ewe. Now watch for a pair of twins. Take one of them, with the pelt of the lamb that died wrapped around it, and give it to her. You will find the ownership complete. It sometimes happens we have a motherless lamb and no lamb-

less mother to take it, and no prospect of any and our only recourse is to make a twin of him by adoption. This to the unpracticed would seem to be slight of hand. Now as to the process. Look over your ewes to drop lambs; find some one with the evidence that she could care for more than one, and that is to drop one lamb. Be there at the time she drops her lamb, with your orphan, stir them well together, with no halfway about it, then remove the new born lamb for a few minutes only until she has well displayed her motherly devotions upon your orphan, which will be immediately, then quietly, and unknown to the mother, drop the newborn lamb by her side, and you have the happy family complete. The simple fact is you have made the mother believe something which is not true, or in other words you have turned her motherly devotions in the direction you desired.

Now some of the older lambs are large enough to want something more than the mother milk. Provide some little place within the yard sufficient for your lambs to pass through to the exclusion of the older ones. Provide them with rations of bran, corn meal, buckwheat, shorts, and oil meal, and you will be surprised at their wonderful growth. Now the time of shearing arrives and the act performed. Within about a week after provide yourself with some of the well known dips, and dip every sheep in your flock. If you have not the convenience yourself drive them three or four miles to some neighbor who has, rather than to allow ticks and vermin to pester your flock the year round, resulting in loss of flesh and wool, thereby demanding increased rations. Grass has now arrived, and without doubt the whole flock will abandon their rations for the tender blades of grass; but as the grass begins to grow old and tough your lambs will begin to return to the fold, if permitted, in

search of their former rations. It is at this time the shepherd must look ahead preparatory to weaning time. This he can do by sowing a few acres of rape, which will be well on hand about the middle of July. Now take your lambs from the old pasture, and avoid the ravages of the stomach worm and the innumerable parasites that are ever a constant enemy to the weaker ones of your flock. Place them upon the rape, with a light ration of grain. This will be sufficient to carry your lambs on tender and succulent feed through the dry months of August and September. Having passed the summer months, if you have prepared at seeding time by sowing turnips among all your small grain, they are now ready to roam the stubble-fields of your farm, partaking of the bountiful supply of turnips, and the after feeds of your meadows, up to the time when the storms of winter begin.

For the rough forage for winter, I would greatly prefer clover hay, cut and cured when not too ripe; but it sometimes happens through drought and winter killing, you are left without the clovers. In such case you will do well by sowing millet or Hungarian. These grasses make a very good substitute if cut when the first heads appear; but when allowed to ripen they are somewhat dangerous feed for any stock. For grain rations, corn, oats and wheat bran in equal parts give good results.

And now having told you our experience in these feeble words, take them, and as you grow in experience you may hope and expect to enlarge upon them,—knowing well that to the shepherd belongs the task of clothing our people, whose future is grand and great. Hoping and hastening unto the day when the storms and passions of political parties will no longer affect our calling, I thank you for your attention.

POULTRY ON THE FARM.

MRS. MATTIE WEBSTER.

Read at Institute at Belmont, Feb. 15-16, 1898.

During the last quarter of a century the poultry industry has developed into one of the largest agricultural industries of our country.

According to the latest census reports, we find the value of poultry products to be in round numbers, \$290,000,000, which is more than the entire cotton crop, and very considerably more than the boasted hog crop which represents only \$186,529,745. Even the great wheat fields of the boundless west do not produce a crop that is of as much pecuniary profit to the United States as eggs and poultry. Yet great as the yearly egg crop is, the business is not overdone, for the United States imports nearly \$2,000,000 worth of eggs annually; by these figures you perceive the demand far exceeds the supply.

The general impression is that this great industry is controlled by the farmers; but such is not the case. Over 50 per cent. of all the poultry and eggs of this country are raised by city and suburban residents, and those who have a few acres, and make a specialty of poultry raising. The farm is pre-eminently the place for poultry, and I can not understand why more of our farmers do not wake up to the fact that poultry can be made to pay them a good profit compared with other branches of farm work.

The time was—in the distant past—when a man was not regarded as quite level-headed if he took much of a hand in this business. It was all right for women and children, but too insignificant a business for a man to engage in. But now poultry culture is one of the fads of the wealthy, as well as the delight of the poor. Men

and women in all ranks and conditions of life engage in this industry. We hear, and read of whole farms devoted to poultry raising, and if the amount of the yearly income of some of the proprietors of those poultry farms should be given it would be a surprise to say the least.

I have asked a great many farmers, whose poultry were only common or mongrel stock, the question: "Does farm poultry pay?" And I can only remember one farmer answering my question positively in the negative. Some were uncertain, but inclined to believe they paid for their board and lodging. Others have answered without the least hesitation: "Yes, they pay, and pay well." I have yet to see the first occupied farm without a flock of some kind of poultry upon it, and this fact alone is conclusive evidence for me that poultry is profitable on the farm. If you, farmer, are inclined to doubt that the biddies are money makers for you, just keep, or have your wife keep an account with them this year—the eggs and fowls used on the table—estimated at market price, the number of chickens hatched, and the amount received for eggs and poultry sold. If you want your account accurate charge all their food at market price. Their feed costs but little, for your poultry live, principally, upon the waste of your farm, converting it into money in the form of eggs and chickens for market. I am satisfied if you keep such an account you will never be heard to say, "It does not pay to raise poultry on the farm." If common poultry, with the little care and attention they receive on the farm, pay, how much greater

profit the farmer could obtain from a well cared for flock of thorough-bred fowls. With the great facilities the farm has for the business—unlimited range, food at first cost, and much at no cost whatever, such as green food, grass, etc., grit and animal food for the picking up all through the summer, the farmer ought to increase his income \$500 a year by raising poultry.

Of the farmers here this evening let me ask, why not raise pure blooded poultry? You know that other thorough bred stock is better than scrub stock, and most certainly is this true with poultry also. Do you think, as I have heard a few express themselves, that common hens lay better than thorough-bred biddies? If you do, just prove the matter for yourselves. Take a pen each of thorough-breds and mongrels or scrubs, give them exactly the same care, keep a strict account with them for a few months, and then express your opinion. Some farmers have the impression that pure blooded fowls are not hardy and must be very tenderly cared for. Of some breeds this is true, but I can select for you breeds that are adapted to our climate, and can stand as much cold as any fowl—even a scrub—should be expected to stand. Is it because the business is considered insignificant and of little importance that more of our farmers do not try to have better poultry? Perhaps you think caring for the poultry is women's work, so have given very little thought to your flock. If you so consider it, just turn the whole business over to your wives; they have had a working interest in it, probably, all the years they have lived on the farm, now give them the entire control of the poultry and proceeds, they paying you for the feed you furnish in fowls and eggs for home use. And you, farmers' wives, take hold of the business, and resolve to make the poultry profits on your farms, greater this year than ever before.

You are rich in experience, and if

you have a love for poultry, a will strong enough to overcome obstacles, and bear disappointments and failures (you must expect some disappointments and failures), stick-to-it-iveness and perseverance, and a determination to succeed you need not fear to enter the ranks of poultry breeders.

Your only capital may consist of your flock of common poultry—that, like Joseph's coat, are of many colors, but let not that discourage you; for they may be so utilized that your desire for a flock of profitable, thorough-bred poultry will be gratified. Having the necessary qualifications of a successful poultry woman, and the capital, the next thing to be done is to decide upon a breed that will best meet your requirements.

If the production of eggs is your main object, the Leghorn, Minorca, or some other of the non-setting breeds should be chosen; if a large fowl with plenty of meat is desired, the Cochin, Brahma, or Langsham will answer your purpose; if a general purpose fowl is wanted—one that will lay well and is the very best for market, the Plymouth or Wyandotte cannot be excelled. Your breed chosen, you are ready for the work of converting your flock of common poultry into a flock of thorough-breds. There are two ways in which this may be done.

The first and most direct is to sell the stock on hand and invest the money in a small flock of pure-blooded fowls. The other way, and the one generally used, is to grade up the common stock. The best hens are retained as sitters and mothers, the others sold, and with the proceeds a few good, thorough-bred males, and two or three sittings of thorough-bred biddies' eggs are bought. In the late fall, select again your best hens and they with the thorough-bred pullets you have raised will be your next season's flock. Sell the others and repeat the proceedings of the previous season, and at the end of the second year you will have quite a little flock

of pure-blooded fowls, and a much improved, larger flock of mongrels.

We have taken it for granted that you had a house for your common fowls, but if such was not the case, one must be provided for your poultry before commencing the first season's work. If necessary to build a poultry house, it need not be expensive in its construction—indeed, it may be built quite cheaply and yet be warm and comfortable.

Poultry can be made more profitable in winter than in any other season of the year if warmly housed and rightly managed. Then it is that eggs and market poultry bring the highest prices. By feeding the biddies in winter egg-producing food, supplying them with fresh water and grit, and inducing them to exercise, by burying their grain in straw and making them work for every grain, we may have eggs for market when every dozen is worth twenty cents or more.

Poultry culture is a pleasant, health-

ful and profitable employment if conducted in a business-like way. It depends upon you to make a success of the business and you can do it if you are willing to plan and work and care for your poultry.

If you intelligently and systematically manage the industry you will be pleasantly surprised when the account is balanced at the end of the year. In three or four years by following the plan suggested for the improvement of your flock, your present flock of every size and color will have given place to a flock of beautiful thoroughbred fowls, uniform in size and color, of far greater value, and your pride and delight. If I should ask you then, "Is farm poultry profitable?" I have not the least doubt but that you would tell me you had proved to your own satisfaction that poultry and poultry products are more profitable than many of the other agricultural products.

IMPORTANT TO FARMERS.

University of Wisconsin, College of Agriculture.—Young Farmers who expect to take the Lead in the Future Development of the State cannot Afford to miss the Short Course in Agriculture.

R. A. MOORE, Madison, Wis.

There is no one factor that is now doing more good in the uplifting of agricultural interests of our state than the training of young men in the College of Agriculture, so as to enable them to meet the close competition and varied problems that confront the farmers of our country at the present time.

No longer any doubt as to the advisability of the farmer being trained in his respective vocation should exist in the mind of even the most skeptical, for he has more varied and intricate problems to fathom than the doctor, lawyer, or mechanic, therefore he is in need of like opportunities to fit him for his life work.

Wisconsin is fortunate in having a college especially for its farmers in the State University at Madison, which gives the following courses: The Graduate Course, the Long Course, the Short Course and the Factory Course in Butter and Cheese Making.

The Short Course in Agriculture and the Factory Course in Dairying are the 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 November 29, and continues 14 weeks, closing March 2, 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.

LINES OF WORK PURSUED IN THE SHORT COURSE.

The First Year students take up the following subjects: Farm Dairying, Bookkeeping, Blacksmithing, Feeding of Farm Animals, Breeding and Stock Judging, Plant-Life, Agricultural Physics, and Veterinary Science. Of the



IN THE STOCK-JUDGING PAVILION.

above subjects the students complete Farm Dairying, Bookkeeping, Blacksmithing and Plant Life.

The Second Year students complete feeding of farm animals, breeding and stock judging, agricultural physics and veterinary science, part of which was taken up the first winter, and in advance have bacteriology, agricultural chemistry, horticulture and economics of agriculture.

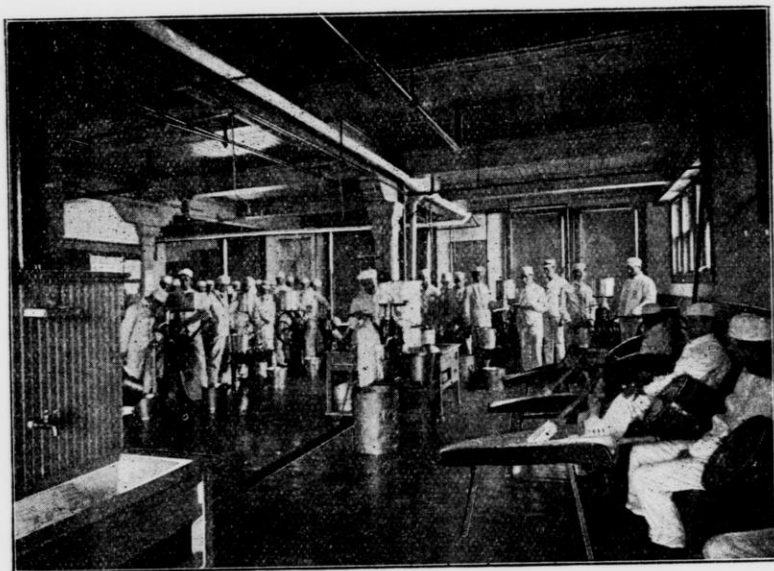
Lecture work in nearly all subjects is followed by practical drill in the laboratory, winter gardens, and stock judging rooms. The student has an opportunity to come in contact and work with the actual objects upon which he has received his lectures.

To give the reader a general idea of what the student is supposed to know in the various subjects, questions are hereby submitted that were taken from the final examination sets used last winter, and upon which all Short Course students passed satisfactorily with few exceptions.

FIRST YEAR STUDIES.

Farm Dairying.

1. What is the average composition of cow's milk? What is the most variable constituent?
2. How does the composition of milk change as the period of lactation advances?
3. What constituents are classed as solids not fat? What is meant by total solids?

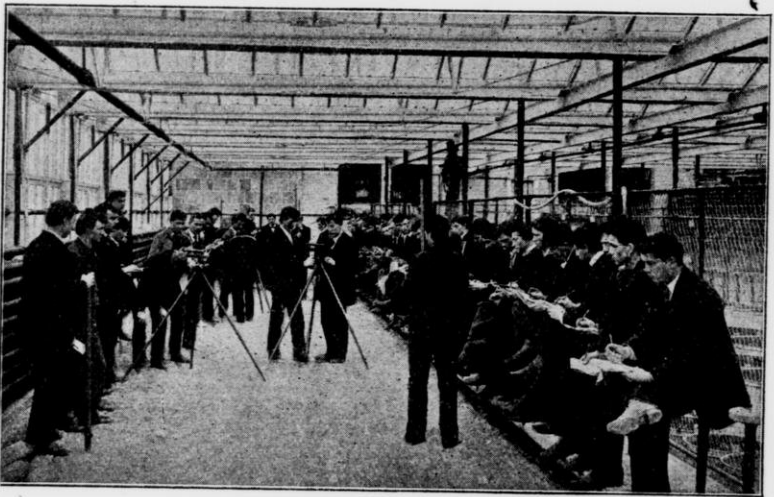


FARM DAIRYING.

4. What circumstances affect the number and size of the fat globules in milk?
5. What is the rule for calculating the solids not fat when the lactometer reading and per cent. of fat are given?
6. What conditions are favorable to creaming by the gravity system? What by the centrifugal system?
7. How does the per cent. of fat in cream affect the losses in butter making? How does it affect the temperature of churning?
8. How should the yield of butter compare with the amount of fat in the milk?
9. What causes mottled or streaked butter and how can this be prevented?
10. How does washing butter affect its flavor and its keeping qualities?

Agricultural Physics.

1. Explain why the strength of timbers increases with the square of the vertical thickness?
2. Explain why long, narrow and low barns are relatively so much more costly than those which are higher and more nearly square.
3. Describe a good way of ventilating a cow barn.
4. How should the feeding of a silo be proportioned to the cows being fed?
5. What are the needs of air in soil, and how may we increase it?
6. What is the amount of water required for a pound of dry matter of oats, barley, corn and clover?



AGRICULTURAL PHYSICS.

7. Why do crops suffer less from drought on drained land than on the same land not drained?
8. Explain how plowing, harrowing and cultivating the soil saves soil moisture.

Feeds and Feeding.

1. How many pounds of dry matter in 100 lbs. of green corn fodder; in 100 lbs. mangel wurzel beets; in 100 lbs. clover hay; in 100 lbs. shelled corn?
2. Is the starch which appears in the potato formed primarily in the leaf or in the tuber?
3. How much digestible protein is there in 100 lbs. of wheat straw; in 100 lbs. clover hay; in 100 lbs. shelled corn; in 100 lbs. linseed meal?

4. Name one kind of hay and four kinds of concentrated feeds rich in protein.
5. Name two kinds of hay or straw and two kinds of grain rich in carbohydrates.
6. Which carries the more fat, wheat or corn? Rutabagas or corn?
7. A dairy farmer has an abundance of oat straw, corn stover and corn; what other foods would you recommend as helpful to supply his herd with a well balanced ration?
8. What per cent. of all the cow can eat is required to support her own body?



VETERINARY SCIENCE.

9. Write briefly directions for growing clover where the seed is sown by itself.
10. What is the feeding value of potatoes compared with corn meal?

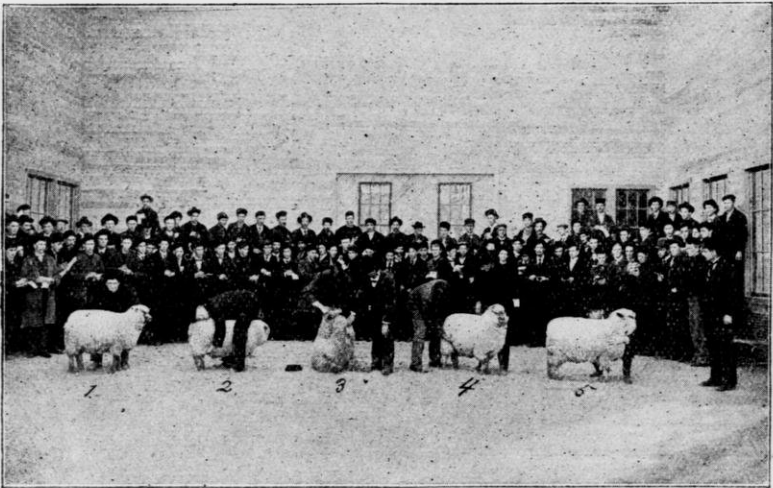
Veterinary Science.

1. How would you examine a horse for soundness?
2. What is the normal temperature of the horse, ox, sheep and hog?
3. How would you prepare the young foal for weaning, and at what age?
4. Give the capacity of the stomach of an average size horse?
5. Name the most common diseases of the digestive organs in the horse and ox.
6. Name a good colic remedy.
7. How would you treat inflammation of the lungs in the horse and ox?

8. How would you kill lice or insects infesting the skin of horses and cattle?
9. Name the diseases of the horse's foot.
10. What is meant by bog and blood spavins?

Breeds and Breeding.

1. Which breeds of our cattle would be classed as distinctively (a) beef cattle; (b) dairy cattle; (c) general purpose cattle?
2. Enumerate the five principal points that you would look for in selecting a good dairy cow.



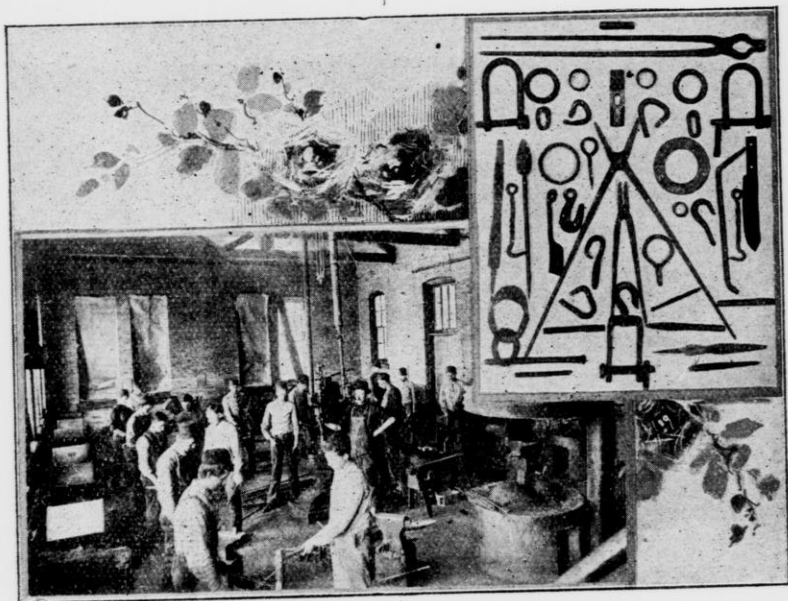
ANIMAL HUSBANDRY.

3. If you had Holstein grades on a farm and wished to improve their milk in quality why wouldn't you cross them with a Jersey?
4. If you suspected that a cow was likely to have milk fever how would you handle her if she had calved without your anticipating the event?
5. What are the principal causes of garget in a cow's udder, and how would you treat a bad case of garget?
6. Mention the leading essentials as to the form of a good mutton sheep. In what particulars would you expect the ewes to differ from the rams in conformation?
7. If you had a hilly and rough farm with somewhat scant pasturage, which breed of sheep would you choose, and why?

8. What qualities in the Dorset breed render them particularly valuable in this country?
9. What are the peculiarities of the Shropshire that would lead you to distinguish it from the Southdown and Dorset breed?
10. Mention the chief points of difference between an Oxford and Shropshire sheep.

Plant Life.

1. State what you can about the cellular structure of plants and the contents of living cells.



IN THE BLACKSMITH SHOP.

2. On what four conditions does the rate at which seeds absorb water depend?
3. What causes the sap to flow from a maple tree in spring?
4. Why does the soil need ventilation, and how is this ventilation accomplished in nature?
5. Would you expect the larger crop of apples after a rather dry or a very wet season, and why?
6. How would you judge by the foliage of the comparative hardness of different varieties of the apple?
7. What causes sun-scald in fruit trees, and how may it be prevented?

- 8 Explain the principle on which we foretell frost.
9. What three food constituents are most likely to be lacking in cultivated soil?
10. Describe the process of making the Bordeaux mixture.

Bookkeeping.

1. In what way does double entry bookkeeping differ from single entry?
2. How do you know when and what to *credit* and *debit*?
3. Journalize the following: Received of J. E. Jones, to balance account, cash \$50.00; his note at 60 days \$125.00.
4. Prepaid my note of 20th inst. in favor of James Walker, \$9,000.00, Discount off \$12.67; paid balance in cash \$8,987.33. Journalize.



HORTICULTURE.

5. January 1st, you have \$5,000.00 and purchase a farm for \$6,000.00, paying $\frac{1}{2}$ in cash and give note for balance due two years hence. You buy for cash 20 cows at \$30.00 and 100 sheep at \$2.00. Journalize.
6. During the month of November, you buy for cows, 12 tons of bran at \$8.00, and sell 7 sheep at \$3.00, and 4 cows at \$35.00, also took in cash for butter \$42.00. Journalize.
7. You trade with J. Smith 8 sheep estimated at \$3.00 per head for a cow worth \$35.00, paying balance in cash. Journalize.
8. Make out a single entry cash account using at least six entries.
9. Write out the following: Check, draft, receipt, certificate of deposit and promissory note.
10. Define the following terms: Solvent, surety, usury, void, resources and liabilities.

SECOND YEAR STUDIES.**Bacteriology.**

1. In what ways may tuberculosis be contracted?
2. What is the tuberculin test?
3. Give four conditions necessary for bacterial growth.
4. What is meant by saprophytes and parasites as applied to bacteria?
Give example of each.
5. In what three ways can bacteria gain entrance to living animal tissues?
6. What effect has pasteurizing upon the bacteria in milk?
7. What advantages should be gained in the use of pure cultures in butter making?
8. Explain the ripening of manure from the bacteriological standpoint.
9. What conditions favor the process of nitrification?
10. Why is it that clovers do not exhaust the fertility of land?

Horticulture.

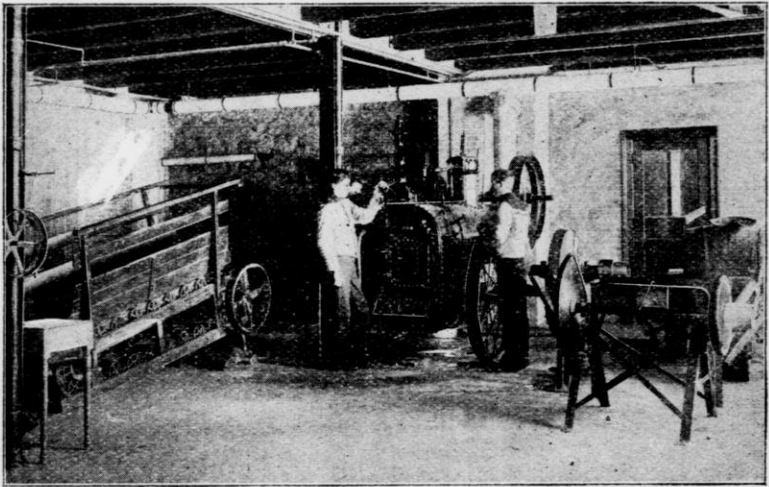
1. Mention three requisites to commercial success in economic horticulture, aside from good culture and suitable soil and climate.
2. What points should be considered in selecting a location for economic horticulture?
3. How should apples be harvested and stored to promote long keeping?
4. Give a general rule for the treatment of the soil of a bearing orchard.
5. How does the plant food removed by the apple crop compare with that removed by the wheat crop?
6. Describe three methods for preventing injury from the codling moth.
7. Describe the method of fruiting of the apple, i. e., from what age of wood, what form of branch, whether flowers are axillary or terminal.
8. How would you rid trees of bark lice?
9. Why are root-grafted apple trees preferable to budded ones for cold climates?
10. Describe the methods for combating the pum curculio.
11. How is the gooseberry commonly propagated?

Veterinary Science.

1. How many sets of teeth has the horse? Name them. How many in each set?
2. Name the bones of the foot and leg below the knee, and tell where each is.
3. Give symptoms of navicular disease.
4. How would you disinfect stables?

WISCONSIN FARMERS' INSTITUTE.

5. If you use arsenical sheep dip, how would you prevent poisoning by the dip dripping on the grass?
6. Give the doses of laudanum, and what is its action on the horse, cow, sheep, and pigs?
7. Give a cheap purgative for cow or ox.
8. How would you mix a disinfectant for white-washing stables?
9. Make a good throat liniment.
10. If a horse is cut by barbed wire across the pastern joints how would you treat it, providing the joint was not opened?



AGRICULTURAL PHYSICS.

Agricultural Physics.

1. State how the surface of the water in the ground is related to the surface of the ground.
2. Explain the several steps in the formation of nitrates.
3. What are the advantages of early tillage of the soil in spring?
4. How should a well be placed and constructed so as to make it safe against surface water?
5. What determines the size of a piston in a well?
6. Explain the bad effects of leaving stock out in cold rains on the principle of latent heat.
7. Describe the practical methods of aerating the soil?
8. How can you tell whether the center of a low area is to pass to the north or south of the observer?

9. Why does eastern United States have frequent rain or snow at all seasons?
10. How do the great lakes influence our temperature, and why?

Agricultural Chemistry.

1. Of what elements are plants composed?
2. What elements are derived from the soil?
3. Which of these are most easily exhausted from the soil by cropping?
4. How can the amount of manure produced by domestic animals be calculated from the food given?
5. What constituents of manure have a money value?
6. How are farm manures best preserved and applied?
7. How may the loss of nitrogen from the soil be prevented?
8. What kinds of plants leave the soil richer in nitrogen?
9. What effect does lime have upon a heavy clay soil?
10. What effect do wood ashes have upon heavy soils?
11. What advantage is derived from a rotation of crops?

Economics of Agriculture.

1. Describe the process through which the staples of agriculture pass in going from producers to consumers.
2. What determines the price of wheat to the consumer? Explain in detail the process of price-formation.
3. Show how the prices of farm products and the location of a farm affects its value.
4. How are national bank notes secured in the United States, in England, in Canada?
5. Describe the causes and effects of the extension of sheep farming in the 15th and 16th centuries.
6. Why in each succeeding stage of our agricultural history have the farmers become larger and larger buyers and at the same time larger and larger sellers?
7. Explain what is meant by deposits; bank capital; the surplus; discount; the reserve; bank notes.
8. Under what circumstances are bank notes more convenient for use than coins? Under what circumstances are checks most convenient? Under what circumstances are coins most convenient?

Breeds and Breeding.

1. What three British breeders were most prominent in improving the Short-horn cattle? By what means did they seek to improve this breed?

2. How does the Short-horn breed compare with the Hereford (1) in size, (2) early maturing qualities, (3) quality of meat, and (4) milking qualities?
3. Which is the most popular breed on the large Western ranges and why?
4. What differences are there between the Aberdeen Angus and the Galloway breeds?
5. Mention the chief points of difference between a typical bull of the dairy breeds and a typical bull of the beef breeds?
6. Why is it not advisable to follow the practice of in-breeding?
7. What are the chief characteristics that distinguish the Holsteins from the Jerseys; (2) the Guernseys and Jerseys?
8. (1) How would you proceed to raise a good dairy calf?
(2) How a good beef calf?

Feeds and Feeding.

1. What chemical elements enter into protein?
2. Name the groups into which the agricultural chemist divides the feeding stuffs.
3. Name the principal constituents of the gastric juice.
4. What becomes of protein compounds in the stomach?
5. How are the digested materials taken into the body?
6. Write a brief description of how the digestibility of clover hay may be determined with sheep.
7. Does adding protein rich substances to a coarse fodder increase the digestibility of the coarse fodder?
8. Briefly describe an experiment which shows that the muscles do not wear out rapidly under a severe exertion.
9. How is it shown that the fat and carbohydrates are the main sources of body energy?
10. Describe the experiments in feeding to observe the influence of feed on the growing body of the pig.
Describe the experiments in feeding bone meal and hard-wood ashes.

Farm Practice Course.

There is an increasing demand for our agricultural students to take charge of farms and estates as managers and superintendents. In order to prepare students for these responsible positions the Regents of the University have directed the establishment of a course in farm practice which shall especially prepare students for conducting and managing the operations of large farms and estates where much labor is employed. Only a limited number of selected students who have been with us at least one term will be admitted to this course. Further information concerning the Farm Practice Course will be furnished on application.

Parliamentary Practice and Organization of Farmers' Clubs.

A convenient time is set aside for regular drill in Parliamentary Practice, Organization of Farmers' Clubs and proper manner of conducting district meetings.

District School Meetings.

Students are elected to fill the different positions in connection with the meetings organized and take an active part in all discussions.

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.

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 Robert's Rules of Order.

Libraries and Reading Rooms.

The students have free access to the libraries 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.

Five hundred and ninety-nine students have pursued the studies of the Short Course; of this number 87 have come from other states, 512 from Wisconsin.

Short Course Certificates.

Four 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 101 certificates have been issued.

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 of the managements 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 of 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.

THE WISCONSIN DAIRY SCHOOL.

Prof. E. H. FARRINGTON, Madison, Wis.

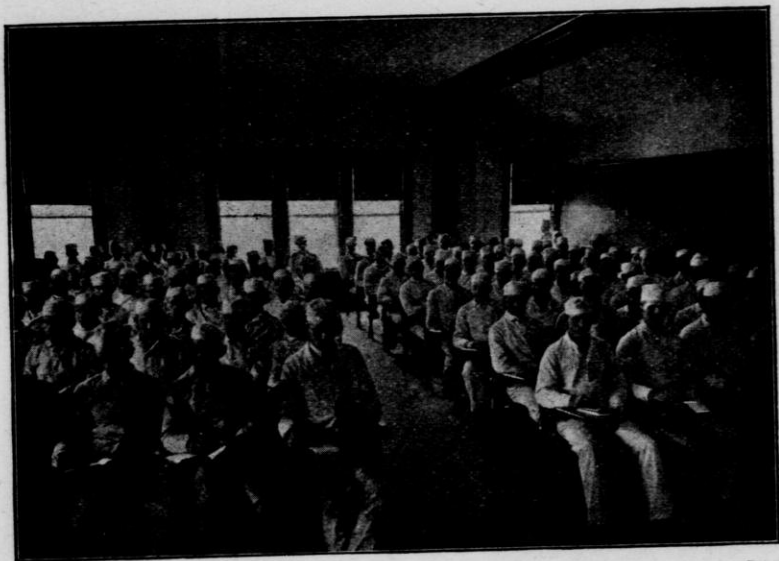
Recent statistics show that there are 2,522 creameries and cheese factories in the state of Wisconsin. The owners and operators of these and other factories all over the country recognize the need of technical schools which give instruction in the theory and practice of butter and cheese making.

The first Dairy School building in the United States was erected by the State of Wisconsin at the University located at Madison, Wis. In the winter of 1892 the first class of 100 students was given instruction in the present building, Hiram Smith Hall, as it was named in honor of one of Wisconsin's veteran dairymen. This building with equipment represents an outlay of \$40,000.00. It will accommodate one hundred students and more than this number have applied for admission every year.

In addition to the thorough equipment of machinery and apparatus used for the manufacture of butter and cheese in factories, the Wisconsin Dairy School has a large milk testing laboratory, a department for instruction in farm dairying where a dozen different makes of hand cream separators

are used with other apparatus for this line of dairying, and a room fitted up for instruction in milk and cream pasteurizing.

The principal term of the year is during three winter months, and at the present time it begins about December 1. All of the departments of the school are in full operation during this term. Students wishing to take the course are required to fill out blanks stating that they have already had at least four months' practical experience in either a creamery or cheese factory. Such experience enables them to get more out of the course than they would be able to do without it, since the knowledge they have gained of a certain kind of separator, churn, cheese vat, etc., enables them to better



CLASS OF 1898—LECTURE ROOM, HIRAM SMITH HALL.

understand the six power separators, different styles of churns and apparatus with which they have to work at the school.

The students meet in the lecture room of the school every morning dressed in white suits. After the morning lecture, which the students write up in their note books, they begin their day's work in the creamery, cheese room, milk testing laboratory or the pasteurizing room. They are supplied with 5,000 to 10,000 lbs. of milk per day and all the modern machinery and apparatus used in such work.

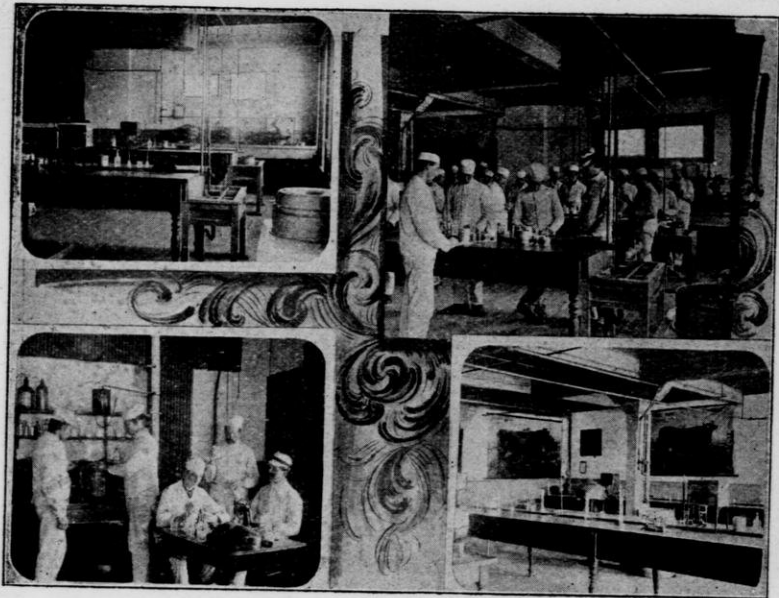
Several instructors in each of the departments watch the students' manipulations in the practical and laboratory work during the day, and at 4 p. m. some one of the professors meets them again in the lecture room.

The lectures given include a course on Creamery and cheese factory man-

agement, book-keeping, etc., Breeding and selecting dairy cows, Physical problems connected with the dairy, Care and management of boiler and engine, Dairy bacteriology, and the Chemistry of milk and its products. This last course of twenty-four lectures is given by Dr. Babcock, the inventor of the Babcock milk test.

Each day or the short term of twelve weeks is crowded with work for the students, under the instruction of the eighteen professors and assistants.

At the close of each course of lectures a written examination is given the students and a complete record is kept of their standings in all these exami-



MILK-TESTING LABORATORY.

nations. Some idea of the lecture room instruction can be obtained from the following illustration of questions that have been asked the students:

Illustrations of Examination Questions.

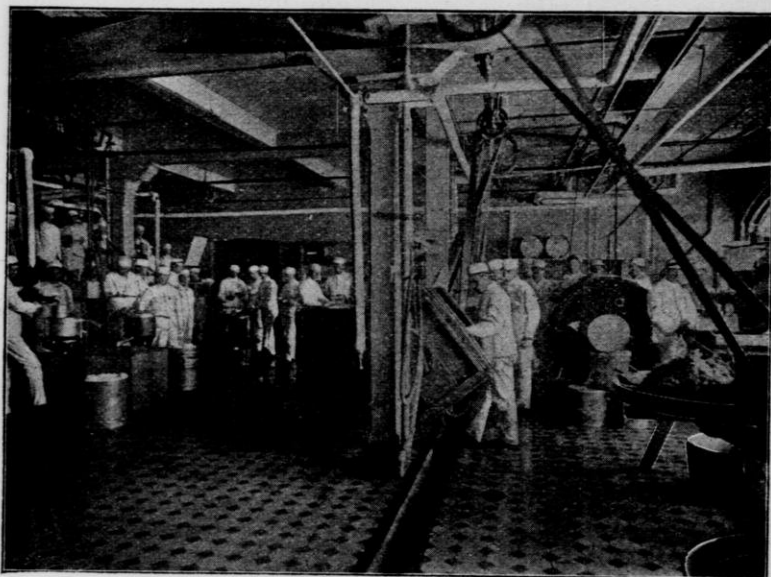
1. Give the average composition of cow's milk.
2. What constituents determine the butter-producing capacity of milk?
3. What determines the cheese-producing capacity of milk?
4. What circumstances affect the number and size of the fat globules?
5. How does the composition of colostrum differ from normal milk?
6. What constituent of milk is most variable?

7. What relation exists between the specific gravity of milk and the reading of the Quevenne lactometer?
8. At what temperature should lactometer readings be taken?
9. Give rule for determining solids not fat from lactometer reading and per cent. of fat.
10. How can you determine whether water has been added to milk?
11. What variation may occur in the per cent. of fat in milk?
12. Which system of gravity creaming is most efficient, and why?
13. How does cream from shallow setting differ from that of deep setting?
14. What is the average specific gravity of milk?
15. How is the specific gravity changed by the addition of water? How by the addition or removal of cream?
16. What conditions favor a close creaming by the centrifugal system?
17. How does centrifugal cream differ from gravity cream?
18. Why is it best to cool separator cream before churning?
19. What occurs during the ripening of cream?
20. How is the development of acid affected by the per cent. of fat in cream?
21. Why have machines which make butter directly from the milk been found impractical?
22. What are the essentials of a good churn?

Creamery Butter Making.

1. Mention five or more points which will interest farmers who are thinking of sending milk to either a butter or cheese factory.
2. Calculate the price of 100 lbs. of 3.5 per cent. milk when sold to a creamery, and also when sold to a cheese factory, if butter is 19 cents per pound and cheese 8 cents, the creamery receiving 4 cents per pound and cheese factory 2 cents per pound as cost of manufacture. Skim milk worth 15 cents per 100 pounds and whey 10 cents per 100 pounds.
3. Give an illustration of some of the data that may be included in the monthly statement furnished patrons with their milk check.
4. Write out twenty or more instructions for the care of stables, cows, milk and milk utensils, with statement of tests which milk should comply with when it is delivered at a creamery or cheese factory.
5. Give at least seven reasons for poor skimming by a separator.
6. What damage can easily be done to a separator in putting it together? Give three important points to be observed in getting a separator up to full speed?
7. What should be done to each of the six separators at the Dairy School to get a thicker cream?
8. What observations is it necessary to make to test the capacity of a separator?

9. What is the first thing to do in setting up a separator after it is taken from the box?
10. If you found by testing that $2\frac{3}{4}$ lbs. of cream and $19\frac{1}{4}$ lbs. of skim milk were separated in $\frac{1}{2}$ minute, how much milk was the separator skimming per hour, and how long would it take to skim 8,750 lbs. of milk?
11. If you separate 5,500 lbs. of milk testing 4 per cent. fat, and had 575 lbs. of cream testing 35 per cent. fat, estimate
 1. How much fat in whole milk.
 2. How much fat in the cream.



□ CRÉAMERY STUDENTS AT SEPARATORS AND CHURNS.

3. How much fat in the skim milk.
4. What is the weight of the skim milk.
5. What is the test of the skim milk.
6. What is the per cent. of cream from the milk.
12. Describe the preparation of three common "starters" for cream ripening, and state advantages and disadvantages of each one.
13. How is the churn prepared for use? How much cream must the churn contain, and what is a desirable speed for the churn?
14. What temperature will give the most exhaustive churning of thin cream, thick cream, and sweet cream?

15. What influences the time required to churn, and what is the objection to churning only 15 minutes?
16. How much should butter be washed? Why is butter washed and what influences the amount of washing necessary?
17. What conditions influence the amount of working which butter should have?
18. Give three or more conditions that produce an exhaustive churning.
19. Give three or more causes for mottles in butter.
20. What is meant by the "over run"?
21. What is the difference between butter and the substance obtained by the Babcock test?
22. What is the usual standard butter score?
23. Give two or more causes of
 - a. White streaks in butter.
 - b. Salvey butter.
 - c. Good flavor in butter.

Milk Testing and Laboratory Work.

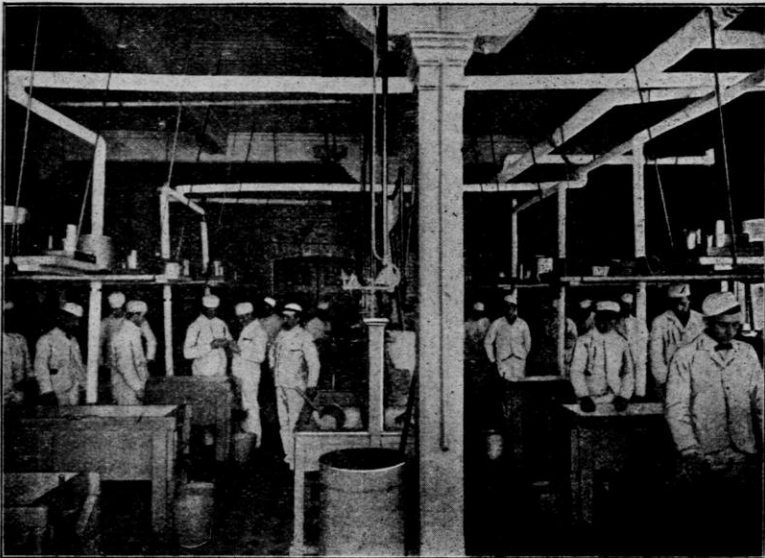
1. On what five points does a good test depend?
2. Describe the proper treatment of a sample of milk before taking a sample.
3. If the sample of milk is loppered how can an accurate test be secured?
4. If there are clots of cream which would not break up by pouring how can the difficulty be overcome?
5. Give proper method of adding and mixing the acid.
6. If the acid is weak what kind of results will likely follow?
7. If the acid is too strong how can a good test be made with it?
8. How can the strength of the acid be approximately determined from the practical results?
9. By what means can the acidity of milk or cream be determined?
10. Describe the method of detecting the acidity of milk at the intake.
11. Describe the method of acid testing from cream ripening?
12. Give formula for determining the per cent. of solids not fat in a sample of milk.
13. How can the correct calibration of test bottles be determined?
14. Give rule for calculating fat in cream when testing by weight.
15. How can cheese be tested?
16. Describe method of testing butter.
17. Name three common preservatives to use for composite samples.

If a student obtains a sufficiently high standing in all of the fifteen examinations given during the term, he may work for a dairy certificate, which the Wisconsin Dairy School gives under the following conditions:

The student must have worked in a creamery or cheese factory for two

seasons of not less than seven months each. One of these seasons must follow the period spent with us, and during this time the candidate must have practical charge of the factory in which he is working. He must report the operations of his factory monthly on proper blanks furnished to him by the University. His factory is inspected by an agent of the school, and no certificate will be issued if an unfavorable report is made by the inspector. If all the conditions are satisfactorily complied with, the candidate will receive a dairy certificate. Thirty-nine certificates were granted in 1898, making a total of 157 that have been issued to date.

Since the opening of the Wisconsin Dairy School in 1891 there has been



STUDENTS MAKING CHEESE.

a total attendance of 780 students, 640 of these were residents of Wisconsin and 140 of other states and countries.

Former students have been 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, and in 1898, when the premium money was divided pro rata among those exhibitors receiving the highest scores, the entries of the Dairy School students drew a large share of the premiums.

The statistics of the last class show that thirty-two of them had positions guaranteed them before coming to the school and forty-three of them had places to work at the end of the term.

Six had their expenses paid by some one for whom they expected to work after attending the Dairy School.

Eight students were owners of cheese factories and two of creameries.

Forty-five had from four months to one year, and fifteen over one year's experience in a creamery before entering the school.

Thirty had worked from four months to one year in a cheese factory while twenty-five had made cheese for more than one year.

Eight were familiar with both butter and cheese making.

About one-half of the students could speak German.



CHEESE CURING ROOM AND PRESS ROOM.

Three were college graduates.

About one-half of the students were between the ages of 21 and 25, one-fourth between 18 and 20, and one-fourth between 25 and 30 years old.

Although the Dairy School cannot guarantee positions to its students, the applications we receive are referred to them and both employer and employee have often found what they want in this way.

During 1897 we received 105 letters of inquiry from persons wishing to hire some kind of dairy help.

Thirty-nine wanted creamery operators, thirty-four cheese makers, seven both butter and cheese makers, and the others were inquiries for second hands, pasteurizers, milk testers, and five applications were received for instructors in the Dairy School of other states.

The creamery and pasteurizing departments of the Dairy School are now in operation during the entire year. A limited number of students who have had no previous training in creamery operations are taken as factory pupils at the Dairy School when the winter term is not in session. This affords an opportunity not only for continual experiments and "factory pupil" instruction but for obtaining statistics and information in regard to many practical creamery and dairy matters. In reply to an inquiry regarding loss from breakage and disappearance of glass bottles used for retailing milk and cream, we were able from our records to obtain some evidence on this question.

Calculating our experience to a basis of 10,000 quarts per year or about 30 quarts per day, we find that to retail this amount will require some 750 bottles. If the product is cream, customers will prefer pints rather than quarts. This is especially true in the summer because the smaller quantity will be more likely to be used up before it sours.

It will be found that to do this amount of business there will be about 150 bottles in circulation among customers and 100 will be in use at the dairy, either full and ready for sale or empty and on hand, to be used as needed.

At the end of the year there will be left about 250 of the 750 bottles and the 500 that have disappeared will probably go as follows:

One-half of them the customers will pay for, one-third will be broken and the remaining one-sixth will unaccountably disappear.

If the bottles cost nine cents each, the bottle account loss per 10,000 quarts sold will amount to nearly \$25.00.

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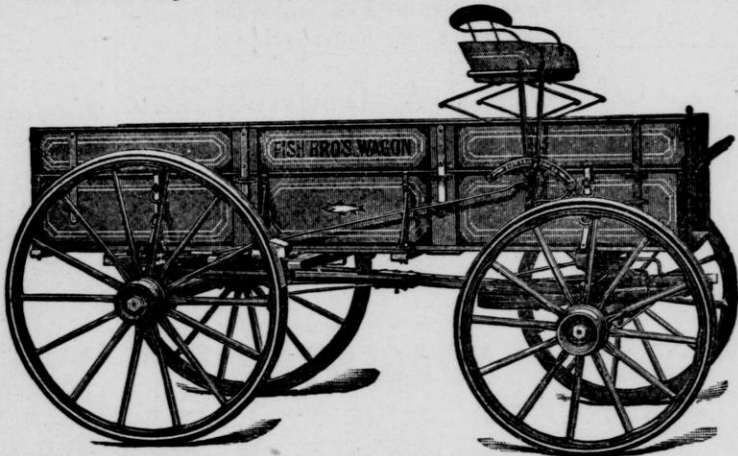
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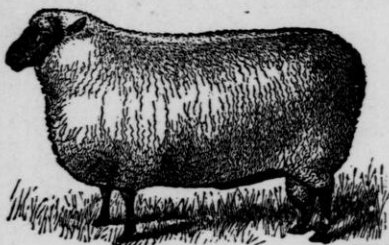
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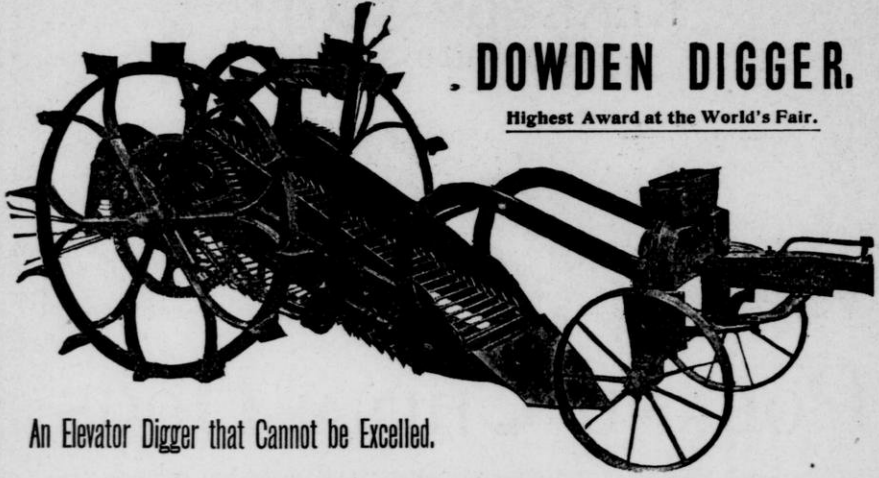
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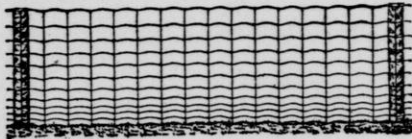
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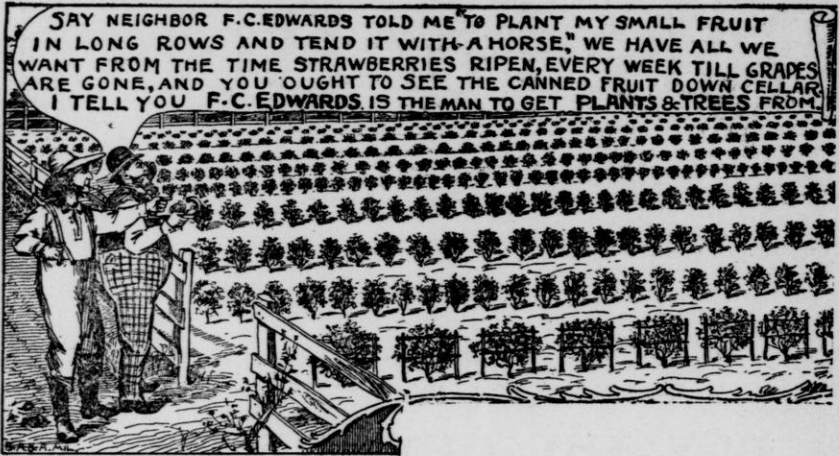
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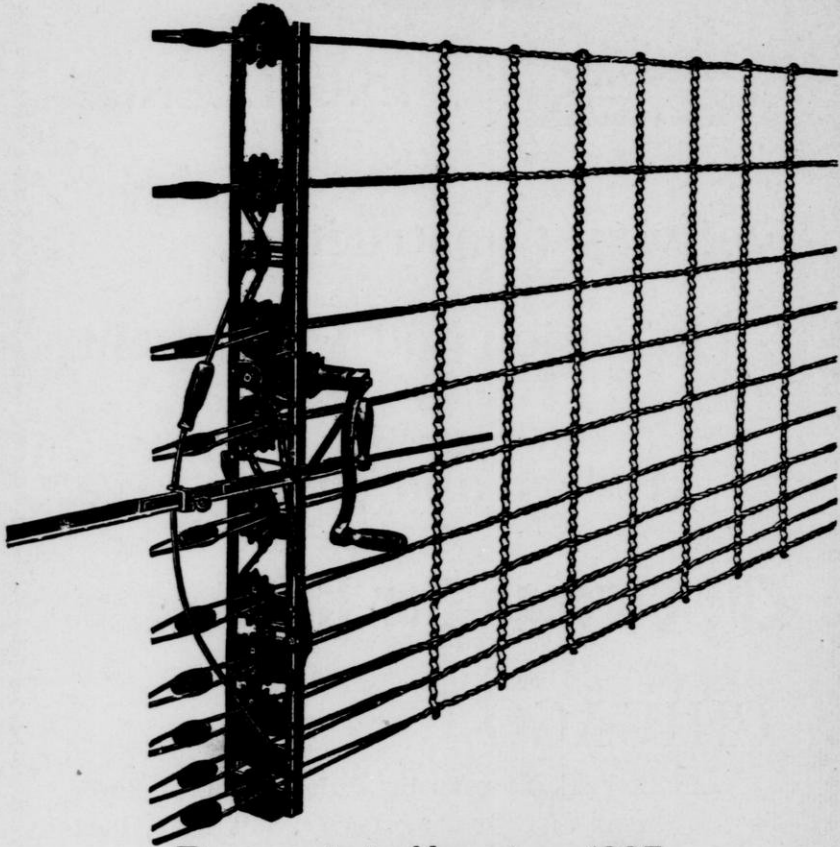
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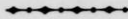
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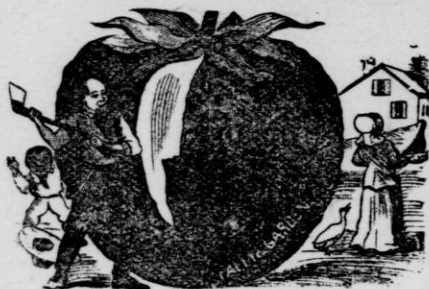
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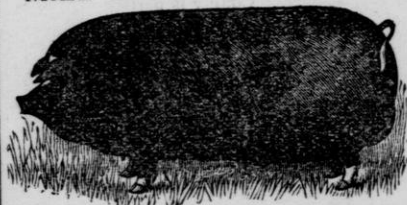
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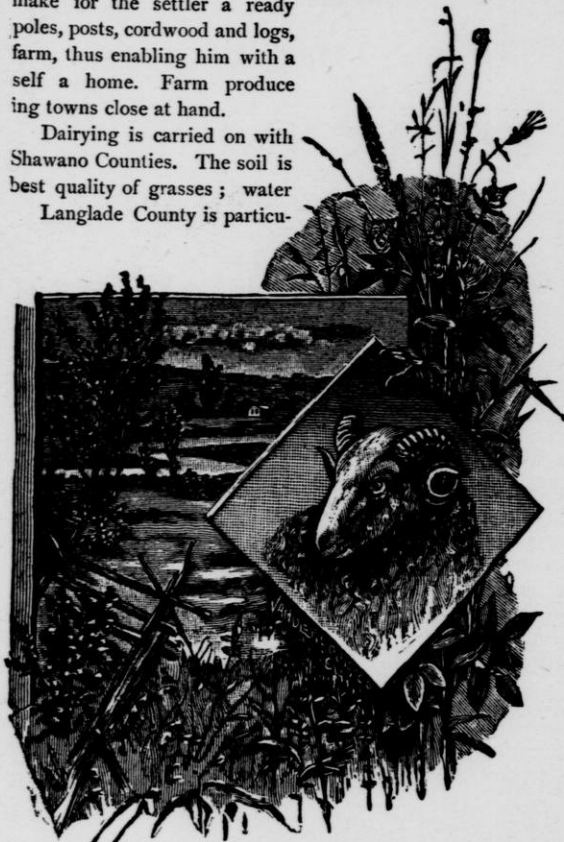
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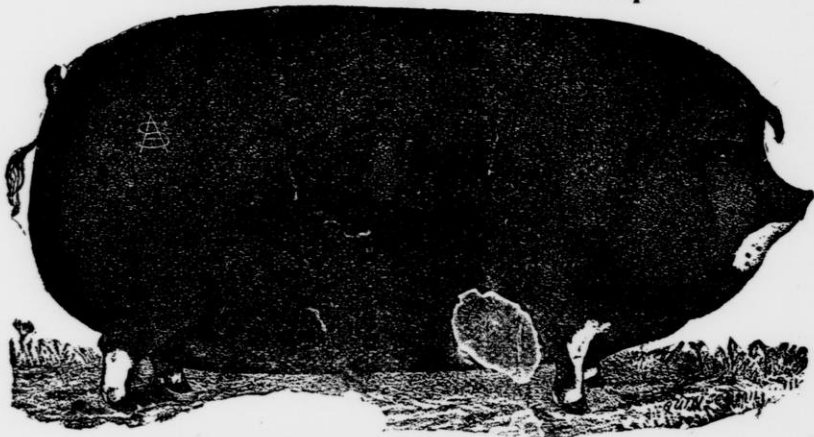
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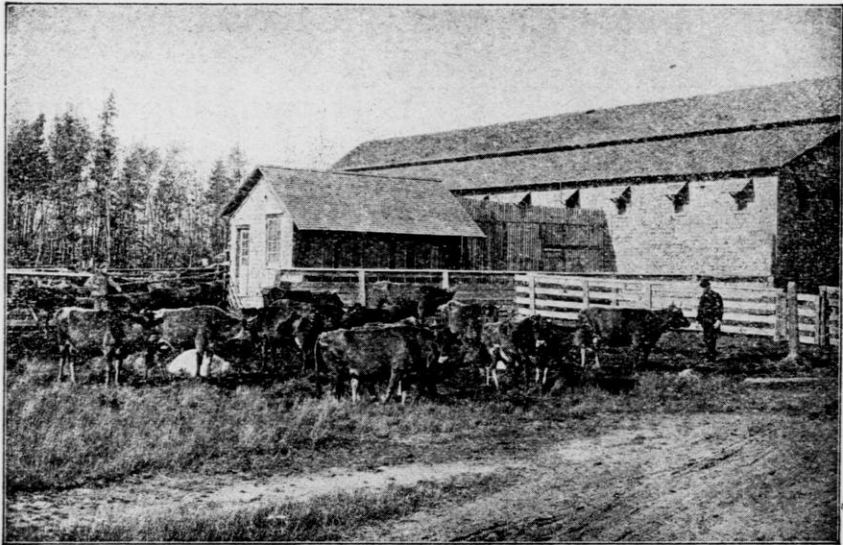
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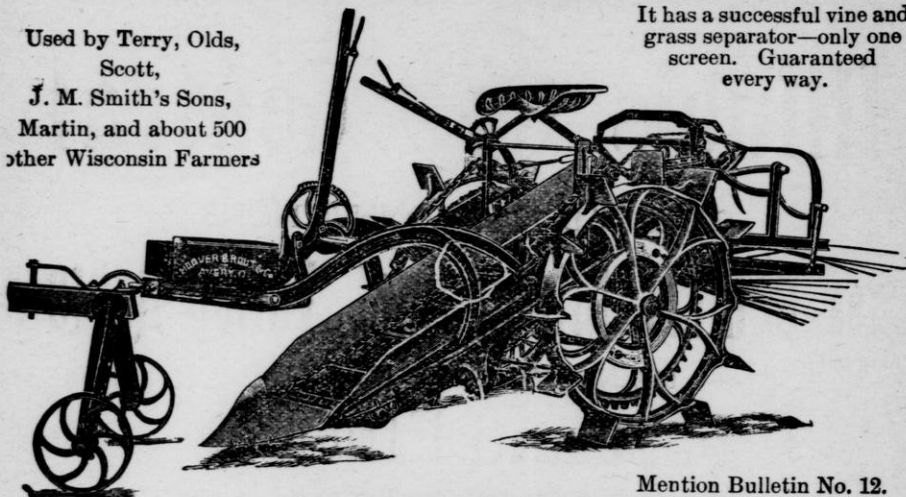
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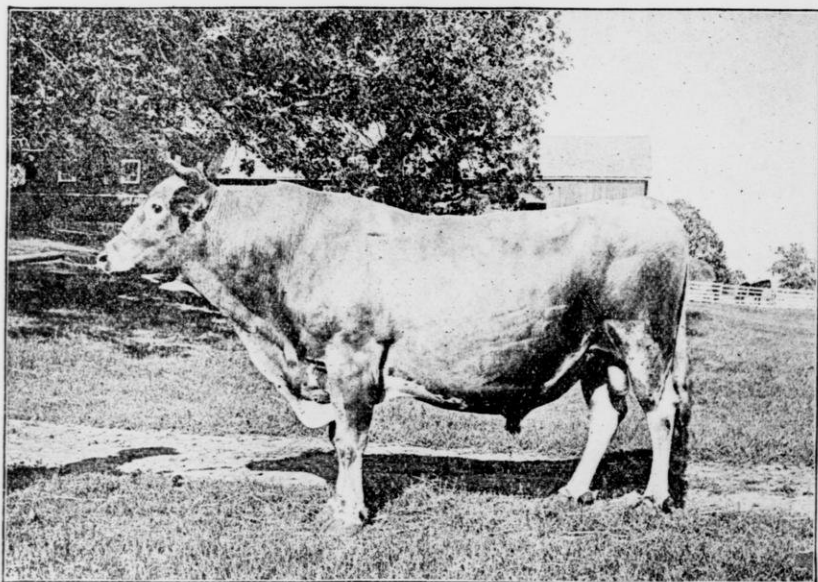
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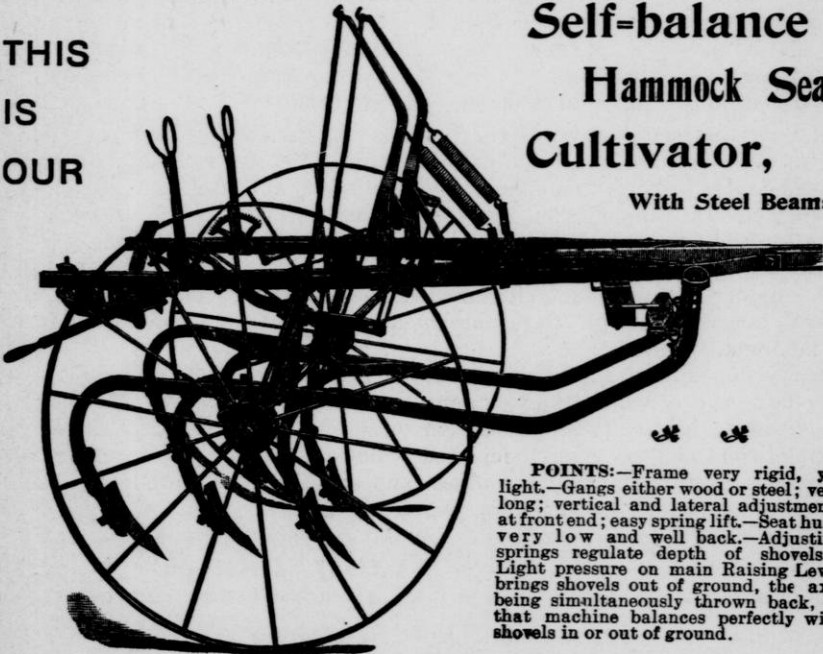


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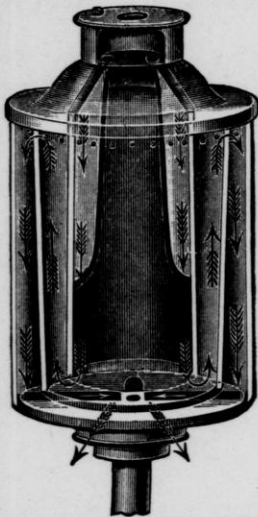
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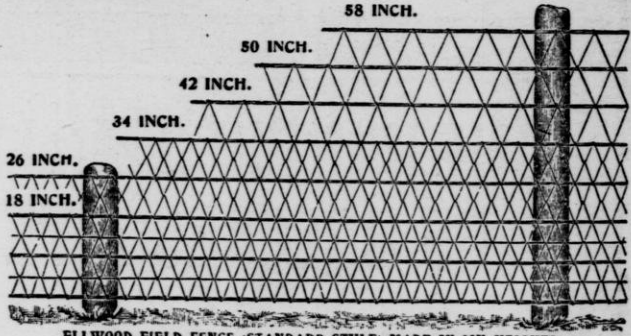
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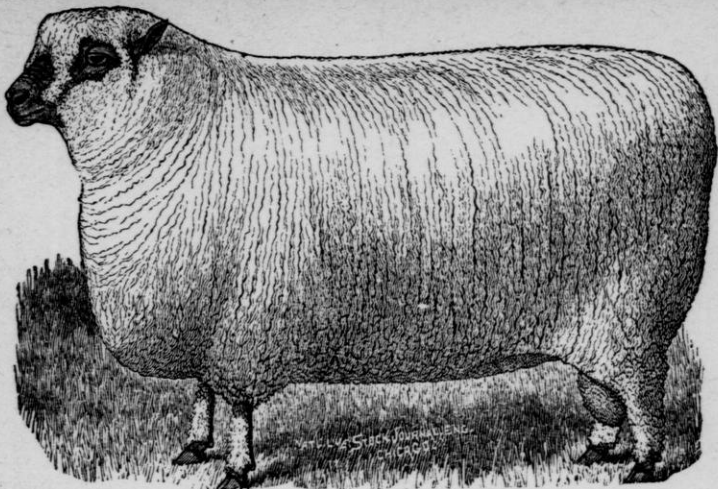


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