Wisconsin Farmers' Institutes : a hand-book of agriculture. No. 5 1891

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WISCONSIN

FARMERS' INSTITUTES;

A HAND BOOK OF AGRICULTURE.

NO. 5—1891.

EDITED BY

W. H. MORRISON, Superintendent.

"That art on which a thousand millions of men are dependent for their sustenance, and two hundred millions of men expend their daily toil, must be the most important of all; the parent and precursor of all other arts. In every country, then and at every period, the investigation of the principles on which the rational practice of this art is founded, ought to have commanded the principal attention of the greatest minds."—JAMES F. W. JOHNSON.

MADISON, WISCONSIN.
DEMOCRAT PRINTING CO., PRINTERS AND STEREOTYPERS.

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HON. WM. P. BARTLETT,

President of Board of Regents University of Wisconsin.

SIR:—I have the honor herewith of presenting to you Bulletin No. 5, Wisconsin Farmers' Institute.

Respectfully yours,

W. H. MORRISON.

MADISON, WIS., NOV. 7, 1891 *Superintendent.*

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UNIVERSITY OF WISCONSIN.

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BRANCHES OF STUDY.

The University presents a very wide range of study, embracing one hundred and seventy-three subjects of study, known as sub-courses. 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 eleven courses; in Civics, thirteen; in Mental Sciences there are fourteen, embracing Psychology, Ethics, Aesthetics and Logic. There are six courses in Pedagogic and courses in Military Drill, Hygiene, Sanitation and Music.

UNIVERSITY OF WISCONSIN.

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In Mechanics and Engineering:—Elementary Mechanics, Mechanics of Material, Mechanics of Machinery, Theory of Construction. Thermondynamics, Elementary Surveying, Railroad and Topographic Surveying Geodesy, Sanitary, Hydraulic, Railroad, Electrical, Mining and Metallurgical Engineering, Steam Engine, 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, construc, tion and testing machines.

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

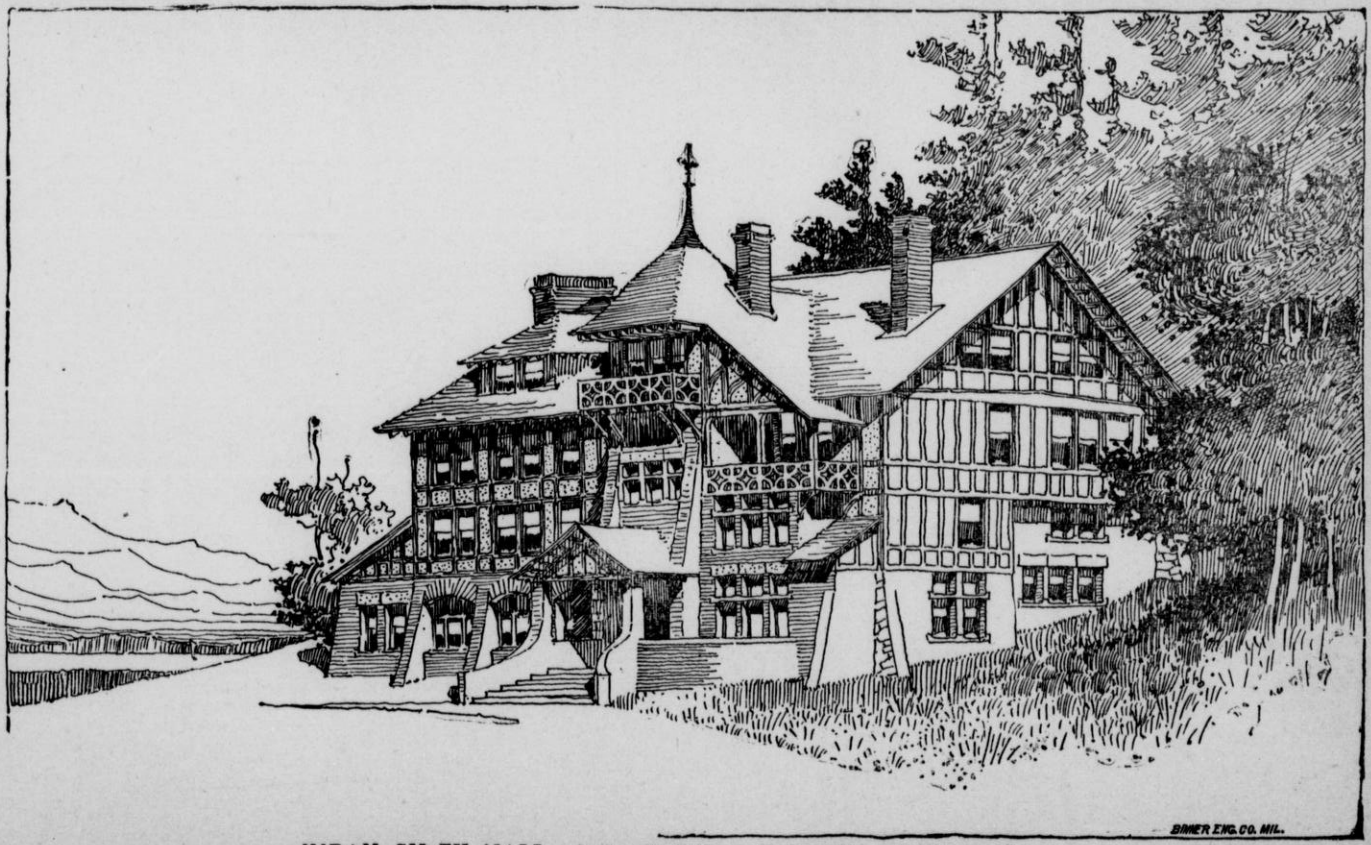
In Law:—Courses in Equity, Jurisprudence, Real Property, Constitutional Law, Wills, Contracts, Torts, Practice and Pleading, Law of Evidence, Corporations, Domestic Relations, Admirality, Insurance, Estoppel, Partnership, Taxation, Criminal Laws, Common Carriers, Medical Jurisprudence, etc.

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

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

The libraries accessible to students embrace that of the University, 23,000 volumes; of the State Historical Society, 138,000 volumes; of the State Law Department, 23,000 volumes; of the City, 11,000 volumes, besides special professional and technical libraries, making in all more than 200,000 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.



HIRAM SMITH HALL—Dairy Building, University of Wisconsin.

AGRICULTURAL INSTRUCTION

AT THE

UNIVERSITY OF WISCONSIN.

The College of Agriculture at the University of Wisconsin maintains a number of courses in Agriculture of such nature that an industrious, ambitious young farmer may find some one of them adapted to his needs, the time he can give, and in cost ranging from that of a full four year's course with its attendant expenses, down to a single term of 12 weeks the necessary cost for which is exceedingly small.

THE SHORT COURSE IN AGRICULTURE.

The Short Course in Agriculture is designed to meet the wants of young men who intend to follow farming and feel the need of increased knowledge in their chosen vocation, but who can give only a limited amount of time to preparation and study. The studies, laboratory work, etc., in this course have been arranged to give the largest amount of information along intensely practical lines without undue crowding. When the course was started seven years ago, a student could take all the studies in a single winter term of 12 weeks. Now the instruction is given by eight professors and lecturers, and the list of studies has been increased until the student must spend two winters with us if he wishes to take all of the studies in the course. For the winter term beginning January 4, 1892, the following is the list of subjects treated in the Short Course.

Feeds and Feeding.

PROF. W. A. HENRY.

The lectures will treat of the laws of nutrition; feeding standards; feeding for growth, fat, milk, etc. Each of the common feeding stuffs employed by our farmers will receive careful attention, and its properties and possibilities noted. The aim of the work is to aid the student in becoming an intelligent feeder of live-stock, utilizing each product at hand in the very best manner. The subcourse will consist of thirty lectures extending through the term.

Breeds and Breeding.

PROF. JOHN A. CRAIG.

These lectures will treat of the various breeds of our domestic animals, with descriptions and characteristics of each. The student will be prepared as far as possible not only to judge stock well for his own personal gain, but also that he may become an expert in the show ring where live-stock is gathered for exhibition and competition. In the theory of breeding, the subjects of heredity, atavism, prepotency, variation, in-breeding, line-breeding, etc., will be carefully discussed. The observing student should gain from this study facts of the highest importance in the management of live-stock. The subcourse embraces thirty lectures besides a study of pedigrees, extending through the term.

Agricultural Chemistry.

L. S. CHENEY, FELLOW IN BOTANY.

Here will be discussed such topics as, chemical elements contained in soil, air, crops, manures; soil,—formation and classification; water and air, as a source of plant food; the plant, how it grows and feeds; manures,—necessity for, kinds, value of stable manure, affected by food eaten; commercial fertilizers fermentation and decay. Three lectures per week.

Agricultural Physics and the Physical Features, Climate and Meteorology of Wisconsin and the United States.

PROF. F. H. KING.

The work in Agricultural Physics will deal with relations of water to soil; movements of water in soil; purposes, methods and instruments of tillage; soil temperatures, and methods of modifying them; questions of drainage; water supply for stock and the kitchen; construction of farm buildings; ventilation and lighting of barns and dwellings; permanent and portable fences; farm motors. One lecture daily, with laboratory work additional.

Horticulture and Economic Entomology.

PROF. E. S. GOFF.

These lectures will embrace methods of propagation, planting, cultivation, pruning, marketing and preserving the fruits of our climate; instruction in the growing of garden vegetables, the construction snd management of hot-beds, forcing-pits, etc.; the culture and adaptation of flower garden and greenhouse plants; the principles of ornamental planting, and of laying out gardens and pleasure grounds, and the formation and management of lawns; methods of seed growing, the principles of selection and the art of cross fertilization with the view of improving varieties; also the classification of insects, the principal injurious and beneficial insects of our climate, with the means of preventing insect ravages. One lecture daily; laboratory work additional.

Practical Mechanics.

PROF. C. I. KING

This course embraces work in the University Machine Shops, covering bench work in wood, wood turning and blacksmithing, and the work is so planned and directed as to cover the fundamental principles of each. The student will be able when he gets through to turn a chisel-handle or neck-yoke and to iron a whiffletree or forge a pair of tongs. Requires two hours' time, daily, in the shops at forge and bench.

Dairying.

DR. S. M. BABCOCK AND MR. F. H. WORTHINGTON.

Short Course students desiring dairy instruction will take the lectures in dairying, 24 in number, by Dr. Babcock, along with the Dairy School class. Mr. Worthington will give laboratory instruction in the use of the milk test and the lactometer. Following this he will direct the class in a study of the various systems of cream separators such as the centrifugal hand separator, and deep and shallow setting. Three forms of the hand centrifugal separator are provided. Practice will be given in churning, working, packing and judging butter. Two lectures weekly, besides laboratory practice and work in the dairy room.

Veterinary Science.

C. A. WOODFORD, V. S.

In this course the needs of the stockman in the care and handling of farm animals will be constantly in mind. The aim will be to teach the pupils to locate and detect the more common ailments of our domestic animals, and give instruction in preventing and curing them. While the purpose of the course is to help young farmers, it will prove of material value to those who later intend to enter a veterinary college. Animals treated by the lecturer in his local practice will be used for illustration. As aids to the work, the department has the skeleton of the horse and cow; the Auzoux life size, desectable model of the horse, containing three thousand named parts; Auzoux models of diseased parts etc. One lecture or demonstration daily.

THE DAIRY COURSE.

The Dairy School is an outgrowth of the Short Course. Young men wished to prepare themselves for operating cheese factories and creameries, and to meet the wants of such, a specific course in Dairying was started in 1889. Last year 72 students were in attendance at the Dairy School. The large attendance and and the great interest shown has led to the construction of a dairy school building commensurate with our wants. A view of this building is given at the beginning of this article. The Dairy Course for 1892 opens January 4, with the following list of subjects.

Subcourse I—Lectures and Class-room Work.

(1) Twenty-four lectures by Dr. S. M. Babcock on the constitution of milk, the conditions which affect creaming and churning, the various methods of milk-testing, the preservation of milk, and other allied subjects. In addition to the lectures, Dr. Babcock will give instruction by frequent recitations and other class work, involving practical questions relating to the dairy.

(2) Eight lectures by Prof. F. H. King, on heating, ventilation, and other physical problems directly connected with dairy practice.

(3) Ten lectures and demonstrations by A. W. Richter, Fellow in Engineering, on the care and management of the boiler and engine.

(4) Ten lectures by Dr. C. A. Woodford on the common diseases of the dairy cow.

(5) Eight lectures by Prof. W. A. Henry, on the feeding and general management of dairy stock.

These lectures, sixty in number, will be given, one daily, through the whole term. The recitation and class-room work by Dr. Babcock is additional.

Subcourse II—Milk Testing.

Instruction will be given in the laboratory by Dr. Babcock and Mr. F. H. Worthington, in estimating the fat in milk, butter and cheese by methods adapted to the factory and factory operators. Instruction will be given in the use of the lactometer and other simple tests. Those taking the work will be fitted to determine the fat content of any sample of milk, and, so far as possible without a complete analysis, to judge whether milk has been watered or skimmed. The efficiency of this subcourse is increased this year by the addition of instruction in a practical method for determining the fat in cheese.

Subcourse III—Butter-Making.

Instruction will be given by Mr. H. J. Noyes assisted by Mr. John Seaman and one other person to be appointed later. The proceses of butter-making will be carried on each day on the creamery plan, from analyzing the milk at the intake to shipping the packages from the refrigerator. In the creamery will be found several different kinds of power centrifugal cream separators, the butter extractor, and hand separators suitable for private dairies. Students in the creamery will be required to make daily tests of the milk used, the skim milk and the butter milk, and to determine and locate any losses which may occur. To further increase knowledge and give training, samples of butter will be secured from different sources, and scored by the students.

Subcourse IV—Cheese-Making.

This subcourse will be in charge of Mr. J. W. Decker, instructor in Dairying, assisted by Mr. George W. Brasure and Matthew Michels. Daily instruction will be given in the manufacture of milk into cheese. The milk and whey will be tested so that the losses in the process of manufacture will be located. Samples of cheese from different sources will be secured, and the students taught to estimate their worth and to recognize the demands of the market.

All students taking subcourses III or IV will be required to take the first two subcourses.

The instructional force in the Dairy School for the winter of 1892, numbers 12 persons in all; 5 lecturers on dairy subjects, 3 instructors in the creamery, 3 in the cheese factory, and 1 in the dairy laboratory.

Advanced Dairy Work.

Those students who have had considerable previous training, after they have been with us a few weeks will take up advanced work in butter and cheese making. This will be largely of an experimental nature and should prove exceedingly interesting to all concerned.

Dairy Certificates.

Students having two years experience in a cheese factory or creamery and having taken all of the lectures, laboratory and factory work, and having passed satisfactory examinations, will be entitled to dairy certificates.

The Long Course in Agriculture.

The Long Course in Agriculture requires preparation equal to that of other courses in the University and leads to the degree "Bachelor of Agriculture." This course gives the student a liberal education along lines relating to agriculture. The sciences of chemistry, physics, botany, zoology, etc., receive especial attention. The student sits with other scientific students in general classes and recites with them during the first years of his stay with us, but gradually takes more and more work in Agricultural Hall, until the last year, when the most of his time is spent upon scientific agricultural studies. Those who wish to prepare themselves for teachers in agriculture or for Experiment Station work, should take this course. It is especially adapted for those young men who wish to prepare themselves for farming in the broadest sense of the word, and who believe that farming offers ample opportunity for well trained minds, both from the financial side, and more largely from the enjoyment of a well developed intellect in rural pursuits.

Expenses.

This is an important part of the subject with most young men. No tuition fees are required by the University. All students pay an incidental fee of $5 per term. Short Course students who take machine shop work pay a fee of $5 for the iron, wood and coal used by them. Dairy students pay $1 for milk testing, $3 for butter making, $3 for cheese making, or $5 for both.

Furnished rooms can be rented at from 75 cents to $2 per week. Table board ranges from $2.10 to $3 per week.

Long Course students should present themselves in September. Short Course and Dairy students come about the first of January. The Short Course and Dairy Course for the coming season open January 4, 1892.

For further information regarding the Agricultural Courses of instruction, write to,

PROF W. A. HENRY,
Madison, Wis.

LIST OF INSTITUTES, 1891-2.

West Salem	Dec. 1-2
Viroqua	Dec. 3-4
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Muscoda	Dec. 17-18
Lone Rock	Dec. 21-22
Prairie du Sac	Dec. 23-24
Hortonville	Dec. 29-30
Beaver Dam	Jan. 5-6
Ft. Atkinson	Jan. 7-8
St. Croix Falls	Jan. 12-13
Clear Lake	Jan. 14-15
Mondovi	Jan. 19-20
Augusta	Jan. 21-22
Independence	Jan. 26-27
Hixton	Jan. 28-29
Dorchester	Feb. 2-3
Greenwood	Feb. 4-5
Weyauwega	Feb. 9-10
Marshfield	Feb. 11-12
Seymour	Feb. 16-17
Scandinavia	Feb. 18-19
Reedsburg	Feb. 23-24
Belleville	Feb. 25-26
Manitowoc	Mch. 1-2
Port Washington	Mch. 3-4
Hartford	Mch. 8-9
Menomonee Falls	Mch. 10-11
Friendship	Dec. 1-2
Plainfield	Dec. 3-4
Princeton	Dec. 8-9
Montello	Dec. 10-11
Fennimore	Dec. 15-16
Dodgeville	Dec. 17-18
Sun Prairie	Dec. 21-22
Blue Mounds	Dec. 23-24
Oconomowoc	Dec. 29-30
Fond du Lac	Dec. 29-30
Hudson	Jan. 5-6
River Falls	Jan. 7-8
Menomonie	Jan. 12-13
Durand	Jan. 14-15
Shamrock	Jan. 19-20
New Lisbon	Jan. 21-22
Sparta	Jan. 26-27
Elroy	Jan. 28-29
Elkhorn	Feb. 2-3
Mukwanago	Feb. 4-5
South Wayne	Feb. 9-10
Brodhead	Feb. 11-12
Palmyra	Feb. 16-17
Morrisonville	Feb. 18-19
Kilbourn City	Feb. 23-24
Rio	Feb. 25-26
De Pere	Mch. 1-2
Plymouth	Mch. 3-4
Eureka	Mch. 8-9
Rosendale	Mch. 10-11

A WISCONSIN PAPER

FOR

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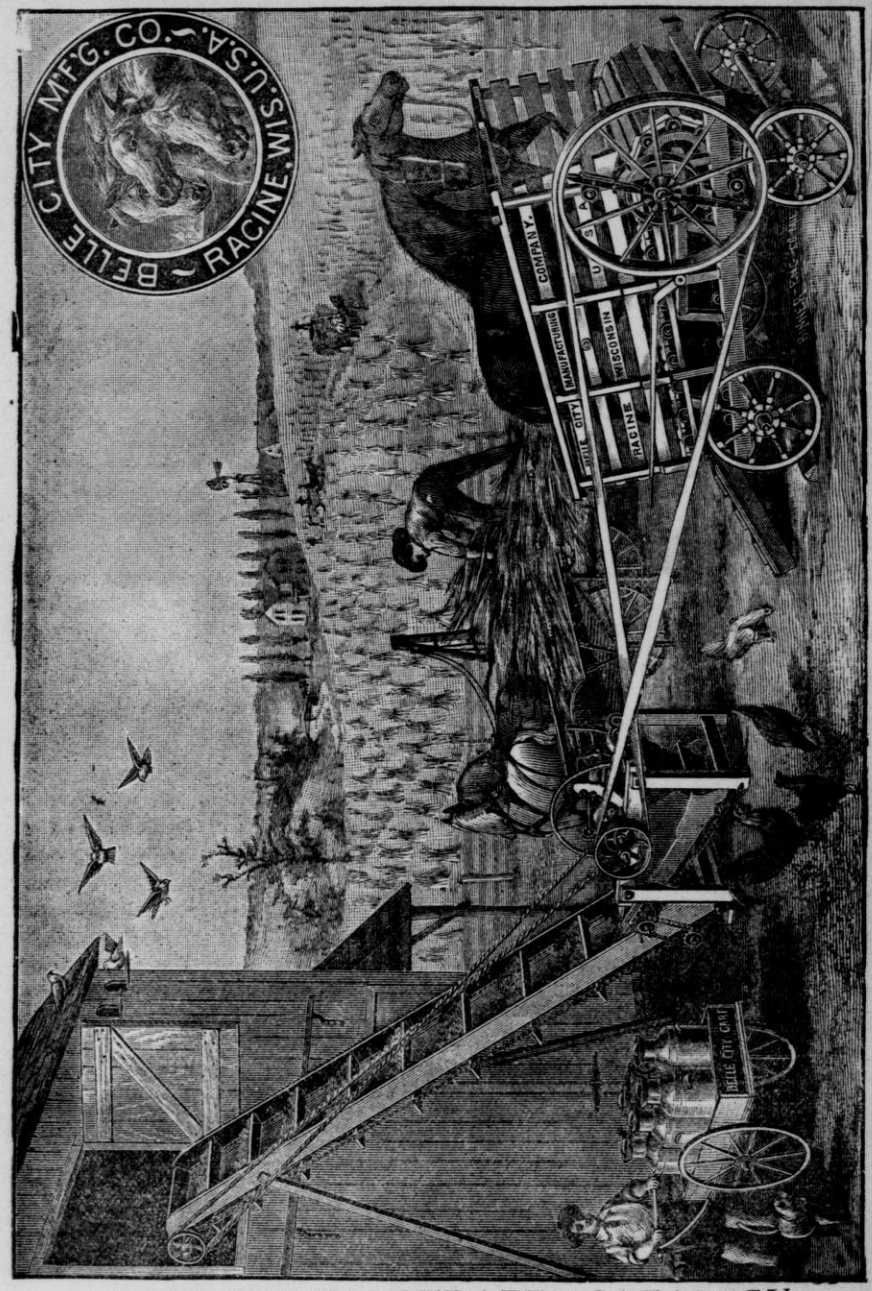


SEND FOR ILLUSTRATED CATALOGU

Closing Farmers' Institute,

Held at Waupaca, Wis., March 17, 18 and 19, 1891.

MORNING SESSION—MARCH 17th.

Supt. Morrison in the chair.

Address of welcome by Mayor Nelson.

Mr. President, Ladies and Gentlemen: In behalf of the citizens of Waupaca I extend to you our most hearty welcome, hoping that while you stay in our city and attend this institute, that the hospitality that you receive at our hands may be such that at the close of this institute you will move unanimously to hold your closing institute here in 1892.

Gentlemen, I am not a public speaker but it gives me pleasure to voice the sentiments of co-operation and good will that our citizens have toward the Farmers' Institutes, for they have been of immense benefit to our county. Two years ago when you held an institute at this place our farmers were discouraged, as our chief crop, potatoes, were only bringing 15 to 20 cents a bushel, but your talks and discussions were conservative and helpful. Your advice was continue to raise potatoes, but endeavor by sowing clover seed and keeping more live stock to increase the yield of potatoes.

The Farmers' Institutes have been worth thousands of dollars to our county. I wish that I could give you the number of bushels of potatoes raised in Waupaca county, but I cannot. In this city alone 1,684 cars have been shipped the past fall and winter, being over one million bushels, that has given to our farmers over $800,000.

We are glad to see you and hope that the exchange of experiences and opinions may be very beneficial.

Again we bid you welcome and hope that your meeting may be pleasant and profitable.

SUPT. MORRISON—I notice by your programme that I am to respond to the cordial welcome that Mayor Nelson has extended to our institute corps, but you will pardon me if I call a gentleman, who is well known throughout our state as well as in many other states of the Union who will respond to the address of welcome. It gives me pleasure to introduce Ex. Gov. Hoard.

Mr. Mayor, Ladies and Gentlemen, Fellow Farmers in Distress: I esteem it an honor to be selected to voice the acknowledgment and thanks of this institute corps for the very hearty, direct, sensible, straight forward welcome we have received at the hands of the mayor of Waupaca. You know there is an old saying that "Speech is silver, but silence is gold." Thousands of men think more than they can speak. In this case we are thanking the people of Waupaca for the tender of their hospitality, and we are at the same time considering the importance of this institution.

We little understand, my friends, as we toil day after day upon our farms or in our shops or at our counters, unless we give it thought, how the constant growth of human labor is modifying the fortunes of our state. We little understand how important it is that that

labor should be wisely directed; we little understand the value of intelligent labor and intelligent thought. We are all of us laborers in this great vineyard. Some of us are hired at the eleventh hour and we are offered a penny and some of us have started in the morning and have hired at the same price, and some of us kick because we don't get any more for a full day's work than those hired at the eleventh hour. Some of us look around and see this man and that man getting rich and we get discontented with the farm. Now, if we can have anything that will sweeten that labor, that will make us more contented with the farm, if we can find anything that will give us a larger view, lift us up just a little, so we can see a little farther, we ought to thank God for it and take courage. We all need that wider vision. We have any quantity of men who are so narrow in their application of God's mercy to man that the world gets but little encouragement for their living in it. Here is the great broad principle of agriculture. It demands the largest exercise of brain and we want to give it a little larger look. We want a little more wisdom. Why, my friends, when I read the Bible, and I do read it a great deal, I find it is a depository of wonderful wisdom in the experience of men; I turn to that passage where God said unto Solomon "Which will thou have, wisdom or riches?" Solomon thought it all over and he could have chosen great riches. But, no, he chose wisdom and he got both; wisdom brought him riches, but riches never would have brought him wisdom. Now, don't we need wisdom? We need it every day. There stands a circle of potatoes nailed up against that wall. What do they represent? Do they represent simply the clod of earth that they laid in to ripen? No, they represent the *thought* of the man that planted them and finally the thought of the man has nailed them against the wall, and made of them a picture of beauty and usefulness to our thought. What prompts this? Wisdom. And this is what the institute work is designed for; to foster wisdom and good thinking along these lines, to set the mind thinking, thinking, thinking.

You know that a good many men behind the plough don't think any more than the horse ahead of it. I have seen men, when they were not thinking about the ploughing half as much as the horse and the result was, cut and cover, cut and cover, and half the ground was not ploughed. No man has any business to despise the work of the farm, for the farmer is the great food producer of the world. Is it a small or foolish thing to produce food? Is it a narrow thing? No, it is the biggest think on earth to wisely produce food.

The farmer is the only man that does it and how should he do it? By being wise unto the laws that God hath given for the production of that food. Wisdom here consists in a proper understanding of those laws.

My friends, this institute work started a few years ago in Wisconsin through the deliberations and discussions of the Wisconsin Dairyman's Association. I remember an executive meeting held in Milwaukee when we came together and talked over this matter of organizing farmers' institutes and it orginated there among that body of earnest men who believe as they believe in their lives, in the value of agitation, agitation of thought.

Why, you may have the best cream in the world, if you don't churn it, it will always remain cream and you will never

get any butter out of it. You may have the best head on the earth, if you don't agitate the thought in it, you will never get any results out of it, and so thinking, the constant agitation of thought, leads finally to the larger reward of the hand. We should learn to think more accurately that we may work more accurately, and more certainly put the reward in our pocket, and add to our comfort and our babies, and our wives,—I mean add to their comfort, not add to the babies or the wives, that is a matter of your own business, not mine.

This winter I came back from other states to Wisconsin and I felt ashamed. I find men fighting this institution, fighting the progress of agricultural thought, fighting the idea of farmers getting together and thinking about and discussing their own business. I find those men trying to tear down the Farm Institutes as though they thought they were doing God's service. They strive to work up a prejudice by calling it a political machine, and this, and that. I leave and go to Canada. I work there in a convention and I find men coming to me every day and saying to me "What a magnificent piece of work you are doing in Wisconsin, the bulletins that you have sent out have done us immeasurable good." Then I go over into Vermont, as I did on the 13th of January, and I find men coming to me saying: "Tell us about the Wisconsin institutes." Calling me up repeatedly in the convention to tell them about Wisconsin institutes and I find Wisconsin fame, honor and credit raised in the estimation of the people of the Green Mountain State by reason of the Farm Institutes. Then on January 16th, I went to Winthrop, Maine, and it was the same there. Then on the 20th of January I went to New Hampshire and there the same questions: "Tell us about Wisconsin Institutes." In December I was at Worcester, Mass., and I met the same question there, and again in Walton, N. Y. Everywhere I go, every successful man in farming recognizes the great value, force and strength of these farmers' institutes, which shall take hold of the farmers and unite them in an intelligent study of that which maketh for peace and righteousness and a better reward of agricultural effort.

Now, these things are in the line of intense common sense. I would not give a fig for any sense that is not common enough to be down where I live. We have watched and prayed and worked for these institutes that they might make the waste places of our beloved state to blossom as the rose and they have helped to do it. They have done a vast amount of good, because they have brought us together, and when we come together we warm and cheer each other, don't we? When men come together and honestly, patiently and intelligently think with one another concerning the things that interest them so much, they are bound to help one another. My friends, the institute work of our state is a blessed work if we can keep it along this line.

We want to hold right steadily in the conduct of the institutes to the technical work of the farm. We don't want to dabble in politics, we don't want to mix up in religion, we don't want to mix up with anything on earth, but stick to this. Give to me a larger judgment of my duty as a farmer, and how to encompass the problems of my work and then I will bless the institutes. The judgment of men is enhanced and enlarged and benefited by rubbing together. You know the old fashioned

saying in Vermont when they go sleigh riding and the boys and girls all tumble into the sleigh. "Lay the brands close if you want a good fire." You need that motto here in the institute work, we need it in the state. There is no man that needs to range up alongside of his neighbor more than the farmer and may God bless him in his efforts in that direction.

MANURE AND FERTILITY.

GEORGE MCKERROW, Sussex, Wis.

Mr. Chairman, Ladies and Gentlemen: This is a pretty big subject to talk about in a few minutes, and as Gov. Hoard suggested, I think it will be "cut and cover."

The great Creator, in giving us this globe for a home, laid down some laws that worked well for thousands of years, yes, probably for mi lions of years. The elements have been acting upon the surface of our soils, dissolving and making soluble the mineral matter in them and growing crops of plants that have gone back again upon the soil and given fertility to it until to day we are enabled to raise good crops. In this country of ours, with our virgin soil to work upon, we have been growing crops, grains mostly, and sending them to the open markets of the world. W. have been selling off the fertility of our soil by the bag full.

No Country under the sun

has ever been so prodigal of the fertility of its soil as this United States of America.

But the time has come for us to make a halt, to begin to think what we are coming to. In fact in many portions of our country we have found out from experience what we are coming to if we continue in this wasteful course. Looking across the ocean to the old countries of the world, to England, Germany and France, and further yet, over to China where they have been cultivating the soil for hundreds, yes, thousands of years; we see that they have learned the lesson of caring for the fertility. They save everything there that will fertilize the soil, saving the sewerage of their cities, saving the silt that is washing down from the rivers, scooping it up and placing it upon the land, drawing fish out of the seas to fertilize with, and the Chinaman go so far that it is said they will not allow the body of a Chinaman to be buried in this country but ship it back to China so that nothing may be lost.

When we began to draw upon our soils for crops and kept it up, we were very much like the manufacturer who put in a good stock of material, wood, iron and coal to begin with, and then continues to manufacture without buying any new material. If he keeps on in this way he soon gets to the end of his business. So with the farmer. He must keep a store of fertility in his soil or he must cease raising paying crops.

What is Fertility?

It means those elements in the soil that are available for plant food. We find in many soils when the chemist analyses them, a goodly amount of fertility but its being in an insoluble condition,

and not available for plant food, those soils do not produce good crops. We find one class of elements that may be termed organic or gaseous. These elements are supplied to our soils mainly by the decomposition of vegetable matter.

We term them Oxygen, Hydrogen, Nitrogen and Carbon. Only one of these is very valuable in the growth of plants, yet they are all needed, they all have some relation to the making available of other elements in the soil.

Then we find another class of elements that may be termed inorganic or mineral elements; they come from dissolving earth, rock, etc., and we find them in the shape of potash, sulphuric acid, phosphoric acid, magnesia, lime, chlorine and silica.

The principal elements in the growth of plants are nitrogen, phosphoric acid and potash. Now, by the thorough cultivation of the soil, we aid in making these elements in the soil soluble, or fit for plant food. The air, the sunlight and moisture are all constantly at work; they are carrying on a mechanical and chemical action which puts these elements in a favorable condition to be taken up as plant food. Now, the more we cultivate and open up this soil, so that it may breathe, so that the air may penetrate it and the moisture may pass through it both up and down, the more rapidly we make these elements available for the plant.

Therefore, I say we should strive to give thorough culture and plenty of it. Yet that adds comparatively nothing to the soil. We must add to that soil in another way and that brings us to the second part of our subject.

Manure.

Prof. C. G. Frierthonger, of England, says that by thorough culture the farmer can get much better crops and can exhaust his soil much sooner than by less thorough culture, yet he advises the getting of as large crops as possible, and at the same time advises the applica ion of manure for growing crops to keep up the fertility of those soils. When we come to the question of manures we must not fall into that erroneous habit of looking upon all manures as being equally valuable. The rotted straw pile has but little value when compared with the manure made from well fed fattening cattle.

The English Farmer

well understands the value of manure. He has studied it for centuries, and we find him feeding those foods which give rich manure very freely to his stock. We find him feeding eight to twelve pounds of oil meal at a time to his fattening steer, when it is pretty well known now that such a steer will only utilize from five to six pounds of this oil meal to the best advantage in putting on flesh, but the English farmer reasons that what he don't get in flesh he gets in fertility. It will pay us to feed stock the material necessary to keep up the nitrogen in the soil, and unless we do feed stock and grow clover the fertility of our soils will after a while become exhausted and we will have to work our farm at the halves, that is, we will have to expend the work and have only half a crop and we might just as well become renters and work the land at the halves as to work our own farms in that way. Now, the feeds that we have access to in this country that will produce rich manures are such as cotton-seed meal, oil meal, bran, middleings, oats and clover. Such feeds as corn, straw and slough hay are not as rich in these nitrogenous elements, and therefore, do not give us as rich manure.

A Costly Mistake.

In feeding our stock and handling our manure, we in the state of Wisconsin, are making a great mistake. We are allowing a great deal of our manure to go to waste. From 40 to 60 per cent. of the manurial value is found in the liquid portion of the manure, and when we bore holes in our stable floors to get rid of this liquid we are losing over half the value of our stable manure. We should be careful to have on hand good absorbents such as we have on the farm in straw, coarse slough hay and to a certain extent land plaster. These absorbents placed in our stables will hold this liquid manure until we can get it upon the soil, which should be as soon as possible.

Don't throw this manure out into the yard to be washed by the spring and summer rains, and hauled out next fall, when we have lost the best portion. Get it upon the land, let the rain wash it in and incorporate it into the soil where it is needed. If we leave it in the yard we will lose interest on it the same as we lose interest on a roll of green backs we carry in our pockets. Let us get the best results by top-dressing.

MR. ROBINSON — What is the nature of your soil?

MR. MCKERROW — Ours is a clay soil. The scientists tell us that the tendency of manure is both upward and downward. In wet weather the fertility is carried downward, in dry weather when the moisture is coming up by capillary attraction it brings back a portion of the fertility to the surface, but not above the surface. The question is often raised, how much we lose in our manures by evaporations, but the scientist tells us that the vapor that is given off from manure that is not heating, though it has a strong odor, does not carry much fertility with it. The young plant should be encouraged and helped, and if we plow under our manure we put it down where it is pretty hard for the young plant to get to it. If we keep the fertility near the surface, the young plant gets the benefit of it. The clover plant, is a great aid in keeping up the fertility of our surface soils from the fact that it reaches down into the sub-soil for many of the elements that make its growth and bringing them up, deposit them near the crown of the plant where they are available for future crops.

We Sometimes Have Rough Manures

that we do not wish, or from some cause cannot haul out upon our fields at all times of the year, that we have to pile up. In my practice I have found it was best to haul out and use a layer of the poorest straw manure for the bottom then pile up the manure as it increases in quality upon that, so that we have the richest manures on top of the pile. Pile from three to four feet deep unless it be horse manure, which we would pile shallower, with the level rather sloping toward the center. What rain falls upon this pile is very little more than necessary to keep down fermentation. The straw below will catch and hold the greater portion of the fertility. Such a pile can be kept and used for top-dressing, for roots or any other crops. We find this good top-dressing for the winter wheat crop, applied and dragged in with the seed.

Farmers in Wisconsin sometimes use salt and plaster. These might come under the head of commercial fertilizers, but as analyses show, they are not very rich in fertility; their benefit is mainly found in the action that they have upon

the elements already in the soil, through making them more available as plant food.

They also seem to draw moisture to the surface of the soil. We cannot be too careful in saving our manure.

Eastern farmers pay at the rate of 17 cts. a pound for nitrogen, and from 7½ to 8 cts. a pound for phosphoric acid, from 3 cts. to 6 cts. a pound for potash. Figuring on that basis we find that a ton of bran contains something over $12 worth of these elements, a ton of hay something like $9.00, a ton of oats some $6.00 or $7.00 worth, a ton of oil-meal some $19.00 worth. If we follow on our farms a continuous cropping, and selling of the crops, we will have to do as they do in the east before long, so it will pay us to be careful in this respect.

DISCUSSION.

Gov. HOARD — Did I understand you to say that where manure is thrown together and heated up that it may through fermentation and evaporation lose some ammonia, but there is not much loss of fertility?

MR. MCKERROW — When it is spread out upon the surface of the soil the scientist tells us there is not much loss of fertility, but in the pile where fermentation is going on and where heat is being generated, there is considerable given off.

MR. BENEDICT — You spoke about using some absorbent. Do you consider that mill shavings used in that way are liable to do injury to a light soil?

MR. MCKERROW — I have had no experience with pine shavings, but I should judge that the benefit derived from their decomposition would be largely offset by the turpentine in the shavings.

MR. EVERETT — Would you advise piling horse and cattle manure together, and would it be a benefit to sprinkle land plaster over that?

MR. MCKERROW — Yes, I would advise both those things. We use land plaster on our manure piles and in the sheep yards.

Gov. HOARD — Land plaster is sulphate of lime and composed very largely of sulphuric acid, which is a constant disintegrent; it breaks down the woody fibre, etc.

MR. MCKERROW — It combines very readily with potash.

MR. FAVILLE — Do you recommend the sowing of land plaster on the soil?

MR. MCKERROW — On many soils I think land plaster is valuable. We find upon clay soils in particular, that it gives a very rapid growth to the clover plant, yet I do believe that if we sowed land plaster every year upon those soils, we would ultimately use up the available potash in them, and possibly make the land what is termed "clover sick."

MR. FAVILLE — If we raised a large crop of clover every year and fed it back, would it hurt?

MR. MCKERROW — No, this will keep the store of fertility all right.

Mr. BARNES — Is not this compost heap the proper place to deposit our ashes?

MR. MCKERROW — It might be a good thing to spread the ashes evenly through the compost heap, and at the same time put the plaster there. I believe it will make the potash in the ashes more available for plant food, but might be detrimental in some other way.

Gov. HOARD — You have to be careful of one thing. The alkali in the ashes will operate upon the organic matter the same as lime will. It will fire-

fang and burn it and it sends the ammonia off into the air.

SUP'T. MORRISON — I would not put ashes in the compost heap anyhow. I think it is better to spread upon the land.

MR. GOODRICH — Do you believe that to maintain the fertility of the soil a farmer must return as much to it as he takes off from it?

MR. MCKERROW — Yes, I do.

MR. GOODRICH — How can he sell anything off then?

MR. MCKERROW — He can sell in the form of stock and butter without taking much fertility. I have heard Mr. Goodrich say that he can put back all the fertility that was lost in a cow's butter in a year, with two bags of bran, and I think in all probability our neighbors in Minnesota and Dakota will be willing to sell us that two bags of bran.

MR. GOODRICH — Isn't it true that some goes off in the seas and rivers that never is returned?

MR. MCKERROW — It goes very slowly. I believe we can take something off and still return the fertility in that soil. Such plants as clover will reach down and get it out of the sub-soil, but I don't think we should lay it down as proper to take off what we don't put on.

MR. FAVILLE — The good Lord has made provisions for us in this matter. Every plant is gathering more or less of the ammonia that is in the atmosphere and depositing it in the soil. Now, do not understand the good Lord will do it all. We have got to do our part and then he will do the rest.

MR. MCKERROW — Doesn't that ammonia that is in the air come from the decomposition of available elements?

MR. FAVILLE — It is possible the good Lord made that arrangement, that isn't our part of the programme.

MR. ROBINSON — Won't it be better to plow under that coarse manure, shallow, than to put it into the compost heap?

MR. MCKERROW — I did not advise the building of the compost heap on general principles, but in case you could not get this coarse manure out from any cause I would. As to plowing under shallow, take it one season with another, I havn't had very good results doing it.

I prefer to put all manure on the surface, for I not only get the commercial value of the fertility, but it acts as a mulch, which helps to carry on this decomposition or breaking down of the elements in the soil, making them available for plant food.

A MEMBER — If this clay land is short of potash, is plaster of any benefit.

MR. MCKERROW — There is no land in this state, so far as I know, where there is no potash, but if there is, plaster probably would not help much. Plaster in the manure heap will always be beneficial.

QUESTION — Why doesn't cow manure heat?

GEO. MCKERROW — Because it contains a large per cent. of moisture. It will ferment some and mixed with horse manure will increase the heat, but not enough to injure it.

QUESTION — How can we prevent horse manure from fire fanging?

GEO. MCKERROW — By mixing it with cow manure. By keeping swine on it or keeping it too wet to heat strongly. A little heating does no harm, but is rather a benefit. The horse manure in the bottom of a gardener's hot beds, so prepared as to heat all that it can be made to is still very rich. The earth put upon it appears to absorb the volatile parts. The loss by heating in mixed manures in the compost heap is very

small, much less than from leaching, when it is thrown out under the eaves of the stable.

QUESTION — How much loss does bran sustain in manurial value from feeding?

GEO. MCKERROW — The loss varies considerably, but with dairy cows properly fed the net loss does not exceed 20 per cent., and if the urine is all saved by absorbents the loss is practically nothing, digestion adding more than is taken away.

QUESTION—When should manure be hauled?

GEO. MCKERROW—It is best to draw out manure as often as possible.

QUESTION — Should it be rotted or fresh?

GEO. MCKERROW — Manure is never worth more than when it is dropped. Keeping will not improve it and the sooner it is spread upon the ground the better.

QUESTION—What is the average daily or yearly value of manure made by domestic animals?

SUPT. MORRISON — One of the late bulletins of the Cornell University Experiment Station is devoted to "The Production and Care of Farm Manures," and it gives much valuable information on both these subjects. An experiment with eighteen Jersey and Holstein grade cows in milk is very interesting. Each cow consumed on an average eighty-three pounds of food, made up of the following ration: 114 pounds of hay, 893 pounds of silage, 189 pounds of beets and 154 pounds of a mixture made up of seventy pounds of wheat bran, fifty-four pounds of cotton-seed meal, eighteen pounds of corn meal and six pounds of malt sprouts.

The excretion from a ration thus made up was eighty-one pounds per cow, having a value for nitrogen of six cents per cow, two cents for phosphoric acid and two cents for potash.

In another experiment where the solid and liquid excrement were tested separately, it was found that the latter was very nearly equal in value with the solid, and excelled it in nitrogen and potash. In each case the manure from well-fed cows giving large messes of milk was nearly or quite ten cents per day.

In the experiment with horses the results are not complete, as the excrement was only saved while the horses were in the stable, excepting one Sunday, during the period when they were not at work on the University farm. Tested in this way, the horses gave thirty-two pounds of excrement, which contained about four cents worth of the fertilizing material. In two experiments the manure on Sunday was weighed and found to amount to fifty-six pounds per day.

On week days the horses were hard at work, and their liberal feed of hay and oats went largely to supply waste of muscle and nerve power. It is possible that the excrement voided on Sunday while resting was worth more per pound. If not, it would only amount to between six and seven cents per day. It is commonly supposed by farmers that horse manure is richer than that from cows. It heats more quickly, and is therefore more active; but the manure from milk cows equally well fed is richer than from horses at work. The horses were heavy grade draft horses, weighing about 1,400 pounds each. The average weight of the cows was 1,173 pounds.

Experiments with sheep showed an average value of manure of 1½ cents per head; but it was especially deficient

in potash, indicating that this material had been more largely used by the sheep in developing either growth or wool. The average weight of the sheep was about 142 pounds each, and the food consumed 5.3 pounds per day. It takes about eight such sheep to weigh as much as the average cow, and for the food consumed they yielded more value in manure. This was possibly due in part to the cows giving milk. Pigs well fed gave a value of little more than one-half cent per day, and on carbonaceous food—corn meal, it was not that. The pig undoubtedly converts more of what he eats into flesh than any other domestic animal.

As summing up the experiments Prof. Roberts, the very efficient director, gives the value per year of manure made by 1,000 weight of each animal as follows: Horses, $19.12; cows, $29.82; sheep, $38.55; hogs, $17.11. In all these estimates of value the basis is that on which commercial fertilizers containing nitrogen, phosphoric acid and potash can be bought in available form.

PLOWING, CULTIVATION AND TILLAGE.

By THOMAS CONVEY, Ridgeway, Wis.

The triple title given the subject I am to discuss, as it appears on the programme, might be very accurately represented by the single word tillage, as the latter includes preparing the ground and cultivation of crops.

Plowing is a bone of contention in our agricultural discussions, and while many of us are experts in plowing with our tongues out of season, comparatively few of us know whether our plows are in fit condition for the spring campaign until the ground is fit for plowing. A sharp plow will do better work and more of it with less labor on man or team. I would prefer two shares for each plow and then the work need not be delayed. Plowing to be well done must be in straight lands to avoid cutting and covering and taking a narrow furrow at times. In plowing such land as I cultivate, a black prairie loam, a 16 inch plow is none to large for a 2,800 lb. team, and then there is no occasion to crowd a team to do a good days work. In a single year in plowing with a narrow plow you may loose enough to pay for a new one.

I Prefer Fall Plowing

for every purpose if it is done sufficiently early. If not I would prefer spring plowing; late fall plowing has never given me satisfactory results, and where I have plowed very late in the fall, especially where the ground was wet, it was injurious for several years. I have resorted to late fall plowing to kill cut worms and feel satisfied there is no merit in it, especially, the statement that where you plow late you turn up the worm to where the frost will kill it. Where you plow sufficiently early you turn under vegetation of all kinds, when the conditions are most favorable for its rapid decay. The vegetation is less woody and a sufficient amount of heat is present to promote active fermentation.

In Plowing under Clover

I would prefer to pasture the second

crop, as plowing under a rank growth of clover late in the season rarely gives good results. Early fall plowing prevents some weeds from going to seed, promotes the germination of those seeds that have matured, causing the destruction by fall frosts, leaves the land in such condition that it will absorb more of the rain and snow-fall and the winter frosts cause a more perfect disintegration of the soil, leaving it in a condition in which it is more easily cultivated it has a greater capacity to retain the necessary amount of moisture, and is in the best possible condition to take up or impart fertility to the growing crop. Another advantage obtained by fall plowing is the ability to get our crops in so much earlier. For when the ground is fit the earlier we sow wheat, peas, barley and oats the better. In fact, it is exceptional for any of these crops to do well when sown late, and I would have no paitence with any one who would delay sowing when the ground was fit; late crops are more subject to blight and rust, also injury from insects, they make a greater growth of straw but it does not stand up so well, nor is the quality of the grain so good. The early crop may fail, but the late crop is almost sure to fail.

The Advocates of Deep Plowing

are not so numerous as they used to be, and people agree as to the folly of deep spring p'owing. Experiments would tend to show that turning up much of the sub-soil, even in the fall at a sing'e plowing, is pernicions. Some sub-soils are nearly barren, others only require a sufficient amount of exposure to the elements to render them fertile. This spring plowing rarely affords.

Deep plowing of sod is always objectionable for it places the vegetable matter so deep that the heat does not reach it to promote active fermentation, and it places the fertility too deep for the roots of crops.

The loosening up of the sub-soil when it is not placed on the surface may be beneficial with some soils and for certain crops.

I do not Think

land can be injured by being plowed when dry. And I am fully convinced that it receives permanent injury by being plowed when wet. Much mischief is done by driving over the ground when very moist, and cattle are allowed to roam over the fields, plowed or unplowed pasture or stubble, needlessly. I have often thought that where cattle are allowed to run in stalk-fields, the tramping did more harm than would the removal of the fodder, even were it never returned.

"As you sow, so shall you reap," is literally true in agriculture. Careless preparation of the soil rarely gives good returns, and while tillage may not be manure, it is the best substitute we know of. In animal husbandry, to get the best results we depend on a combination of breed and feed. So in agriculture, we depend on tillage and manure, and the tillage is indispensible in preparing the ground when manure is applied, as it should be well distributed in the surface soil. In the cultivation of my land I strive to secure a fine surface soil and a firm sub-soil, and when I spring plow, I harrow and pulverize until the ground is fine, level, and well compacted. In preparing fall plowing I would only strive to loosen up the surface to the depth at which I expected to plant.

I Prefer to Drill

in grain for various reasons. It takes less seed, it is more evenly distributed,

all being placed where it will grow if the grain is sounnd. The grain stands up better, ripens more uniformly and does not suffer so much from drought, or the extreme heat of midsummer; being sown deeper, it gives grain of a better quality and more of it.

Drilling has these disadvantages, however; it costs more, does less work in the same time, will put grain too deep if the soil is too loose, and the shovel drill is difficult to operate when cornstalks or stubble are on the ground. In spring plowing it is much better to harrow before the ground dries too much as loose ground will be very apt to do in a short time. Few farmers realize the advantages of perfect preparation of the soil and while it may be possible that land may receive too much cultivation or preparation, I have never seen any instance of it, but I have seen crops suffer from injudicious cultivation, by seeding too deep, a very common occurrence, by cultivating too deep, which occurs more frequently, and by neglect to cultivate at the proper time.

The Main Objects

to be attained in cultivation are, 1st, to loosen up and pulverize the soil that it may arrest and retain the necessary moisture; 2nd, to make the soil porous to promote the extension of the roots of plants; 3rd, to produce that firmness of soil that is indispensible if we expect the plant to take up the largest amount of fertility; 4th, recent experiments tend to show that the absorption and retention of solar heat depends not only on the color of the soil, but also on its more perfect pulverization, and the evenness of the surface; 5th, the destruction of weeds.

In those crops requiring summer cultivation we should not neglect to cultivate after each rain, as soon as the ground is sufficiently dry, to break up or check capillary action, and retain the moisture near the surface. Cultivation at this time is the most propitious to check the growth of weeds.

Compacting the Soil

by judicious cultivation, appears to be especially needed in promoting the perfect germination of seed, especially grass seed, and time spent in the preparation of ground hastens the growth of the crop. This is especially so of the corn crop, as careless preparation means slow growth, difficult cultivation, and meager returns. Many persons claim they cannot harrow corn after planting, simply because they do not give the ground proper cultivation before planting. Therefore they fail to avail themselves of one of the most perfect methods of weed destruction. I will here ask a question of this audience. How does the root pruning that results from deep cultivation promote plant growth? In conclusion I will say, in imitation of the language of a distinguished writer, we *must* cultivate, *we must cultivate.*

DISCUSSION.

MR. MCKERROW — How would you set your plow to do the best work?.

MR. CONVEY — A plow in good order should always run level.

MR. GIBSON — Will the shallow plowing do in dry weather turning down clover?

MR. CONVEY — I don't plow less than four inches. and I would consider that about the right depth to plow down a sod.

MR. GOODRICH — Wouldn't land that is plowed in the fall wash worse in the spring?

MR. CONVEY — Not if it is sufficiently level or where it is kept in proper condition, that is sown to grass in 3 or 4 year rotation.

QUESTION — Would you turn up any sub-soil at all?

MR. CONVEY — I would be inclined to turn up very little, especially in spring plowing.

MR BURKMAN — I got hold of some land several years ago that would not grow more than ten bushels of wheat, or anything else to the acre. I couldn't seed it, I had not barn yard manure enough to cover it. In the fall I plowed it as I could, tried to make it two inches it would run to one inch; and as late in the fall as I dared I plowed it again, and that ground the next year raised thirty bushels of No. 1 wheat to the acre, and was seeded in the best order.

MR. CONVEY — Where land is kept in proper condition by judicious rotation of crops, and judicious manuring it may not be necessary to have deep plowing, but if your sub-soil is rich, and the land is run out, it may be necessary to plow deeper.

MR. ROBINSON — Were your lands clay or sandy?

MR. BURKMAN — It is clayey black soil.

MR. MCKERROW — I believe it is a good plan to run a heavy roller on the spring plowing rather than dragging. Dragging is preferable to rolling or planking on fresh plowing, dragging levels and pulverizes, rolling or planking merely firms. The more perfect the pulverization, the less a crop will suffer from drouth, it also leaves the land in best possible condition for the crop to take up the necessary fertility. This was the principal advantage attained by the old style of summer fallowing, another being the destruction of weeds, of course it would be better to roll and drag too. Very few, give land sufficient cultivation in preparing for seeding, then they are disappointed with the growth, especially in dry weather, which we are sure to have during some part of the season.

QUESTION — Why would grain drilled in, ripen any earlier than if sown broadcast?

MR. CONVEY — It does not ripen as early in my experience, it ripens more uniformly because it is all sown at a uniform depth.

MR. OLSEN — Why is it that dragging will make it more firm than rolling?

MR. CONVEY — It pulverizes the soil. I would recommend rolling in every instance with such a soil as I have, unless the ground would be too dry, then it would blow away.

QUESTION — Did you ever drag spring grain after it was up?

MR. CONVEY — I never have dragged spring grain, I have fall grain.

QUESTION — Do you plow deeper for corn than you do for any other grain?

MR. CONVEY — No, sir.

QUESTION — Do you drag corn after it is up?

MR. CONVEY — Sometimes I have, yes, I have also cultivated before it came up, and then dragged and consider it the best way to handle fall plowing.

SUPT. MORRISON — The most successful corn raisers that I am acquainted with plow their corn land in the fall, and in the preparation of the seed bed spare no labor, in fact the most of the tillage and cultivation is done prior to planting. At the proper temperature the planter is started. The moisture in the soil can be largely regulated by the tillage. The best crops of corn I have ever seen in Wisconsin, the seed was put in thoro-

ughly prepared soil the last half of May. Corn ground well prepared is more than half worked.

QUESTION — Do you prefer to turn sod over flat or turn it over edgewise in plowing?

MR. CONVEY — I prefer to turn it over flat or nearly so.

PASTURES AND MEADOWS.

By C. P. GOODRICH, Fort Atkinson, Wis.

Pastures and Meadows

Are of more value and importance to the farmers of Wisconsin, than are all her other lands combined. They cover many times more acres, bring the farmers more money with a less expenditure of labor to harvest or secure, and yet, as a rule, they receive very little care and attention. With the exercise of proper care and judgement, their product might be greatly increased, perhaps doubled. Every farmer should keep live stock enough to consume nearly, if not quite all the products of his farm. This he should do to maintain its fertility, so that after it has been occupied through one generation the next will not have to abandon it or starve.

Not more than one-third of a farm should be plowed and cultivated each year, the rest should be in pasture and meadow in the proportion to suit the needs of the stock.

Some Parts of the Farm

should be in permanent pasture for the reason that it is the only safe way to provide pasture every year, for occasionally we have a season that fresh seeding fails where we are practicing a rotation of crops on the whole farm. Most farms have some land that is not profitable to cultivate each year, it being too wet to insure a good crop, or so rolling that it washes badly and will in a few years become impoverished and gullied to such an extent as to be nearly worthless. In seeding for a permanent pasture I would advise sowing a variety of seeds. Red clover (unless the land is too wet), alsike clover, timothy, red-top and blue grass, and perhaps some others. The red clover would probably run out in two or three years, but would produce a good deal of feed at first. One object of sowing a variety of grasses is to give a variety of food to the stock, for it has been found that they crave a variety, and will thrive better when they can have it. Another object is that there will be kinds adapted to the different kinds of soil, so that after two or three years it will be seen that one kind of grass will predominate in one part of the field and another in another part, illustrating the law of the survival of the fittest. In this way the ground will be fully occupied and leave no places to be grown up to weeds.

If the Seeding is Done

the same year a grain crop is raised on the land, I would advise sowing clover in the spring with the grain, and the other seeds after harvesting, about the first of September. If no grain crop is to be raised, I would sow all in the spring, then it could be pastured in the last part of the season. Never let weeds take possession of your

pastures, they are unprofitable and injurious to dairy stock as affecting the flavor of the milk. If for any reason the grass dies out in places and weeds are coming in, sow on more grass seed. In seeding for permanent pastures I would sow on plenty of seed, one peck or more to an acre of all kinds together. Lands that have never been plowed, such as rolling prairie or where timber has been chopped off can be seeded by sowing on Alsike, timothy, blue grass and red-top seed early in the spring, and when the cattle are turned on they will tramp the seed into the ground and it will grow so that in a year or two there will be a good stand of grass.

Sometimes it is Desirable

to have permanent meadows on low, moist lands. They can be seeded in the same manner as permanent pastures, but the blue grass seed should be left out, as the grass is too short and ripens too early for hay. Such meadows should be top-dressed as often as every third year, with fine well rotted manure and well harrowed with a sharp toothed harrow early in the spring. In this way they can be kept up to a good state of productiveness, otherwise they will deteriorate each year, for no land can produce continually successive crops of hay without exhausting its fertility, unless it is replaced by manure. Clover may be an exception to this rule. On most soils it is beneficial to sow on plaster, salt and lime on both pastures and meadows. Pastures also should be occasionally top-dressed with manure, for it has been found that long continued pasturing, unless the stock are fed something besides what they get from the pasture, will slowly but surely reduce its fertility. In some of the dairy districts of the eastern states where lands have been pastured with cows for 50 or 75 years, especially where the cows have been yarded nights and no manure put on them, they have become so reduced that they will not carry half the stock they once would.

In Some Instances

they are over-grown with weeds and the grass has died out. They can be renovated now only by plowing up, manuring and re-seeding or perhaps by manuring, seeding and thoroughly harrowing. If the farm is all good tillable land suitable for corn and all kinds of grain, my way would be on most of the farm, to practice a three or four years rotation. First corn then some kind of small grain and seed with clover, then mow or pasture one or two years. It is well after the grain is taken off to sow some timothy seed, say two quarts to the acre, so that if the clover should kill out in the winter in spots you would be reasonably sure to have something to occupy the ground besides weeds. I would surely sow the timothy and perhaps alsike clover too if I intended to pasture or intended to keep it in a meadow more than one year. I would manure it well every time I pastured it.

Stock Should Not Be Turned.

on pastures early in the spring when the ground is soft and the grass small and feeble, for they will tread up the ground, injure the roots of the grass and bite it so closely that it never makes much growth. Grass must get a good start in the spring if we expect to get much from it during the summer. The stock also do much better to be kept from the pasture until the grass has got up enough to afford a good bite with some substance to it, so they can satisfy their hunger without working hard all day for it.

In Some Parts of the State

there are large tracts of wet marsh lands that are now nearly worthless, for the grass that grows on them is of such a poor quality that stock will not thrive on it in fact will not eat it unless compelled to by being prevented from feeding on good nutritious grass, thereby starving them to it. Such lands if of peaty formation, when pastured a few years become so trodden up as to become little better than mud holes during the wet season. On many such tracts of land by a judicious outlay of money in drainage, sometimes amounting to only a small sum per acre, they may be dried out so as to be very valuable either as pasture or meadow. If such land is pretty well dried out by draining, I would not advise breaking up and killing out all the native sod, for then the peat in a dry time will be so loose and light that it will be nearly impossible to get it seeded again to grass.

It Would Be Much Better.

to go over the ground with some implement that would cut the bogs and smooth it down and then sow on grass seed adapted to such land, such as redtop, alsike clover and perhaps timothy. By this means the marsh sod that is left undisturbed will serve to make the ground firm enough so that stock can travel on it without cutting it up, and the new seeding will be much more likely to live, as the surface of the ground will not dry out so badly when hot dry weather comes. Treated in this way the cultivated grasses and blue grass will gradually run out the marsh grass, and the tramping of the stock will make the ground firmer each year and the result will be a very valuable permanent pasture.

A Top-Dressing of Manure

once in three or four years will greatly benefit such a pasture as this, as well as upland pastures. Marsh meadows, in many instances can be greatly improved by a similar method of smoothing down and sowing on grass seed and not plowing them. But such meadows when once well fixed should never be pastured, for it will serve to bring in june grass and white clover, which are too short to produce much hay and will also tend to make the ground rough again.

New Seeding of Any Kind

should never be pastured much the first year, but should be allowed to get a good strong start. New clover seeding should not be pastured much in the fall, even if it does have a pretty good growth. It is better to have the grain stubble stand up so as to hold the snow as a protection to the clover, and also if a coating of ice comes on the ground, to let in air and prevent it from smothering out. If the stubble is tramped down flat by stock, such a coating of ice will be sure to kill the clover.

In Conclusion

I wish to urge again the importance of taking good care of pastures and meadows, of frequent top-dressing with manure, and above all of not allowing them to grow up to weeds. If you discover any places where the grass, for any cause has died out, sow on and harrow in more seed, because, besides losing the use of the ground, you will be growing weeds if you do not.

DISCUSSION.

MR. FAVILLE — I want you to tell us how we are going to get manure to put on pastures every two or three years?

MR. GOODRICH — The fields that we cultivate, that we make hay upon, our meadows, the straw from our grain and the fertility that Mr. McKerrow told us about, coming from the fields of Minnesota and Dakota.

GOV. HOARD — Don't you find a little difficulty in top dressing pastures, from the ground becoming offensive to the cows?

MR. GOODRICH—We don't cover over the whole pasture at once, only 2 or 3 acres at a time, and that gives the grass a good chance to grow up, and after one or two rains they will come back to better grass than ever.

GOV. HOARD — I have observed where pastures were top dressed the end of October, then there is the whole winters snow and rain before you turn out and the pasture is very much less offensive to the cattle.

MR. GOODRICH — That theory is all right, but as Mr. Faville says "Where is the manure to come from in the fall, if we have been hauling out all through the spring and summer."

GOV. HOARD — But I have been considering that you are sensible enough to keep enough for top dressing.

MR. GOODRICH — I draw it out when I have time, winter or summer. If I have it in October I put it on in October.

MR. RICE — Suppose you had a peat bog, but it had been ditched and had become rotten or mellow, what is the best time to put it on that soil?

MR. GOODRICH — A good many years ago I helped to haul out some peat muck and it had some slight effect on the land but very little, If it is loose and light I think it would be better to take it in and mix it with the manure in the stable as an absorbent. There are some elements of fertility in straw as far as it goes. It is as good as mulch.

SUPT. MORRISON — It shades the land.

MR. CONVEY — Do you approve of the summer feeding with grain for the purpose of adding fertility to the soil?

MR. GOODRICH — I don't think I would do it for that purpose alone.

MR. CONVEY—Don't you think it adds largely to the fertility of the land?

MR. GOODRICH — It certainly does.

MR. CONVEY — Would you advise taking a hay crop off the pasture the first year in order to allow the land to be less subject to injury by the tramping of cattle, to make a better sod?

MR. GOODRICH—I would mow it the first year in order to get a stronger, better sod and the ground would be firmer. I certainly would not pasture it the first year.

MR. CONVEY—I think our pastures are damaged to a large extent by turning the cattle on them too early in the spring when the ground is soft, and also keeping them to late in the fall.

MR. MCKERROW — If you had a farm, all good tillable land, would you have any permanent pasture on it at all?

MR. GOODRICH— I would to make sure that I would have *some* pasture.

QUESTION—What would you use for cutting up these bogs?

MR. GOODRICH — I have seen used different implements. I have seen one that had teeth that were knives slanting back some slanting sidewise to the right and some to the left and when it was drawn over the bogs it worked them up pretty well. Then when the ground is just thawed out two or three inches you take a disk harrow. Then go over the ground with a common harrow, then with a heavy roller. It is considerable work but it is better than to plough the sod up.

MR. ROBINSON —On these marsh lands that are kind of tough the only way I could manage was with a bog hoe, or plow it.

MR. MCKERROW—Would you sow lime on limestone soil?

MR. GOODRICH — I wouldn't sow lime on soil that had enough lime in it.

MR. MCKERROW — I think the object of the lime is to supply it in the bones of the cattle.

QUESTION — In the bottom of our small lakes here we have a sort of marl which seems to be a sort of decomposed shell. Would that be beneficial to our land?

MR. GOODRICH — I never had any experience with it.

MR. CONVEY — I think there is always a deficiency of lime on low moist ground, and this marl is largely composed of lime.

GOV. HOARD — In Stockbridge, N. Y., it is a limestone country and those men have found that for meadow lands and for all kinds of purposes that a top dressing of lime is good. The lime in the soil is not yet in condition that it can be taken up by plants.

MR. GOODRICH — I know that to be a fact, I have seen it sowed right over a ledge where the lime rock was quarried out from which the lime was burned with good effect.

A MEMBER — I will say there is so much lime in this marl that it has been taken right out of the lake and used for cement.

A MEMBER — If you had a quantity of straw left in the spring that had not been worked into compost, would you prefer to put that on as top dressing or keep it until you could work it into compost in the barn.

MR. GOODRICH — I would haul it out on the pasture.

MR. MCKERROW—I have hauled out a good many of these old straw stacks onto the pasture lands, and have always been well satisfied with the returns. It is very useful as a mulch, and it keeps the stock from cropping that pasture too close and gives it a new lease of life, and also appears to give it a great deal more growth than the fertility in the straw would warrant in itself.

SUPT. MORRISON—Wouldn't you consider a man rather a poor farmer that had lots of straw stacks that had to be worked down that way?

MR. MCKERROW—We know of farms that we have bought just because they were left that way.

SUPT. MORRISON — They were sold under a foreclosure?

MR. MCKERROW — Yes, that is about it.

A MEMBER—I own a farm that had a lot of these straw stacks, but when I came to keep 400 or 500 sheep I didn't have to draw it out that way.

MR. ROBINSON—Can we get benefit from purely vegetable manure?

MR. GOODRICH—Yes.

MR. ROBINSON—Then why don't we get it from the muck from our marshes?

MR. GOODRICH—Perhaps you put on too much of it. It should be spread lightly and evenly after plowing.

MR. ROBINSON—I took it out of the marsh and thought I had a bonanza, but it didn't work very well.

GOV. HOARD—There is a vast difference between muck and peat. Peat comes out sour and cold.

MR. ROBINSON—We take off the peaty portion and underneath that there will be three feet perhaps of purely vegetable product.

GOV. HOARD—That is fine for manure if you handle it right.

I remember my father had a peat heap in the barn-yard, and his 25 or 30 pigs rooted it over and it was then spread upon gravel knolls and we found the clover was the very best on this gravel and on sand but it was worked over 3 or 4 times in the summer.

MR. MONRAD — When the peat has been treated in that way you have the very best absorbent for liquid manure that you can get. You have a bonanza indeed.

SUP'T. MORRISON — Two years ago I visited the great farm of Mr. J. J. Hill the railroad king of the northwest, and in passing through his large barns and stables I found small piles of this muck placed conveniently in different parts of the stable; I asked him what he used it for. He said, "We use this peat or muck entirely as an absorbant, and we find it the best with land plaster that we can possibly get." And I thought to myself "Here is this great railroad king with his millions, saving the liquid manure in his stables, and if we farmers in Wisconsin would be as particular in saving those leaks and wastes it would be millions in our pockets.

A MEMBER — About this mulching with straw, would you rather put it out into the pasture in the spring or leave it until the fall when you could draw it into your land and work it under.

MR. MCKERROW — I would take it to the pasture unless there should be some foul weed seeds in it. In that case I would compost it, rot it thoroughly unless straw was short and I wanted to save it for the next season.

MR. WILCOX — I think it would be a good plan to haul it out in the fall. It will keep the snow and the air from the plants.

MR. GREEN — Mr. Goodrich, how much alsike would you use with other seed.

MR. GOODRICH — If mixed as I described I would not put in more than three pounds. It is a very fine seed.

MR. GREEN — I have sowed one and two pounds to the acre with other grasses, and had a very thick crop.

MR. GOODRICH — I believe in seeding pretty well for permanent pasture.

A MEMBER — I sowed four pounds and had a heavy stand, just like the wool on a sheeps back.

MR. MCKERROW — We have sowed at the rate of two pounds and have a good thick stand. You must remember two quarts of alsike seed is about equal to four quarts of medium red clover.

The Institute adjourned.
To meet at 1:30 P. M.

AFTERNOON SESSION—MARCH 17th.

The Institute met at 1:30 P. M. Sup't Morrison in the chair.

CLOVER AND HAY MAKING.

By C. H. EVERETT, Beloit, Wis.

Mr. President, Ladies and Gentlemen: I am not here to tell you all that there is worth knowing about clover by any means, for the man who make such an assertion would be bold indeed, but I hope to say some things that will be worthy your thought and consideration, and perhaps I may suggest some method that may be worth your adoption. I shall talk from my own personal experience and observation with clover.

I have been obliged to make somewhat of a study of it in order to get the best results and with the most economy. I have studied and tried to understand the characteristics of clover as a fertilizer and first I will speak of clover as a fertilizer. Many farmers make a mistake in not sowing enough clover in the first place, and then they leave it down too long. They will seed perhaps half the farm to clover, and then will let it lie until it has run into other grasses which it will do in three or four years.

I have known men who have kept it six or seven years until it has run out of clover into red top and other grasses, and the excuse is that seed costs too much. They fail to realize that every dollar invested in clover seed will bring back five or six. It is wrong to leave clover longer than the second year.

If you seeded last spring you will get this summer a better quality of hay off that land than you will the year after.

You will cut that piece once or twice the same season, first and second cutting of hay or one hay crop and one seed crop, or hay crop and fall pasture as the case may be. The roots at that time have obtained their growth and as you all know, have gone to the lower stratum of soil after the fertility that is beyond the reach of ordinary vegetation, and if you plow under at that time you secure the plant food you are after.

I say, sow all the clover you can every spring. Don't let it lie until it runs out.

Land plaster is very valuable on all our soils when used in connection with clover. It is not in itself a fertilizer but it takes up the ammonia, and holds it in the soil as a plant food. Chemists tells us that all vegetable matter while decaying generates ammonia, and as that evaporates at eighty degrees, it goes back again into the soil by being condensed with moisture, then the land plaster takes it up and holds it for the soil. For years it has been a study to find out how plants obtained the nitrogen which is so valuable.

It has been decided lately by German chemists that in the little warts on

clover root which you have seen so many times there is a minute, living germ that takes the nitrogen from the air in the soil, and feeds it to the clover plant.

Of the amount of clover seed to sow and the methods, there are many different opinions, but my advice would be, you can get just as good results from four as you can from ten quarts if you use a little care in sowing it.

One quart of clover seed contains approximately 500,000 grains, and by a little further figuring, I have found that that evenly scattered over an acre of ground would give a little more than twelve plants to the square foot, and as seven plants is about the average, you will readily understand the folly of such heaving seeding. I think four or five quarts is a liberal amount where you are sowing for hay, and where I am sowing with small grain to protect the soil from the sun for fall seed, fertility, etc., I sow two or three quarts, and I would rather see the stubble fields in our state covered with a green verdure of clover than to have the hot sun pouring down into the soil cracking it open and letting out the moisture and the fertility. There is another advantage in having your fields seeded to clover. After harvest you can take your stock from the permanent pastures and turn them on the clover field and the permanent pastures will be much better the following spring for doing so.

Clover Hay.

I will speak next about clover hay which has a higher feeding value than any hay we can raise in this or any other state in the union, ton for ton. It is claimed that one ton of clover hay and a ton of barley straw mixed, is equal in feeding value to two tons of timothy hay. It comes nearer to being a balanced ration complete within itself, than anything else we feed. It has a manurial value of $9.00 to $10.00 a ton, based on the price of commercial fertilizers in the east, as they pay there 16 cts. a pound for nitrogen.

Stock raisers all know the value of clover in raising young animals, it contains so largely of those elements that go to make up animal growth. The dairyman knows the value of it. It is even good for the brood sow. I prefer it to all other hay for horses but we must use judgment in feeding it, or they will eat too much of it. We can raise clover cheaper than timothy. It stands drouth better on account of its long roots, it will yield from one-third to one-half more than timothy, and is a surer crop.

Save The Best.

The foliage of the clover plant is the most valuable part, and we must save that if we wish to get all the feeding value in the hay. In speaking of good clover hay, I do not mean the average quality to be found in this state. I don't mean that coarse mow-burned indigestible stuff that can be found in abundance.

Hay of any kind must be bright and clean, free from dust and possessed of the desired aroma. I know it is possible to make such hay.

SUPT. MORRISON — Suppose it rained every day in June?

MR. EVERETT — If we had nothing but an ordinary shower each day, I would have just about as good hay. There is, in my judgment, only one method of making hay, and by that method I get a certainty of success in quality each year, that cannot be said of any other method with which I am acquainted.

Hay Caps.

You all know that clover hay has got to sweat out somewhere. If it is allowed

to sweat in the stack or in the barn there is a loss of feeding value, it becomes discolored and dusty, oftentimes almost spoiled. I have found from experience, that the place to let that take place is in the field, and I have found to do that successfully, in all kinds of weather that hay caps are a necessity. I don't mean something that will cost 30 or 40 cts. each, but a simple hay cap made of cotton cloth. I buy that cotton cloth by the bolt, and the caps are made one yard square. I tear off a yard square and hem the two rough edges. I fasten those down on the hay by means of little weights at the corners of the caps and they keep in place all right. I used to use the pin but the hay would settle down, and in a hard wind the pins would work out.

I studied a long time to determine what I would use for weights. I went to the factory and found it would be too expensive to get them cast, then I wondered if I could fasten in pebbles weighing about four ounces, and the more I thought the surer I was that I could. So I fastened in a pebble to each corner of the cap by means of a little piece of the cloth. I tear up the cotton in squares just large enough to place the pebble in the cloth and tie around. Then I tie a strong piece of hemp string around it and to the corner of the hay cap. I know of such caps having been in use on a farm near Baraboo for 20 years and they are good to-day. When drawn over the hay in the field they are nearly water-proof. Such cloth when it is wet thickens up and it will turn water like canvass.

The Time to Cut.

Now then, as to when to cut clover to make the best kind of hay. Many farmers wait too long, until the heads are turned borwn, because they say they can handle it easier. That is true, but the ease with which they handle it has been purchased at a price of ⅓ the value of the hay. I have found that by cutting off the clover plant as it began to head that the stalk was full of water, it was very rank, very green.

Then I waited until the head was out in full bloom and cut again, and I found at that stage of maturity that the stalk had commenced to get a little bit pithy; of course at that stage of maturity the honey or sugar is in the plant. Then I waited until the hay was turned brown and I found the stalk was getting hollow, woody; it was fast loosing its feeding value.

So I determined the best time is when it is in full bloom, and we go by that rule.

If you have fifteen acres of clover you will need 350 or 400 caps. If you have fifty acres you won't need more than a thousand.

To illustrate my methods, I will take 15 acres of clover hay, and handle it as if I were at home.

If I were ready to cut I would go out after the dew is off; never put up clover with any external moisture on it, and would cut down enough this morning to make 150 cocks of hay as nearly as we could guess at it; after dinner we cock it up, and put on the hay caps.

Making Hay.

We take no chances on the weather, as soon as it is piled up it is covered. Tomorrow we repeat that operation, the next day the same, putting up each day about 150 cocks. On the morning of the fourth day, if we have had average hay weather, after cutting the usual amount of hay we remove the caps from the hay that was cut the first day. That hay has been through the sweating, and we open it to let it throw out the water

that is in it. In opening that hay up don't tear it all to pieces, and scatter it all over the ground. The hay has settled down, and we take it off in what I call flakes.

We put two rows of cocks into a winrow and in two or three hours of good weather that is perfectly made hay; you have all the moisture drawn out, and you have all the feeding value left in. It does not go through the sweating process a second time in your barn, and it comes out a good color, bright and sweet. Some years it takes longer to sweat out than others.

It is handled in flakes and it makes pretty work of it. The caps taken off this hay cut the first day, will be used on the hay cut the morning of the fourth day, and after that we draw every day, and add as much each day, so we are using 400 or 500 caps each day, but only handling 150 or 200.

Those caps may be used for other purposes. I use them in curing millet and in curing oats cut green for dairy cows.

I don't expect you all to adopt these caps, but I wish some of you best farmers would purchase cloth enough to make a few, and give it a good fair trial so you can determine for yourselves whether I am talking facts or not. I believe this method is practical because it means economy and good sense.

DISCUSSION.

MR. MCKERROW — How deep do you sow clover seed to get a good catch in a dry season?

MR. EVERETT — We have a heavy clay soil. We sow clover seed with all small grains, and we always sow in the spring after the grain has been sown and harrowed. All the covering that clover requires is rolling in our soil. In your sandy soil I am told that clover has to be covered one-half to two inches deep.

MR. FAVILLE — Did you ever know of clover seed that failed to grow?

MR. EVERETT — I never saw clover seed that failed to germinate.

QUESTION — How expensive are those caps?

MR. EVERETT — They cost about six cents by the bolt. Unbleached cotton cloth.

MR. WILCOX — What brand do you use?

MR. EVERETT — It is what is known as "B. B." made at Janesville, Wis.

QUESTION — Do you advise pasturing the clover the first fall?

MR. EVERETT — I don't advise it unless you have a very heavy crop of clover. I would object to pasturing very close where I wanted to save it for hay the next year.

QUESTION — How many caps does it take to cover the hay of an acre of land?

MR. EVERETT — About 75 caps if you are raising three tons to the acre.

MR. WARREN — Do you consider alsike as good as medium clover?

MR. EVERETT — I do not. It is not as good a fertilizer. You can get but one crop of hay from it usually, though it makes good pasture, and makes a good soiling crop.

MR. FISHER — Can you make a first-class quality of clover hay from mammoth clover?

MR. EVERETT — It is coarser hay though it is good quality. It has full feeding value.

MR. CHANDLER — Will your hay caps blow off?

MR. EVERETT — They would blow off sometimes when I used the pins but

since I have used weights they will stand any kind of a wind.

QUESTION — Do you have any trouble raking this green hay?

MR. EVERETT — Not at all. I have to make smaller winrows. A one horse sulky rake will do it nicely. The only time the hay would mold by this method would be when we have 4 or 5 rainy days, then it will mold near the ground a little.

MR. FAVILLE — There is no trouble in raking, but the trouble is in pitching it. All of it that is under the winrow has not been stired by the rake and so sticks to the ground and it is difficult to get it up. This may be largely remedied by double raking I mean by that going twice over the same ground. In that way the hay is all stired and the winrow is left compact. Of course this makes double the work in raking but the time saved in pitching will very much more than pay for the extra raking. And I would add that double raking will be found to pay in any kind of hay as well as in clover.

QUESTION — When will you sow plaster to get the best results?

MR. EVERETT — I have always sowed early in the spring.

MR. GOODRICH — What makes clover hay dusty?

MR. EVERETT — Fermenting and heating in the mow.

QUESTION — In putting up your hay preparatory to covering it with caps, isn't there danger of getting too much?

MR. EVERETT — Yes, the piles should not be made too large. If made small and snug they will sweat out much quicker. I think the piles should contain about from 60 to 70 pounds of cured hay.

MR. MCKERROW — Would you be just as particular in cocking up this hay as if you were going to leave it uncovered?

MR. EVERETT — Just as careful.

QUESTION — Do you think you get as much feeding value out of clover hay, as you would by siloing the clover?

MR. EVERETT — Yes, I believe I get more. Prof. Henry told me at Madison that if it was practical to make hay by that process, he had got done trying to silo clover.

QUESTION — Will it hurt if the hay stays piled longer than you said?

MR. EVERETT — No, sir, sometimes it has to stay 7 or 8 days, and it takes no hurt except where it would weather-color around the outside.

QUESTION — Would you recommend putting salt in hay while you are putting it in the barn?

MR. EVERETT — No, sir, I think it would be an injury. I think it forms a brine and starts sweating, and heating. We used to think that we ought to salt hay to get the stock to eat it. If I had hay that the stock wouldn't eat without that I would sell it.

QUESTION — Do you take the pebbles out of the corners of the caps?

MR. EVERETT — No, just hang your caps up in the tool-house or somewhere, and be sure the mice and rats don't get at them.

QUESTION — Is the second crop worth more for hay than it is to plow under?

MR. EVERETT — Yes, I would prefer to make hay of it, then to make that hay into manure, and put the manure back, than to plow under. The clover root is a great fertilizer, and has a mechanical effect on the soil as well.

MR. MCKERROW — As I understand the clover roots act as a sub-soil plow. Do they do any good as a drainage plant, do you think?

MR. EVERETT — I think the decayed roots afford a chance for drainage.

MR. BURKMAN — Would you sow all clover for a pasture?

MR. EVERETT — We have a permanent pasture of 120 acres that never had a plow in it. I would not depend on clover alone for a pasture, I would sow a mixture of grasses, orchard and timothy, and blue grass, and all kinds for a pasture.

MR BURKMAN — Most of us cut a crop, perhaps, two crops, and then pasture, and then break up, a grain rotation, but we are using all the land for pasture as we come around with the rotation.

MR. EVERETT — In that case you perhaps would have to sow some timothy, but I would use as little of it as possible.

MR. WILCOX — What would you do with the second growth, the second year? Our practice is to plow it under usually.

MR. EVERETT — My practice is to cut it for hay if there is a sufficient amount of it. If it is going to be light we pasture it.

QUESTION — Do you think there is any benefit in ploughing under clover on clay soil?

MR. EVERETT — It has a mechanical influence perhaps, but I would prefer to pass it through the animal system, and put it back that way.

MR. MCKERROW — At what stage would you plow clover under to get the best results?

MR. EVERETT — In full bloom. I will say by our method of making hay we save all the foliage.

MR. ROBINSON — How do you keep up the fertility of your 120 acres?

MR. EVERETT — In that pasture are all kinds of grasses that grow in Wisconsin. There is high land and low land, June grass, red top and all kinds, and the fertility is kept up by the stock on the pasture. It has never been top dressed yet, and never been ploughed?

QUESTION — That could not be considered good land for rotation of crops?

MR. EVERETT — No, it could not be worked, part of the time some of it is a little low, and some of it is stumpy.

QUESTION — Do you get such rank growth of clover as to bother you when you harvest?

MR. EVERETT — We do some years, and it retards the work in drying the grain.

QUESTION — Is it profitable to keep a clover field more than one year.

MR. FAVILLE — No, for the reason that it is a biennial and when it has matured seed its life is gone. I have tried the different methods and have settled upon the plan of mowing only one season (two crops) and then plowing for corn. In this way (in ordinary seasons) we get a good crop of hay and have exhausted largely the life of the plant and it is at its best as a fertilizer and is very likely to die out the next winter.

QUESTION — Is it ever advisable to cut clover the first season after it is sown.

MR. FAVILLE — Yes, when the season is especially favorable for its growth some of it will get so far advanced that it will ripen its seed and that will die out but if the top is cut off it will prevent that and the plant will be saved and then again it is advisable to cut to prevent the weeds from maturing their seeds. The plan of doing this is to set the mower so it will run high and let what is cut fall as a mulch which will be found very beneficial to the young clover for the winter.

QUESTION — Is there any danger of land becoming cloversick?

ANSWER — there is much more dan-

ger of land becoming sick for the want of clover. I trust no one will be deterred from sowing liberally by any such idea.

Q — Do you believe worn out land can be brought to a high state of production, by the use of clover and land plaster?

A — I know it can from my own experience, but all the manure possible should be made and carefully taken care of; good manure applied to a clover sod that has previously had a dressing of plaster and plowed shallow, will yield heavy crops of corn.

Q — Will clover kill out snap-drag or Canada thistles and other noxious weeds?

A — I think not, but it will rid a farm largely of all common weeds. A well clovered farm is generally very free from weeds.

Q — Is it a good way to sow clover by mixing with the grain in the seeder?

A — While some farmers report good results by that method, I believe it is not good economy; it may do on a sandy soil, but on our heavier soil clover seed should not be covered deeper than one-half inch. I believe I can save seed and get better results one year with another to sow by hand, or with some of the machines made for that purpose.

Q — Do you fall plow clover sod for corn?

A — Very seldom. I have found it better to apply the manure during the fall and winter, and plow just before planting, turning under a heavy mat of clover.

Q — Is mammoth clover as good a fertilizer as the medium?

A — Perhaps it is just as good, but I would prefer the medium; the large clover grows a little heavier root, but will not stand as thick on the ground as the medium. I believe I can get more pounds of roots from an acre with medium.

Q — You spoke of curing millet and sowed corn, with hay caps. How do you do it?

A — Millet is very hard to cure. After cutting I let it lay for 24 hours, then put in small piles and cover with caps for about three days, then open to the sun for a few hours, then pile again, putting two piles into one, and cover for two days, when it is ready to stack and will be of extra quality. The corn is cut with reaper and left in gavels for a few hours, then bound, turning the top of the gavel to the center and set in shocks of 12 bundles and the caps put on, in a few days two of these shocks are put into one and the caps put back and left until cured.

Q — Has that sowed corn much feeding value?

A — Not very much for the dairy cow, but it is excellent feed for calves and affords a variety for the cow. I raise it, and millet also, on land after I have taken off a crop of clover.

Q — What is the cost per yard of the cloth from which the hay caps are made?

MR. EVERETT — The cloth costs me 6 cts. a yard.

Q — How wide is the cloth from which the caps are made?

MR. EVERETT — One yard, but if any one wished to go to the extra expense, cloth 1¼ yard wide would make a more desirable cap.

Q — Is it necessary to hem the edges of the caps to prevent them fraying out?

MR. EVERETT — Yes, it should be done.

Q — What will be the cost of the caps when they are all complete?

MR. EVERETT — I think one cent per cap will hem them and furnish strings, pebbles, etc. Making total cost 7 to 7½ cents per cap.

SCIENCE AND THE CLOVER PATCH.

By PROF. W. A. HENRY.

Fertility.

In a section like this, the subject of fertility is one of the very highest importance. To keep the land to a high state of fertility with barnyard manures is out of the question, because there is not enough of it. Commercial fertilizers are high priced, and beyond consideration where the crops sold from the land do not bring extraordinary prices. How, then, to keep up the fertility of our fields, is a most serious consideration. The value and importance of clover for this work calls for most careful consideration at our hands. Every farmer who has experimented with a field of clover, knows that when he has taken off a crop of hay, the land for some reason, is still in better heart than had no clover been grown. The condition is very different from that which prevails where a grain crop or even a corn crop is removed. In fact, there has always been a mystery about the clover plant which seems to bless the soil upon which it grows, though how and why has seemingly been beyond finding out.

The First Experiment Station.

Nearly half a century ago, John Lawes, an English manufacturer, became interested in agriculture, and established an experiment station out of his own private funds. One of the first problems taken up was a study of the clover plant. An investigation was made by the chemists of the station; Gilbert and Pugh discovered this fact, that in an ordinary clover crop, several hundred pounds of nitrogen was removed in the hay drawn away from the field, yet if the upper six inches of soil is analyzed before and after the crop is grown, there still is as much, if not more nitrogen in this upper layer than before the crop was removed. Where does this extra nitrogen come from, and how is it gathered? Their studies seemed to show that no nitrogen could be taken in by the leaves of the plant, though four-fifths of all the atmosphere is nitrogen. As a tentative conclusion, their results seem to indicate that the nitrogen must come from the sub-soil, and that the clover plant simply transferred it from deep in the soil to near the surface. This explanation was not at all satisfactory, and it was left to a German by the name of Helriegel who has made a most wonderful discovery. To be brief, it is this; that on the roots of the clover plant there are little knots or tubercles. In these are minute organisms,—living things, these microscopic creatures have the power of taking nitrogen from the air and turning it over to the clover which grows thereon, and these plants upon dying and decaying in the soil, leaves the nitrogen in available form for succeeding plants.

Nitrogen in Clover.

It would take too long for me to enter into the details of this patient student's

work, but it has all the fascination of a novel about it. He found that if clover seeds were planted in several different flower pots in sand from which every particle of vegetable matter had been burned or washed out, that the little clover plants springing up would grow for awhile, if watered with pure water, but that after a short time, they would die, seemingly for the want of nitrogen. If to these starving plants he added a little water in which soil taken from a clover field had been stirred, that this water, though looking pure, carried to the plant organisms, which attaching themselves to the roots, formed the tubercles, and from that time if the plants were watered even with pure water; they would start ahead and make an entirely satisfactory growth. He found these same tubercles with organisms within, on all of the leguminous or pod bearing plants, such as the clover, pea, bean, etc., but found none upon the roots of the cereals, oats, wheat, rye etc.

Nitrogen is one of the leading elements in the structure of the plant, and without it no plant growth is possible. Phosphorous and potash are also elements often lacking in the soil, but usually there is a large quantity of both these minerals there, only they are not always in the most useful or immediately available form.

Gardners and others who buy fertilizers, pay a price not less than sixteen cents per pound for nitrogen. Now the scientist has shown us that the leguminous plant, especially our common seed clover, if given the opportunity, will gather this nitrogen from the air and stir it up without charge, and at last we have an explanation of the beneficence of the wonderful clover plant. It has taken science a long time to find this much out, but time and patience has at last accomplished this great work.

Sow Clover Seed.

With renewed confidence, then, I come to you again to urge that you place large faith in the clover plant. Keep it growing upon your farms wherever possible, and make all the use you can of it, for even though you remove the crop, the roots and leaves which fall to the ground are rich in nitrogen. Grow just as much clover as possible, at all times sowing seed with every spring grain crop, even if the young plants must be plowed under in the fall. The first time you visit a clover field after this talk, I hope you will dig up a plant and observe the little knots upon the roots. Within these are living organisms, almost infinitely small, each of which is working to gather the expensive nitrogen from the air, and turn it into a nitrogen compound that the coming plant can use and so aid in keeping your fields fertile.

GRAIN RAISING.

By HARRISON COLE, Waterloo, Wis.

There is no branch of farm industry that has occupied the time and attention of more men than that of grain raising. And when thought, intelligence, and right methods are brought to bear, it has been, and will continue to be, a profitable business. But when wrong methods have been adopted, it has proven the bane of those engaged in it.

Quick Returns.

The quick returns of exclusive grain raising have been so fascinating to many farmers, that from year to year they have continued to sell their farms by the bushel, until the transaction ceased to pay expenses, and in balancing up accounts, too often have had to put a mortgage on their once fertile acres. Young men may not be aware that forty years ago it was a common expression that the more fertile parts of Wisconsin were so rich in natural deposits that they would never need any manure, and it was not an uncommon thing for men to move their log stables, because they could easier do that than to move the pile of manure that had accumulated around them, and that the burning of straw stacks was of common occurrence. These wasteful practices, I am glad to say, have been mostly abandoned, yet there are but few farmers that husband their manurial resources as closely as its importance demands.

The Farmer's Bank.

Grain raisers should remember that fertility is the farmer's bank, and that in order to have their checks honored, they must make liberal deposits, and that the value of these deposits is not determined so much by their bulk or heft as by their quality, and in order to have them represent a gold value, a large share of the grain raised on the farm must be fed there in connection with good hay and the refuse of the grain crops. I know of no practical way of successful grain-raising disconnected with animal industry. In fact I am personally acquainted with farms that have had but few animals kept on them for the last forty years, that are selling less grain per acre than others that are keeping a large stock of animals, leaving the returns from the animals clear profit.

A farmer's wealth cannot be reckoned by the number of acres he tills. A few acres well tilled may yield a handsome profit, while a large acreage may, and often has, with indifferent tillage run the farmer in debt. A good many reckon their thoroughness by the amount of time they spent on a field; while this may be true to some extent, right methods intelligently applied are of more importance. When manure first began to be valued in my neighborhood, we were terribly afraid of evaporation, and as soon as possible after drawing out manure it was plowed under as deep as possible. The growth from this to surface applications was slow, yet we have arrived at the conclusion that it is better to keep the manure at or near the surface, and we get double the benefit from the same amount that we formerly did.

Be Thorough.

Often for the want of a little more thorough work in putting in, and caring for a crop, we have to content ourselves with half a crop; if we can double the crop, we often more than trebble the profit, the extra expense being but little. I presume there never was a farmer that did not some time have this fact forced home upon him.

Poor Seed.

The loss to this country from poor seed, can never be ascertained, but beyond doubt it is much more than the most of us realize. The difference between a bushel of seed corn that throws out a strong healthy sprout, and one that throws out a sickly sprout after water gathers around the germ, is at least ten dollars per bushel to the one planting it. I apprehend that the running out of small grain, that so many complain of, is largely due to imperfect seed. Grain that has heated is more or less impaired for seed. To avoid this we should let our grain for seed get thoroughly ripe, stack it in small stacks or put it on a scaffold when dry. The amount of injury it receives from machine threshing I am not prepared to say.

It is impossible to farm against seasonns. The rule that works satisfactorily one year, may be a total failure another year, owing to climatic conditions, which with our present knowledge, it is impossible to forecast.

Rotation of Crops.

Each farmer should formulate a rotation of crops which he thinks best suited to his soil, climate and circumstances, and keep a close eye on the most prosperous farmers in his neighborhood, to see if he cannot improve on his methods. Having adopted a rule that is suited to you, do not be too prone to censure those that do not agree with you. We have a great variety of soils, and the rule that works well on one soil, does not apply on another.

On my farm, which is a clay loam, I have adopted a four years' rotation as nearly as possible. First medium red clover, mown twice for hay. I then cover that with manure, and plant it to corn. If I wish to plant more corn next year, then I mow clover this year, I try and sow my oats next to my clover field, and manure the oat stubble and plant it. I like to spread manure on my next years' corn ground in the fall and early spring, and let it lay as long as I can and get my corn planted in season. I then put all my teams at work on my corn ground; if the clover has a good start, I like it all the better, turning it and the manure nicely under, and as soon as it dries off a little, I drag it down close up to the plows; this helps to retain the moisture.

Plant within three or four days after plowing, I have always planted in check rows, though I believe more corn can be raised in drills if it could be kept clean. I like to drag corn if it is reasonably dry, but in wet seasons I have known dragging to be a positive damage to it. I follow the corn with two or three crops of small grain, always sowing clover with my small grain, pasturing on my stubble fields (which I do not wish to mow the succeeding year), with sheep, and as they eat most kinds of weeds, it helps to keep said weeds in subjection; the clover also furnishes a couple of months of nice pasturage for my sheep, keeps the ground full of roots which prevent the soil washing and adds to its fertility. With wheat I have better success sowing it with a drill after the ground has been well prepared. But

with oats and barley I see but little difference between the seeder and drill.

If it does not rain soon after sowing grain, I like to roll it to bring it up evenly. Grain of all kinds that I do not wish for seed, I like to cut a little green.

To Recapitulate.

1st. To retain fertility is the first requisite to successful grain-raising.

2nd. It is impossible to retain the fertility of a farm not connected with animal industry.

3rd. The more grain we can profitably feed our animals, the better we feed the farm and the better the farm will feed us.

GRAIN RAISING.

GEORGE MCKERROW, Sussex, Wis.

Experience.

Mr. President, Ladies and Gentlemen: I shall talk to you a few minutes on this subject from my own experience, not because it is better or more extended than that of anybody else, but because I can talk from that standpoint more intelligently.

I was born and brought up on a Waukesha county farm of eighty acres pretty well covered with stones, brush and a mortgage, upon which my father succeeded in raising from five to seven bushels of wheat to the acre about the time that I began to take an interest in farming.

We found after some years that by changing the system and rotating with clover, keeping stock and feeding the land with manure, we got it into better condition so we could raise better crops.

I prefer to talk of grain raising in rotation. In the first place we want good rich soil, then give it good tillage, sow good seed, handle the crop well after it grows, and get as much money out of it as we can. I agree with Mr. Convey that earlyfall plowing upon our clay soils gives us the best grain crop. I have a theory that early fall plowing destroys weed seeds to a certain extent, also allows the soil to breathe more freely and the action of the elements, moisture frost and sunshine, causes more of the fertile elements in the soil to become soluble or available for plant food.

A Good Seed Bed.

In the spring of the year we strive to make a seed bed upon the surface about two inches in depth, rather less than more. The surface should be fine and level, then we are ready to sow the seed. We prefer to set our seeder teeth so that they slant back, that they may dig no deeper than the two inches that has been pulverized; we think we get our grain at a more even depth and it germinates more evenly. We follow the seeder with a fine smoothing harrow, and that with the roller unless this particular piece of ground is of a heavy clay nature which will cause it to run together after a storm.

Then we follow the rolling with a smoothing harrow again to leave it in a little more broken or rough condition. The advantages of rolling our land we think to be that it makes the soil more firm, and also causes the retention of more heat and moisture, and these two

elements are necessary to germinate the seed and give the crop a good start.

Those results have been observed by students of the experiment station in different parts of the state and proven by experiments at the station. Our rotation is clover, corn, and small grain. As we do not plant corn enough to use up all our clover sod, we have clover, oats, winter wheat and clover again. A dry season comes in and throws us out of this rotation sometimes, but we follow it as well as we can.

Use Good Seed.

Now, many farmers make the mistake of arguing this way: "I have some good grain that will bring a good price on the market; I will sell that. I have some poor shriveled grain that grew down on low ground. I will keep that for seed." It is a great mistake. It is a very true principal in both animal and vegetable growth that "Like begets like," and if we sow poor seed we may expect a poor crop. Again in selecting our seed, we should strive to select it from a field that has been uniform in both quality andquantity.

When we have this seed let us clean it thoroughly. I used to think when I was a boy, and my step-father kept us cleaning seed grain after it had been cleaned two or three times over, that he did this to keep us out of mischief, but I have concluded that he was right about this thorough cleaning.

A Change of Seed, and Sowing Salt.

I now believe that a change of seed grain is a good thing except seed corn. I have fooled away considerable money in trying to get some kind of seed corn that would make a better crop than the kind we already had, and I have not succeeded in getting any that does better than seed that has been grown here for years.

When our crop is sown we should try to encourage its growth all we can. We favor sowing salt upon our small grain from the action that it has upon the soil. It has been demonstrated that soil with salt sown on shows more moisture per acre than without the salt.

It is argued by scientists that salt breaks down the silica in the soil, and makes it fit for plant food. This silica is the element which gives stiffness in the straw, and firmness to the grain. When the country was new our grain crop would stand for days after it was ripe, but now, before it is ripe it turns white instead of yellow, the straw instead of being glassy is rough, and it krinkles down before it is ripe, and we find salt helps these troubles. We sow clover with nearly all our small grains except where they follow clover. We sometimes drag these pieces and we think it benefits them, but I believe that spring wheat and winter wheat are benefited more than any other kind of grain by being thus dragged.

It is certainly true on our heavy clay land. We first discovered the benefit of salt upon our soil by salting some patches of Canada thistles to kill them off. We found wherever the salt had been put on, the grain stood up with stiffer straw and longer heads. We thought at first the sheep had been attracted to those spots, and had deposited more manure, and so made the soil better, but we experimented on other places and found it was the salt that gave stiffness to the straw.

Early Cutting.

There is another place where we, as farmers, are apt to make a mistake, and that is at the time of harvesting. I believe in cutting our grain crop a little on the green side, when the kernel is in a thick doughy condition. At that time

we get more feeding value in the grain, and in the straw, and we have found during our dry seasons when hay was scarce, that there was some feeding value in straw. In cutting it early we must observe a few principles. We are nearly all cutting with the binder and we try to get ahead of the twine trust by making large bundles and tying them tight, but we cannot do that and get the best results. Make the bundles small and tie them loosely. We drop our bundles in winrows in the field when we are cutting in dry weather; we leave these bundles four or five hours, and put two men in the field in the afternoon to set them up. We put them up ten bundles in a row with two cap bundles on top, but if it promises to be dry weather right along we set twelve bundles in a row, and allow them to stand that night and the second day, and on the second afternoon we cap them with two from the end of the shock. If we cap right away we find the center is a little brown, and this will make a difference in the price on the market.

We have found in hauling in our grain, particularly in the barley crop, that it pays us to divide these shocks and allow them to dry for an hour or two; it prevents an undue sweating in the mow or stack, which should be avoided.

DISCUSSION.

MR. FISHER — How much salt do you sow to the acre?

MR. MCKERROW — From 150 to 300 pounds, sowing it from the hind end of our lumber wagon which saves our muscle. Where we have sowed clover with our small grains we always sow plaster with our salt, fifty to seventy-five pounds of plaster with 150 pounds of salt per acre, and we sow the salt as soon after the grain sowing as we can.

MR. OLSON — You say you sow clover with you grain?

ANSWER — Yes, sir.

QUESTION — Do you believe in packing the surface?

MR. MCKERROW — Yes, the best piece of spring wheat I ever saw grown was where a flock of sheep had tramped all over a field after it was dry in the spring. That field of wheat raised thirty bushels to the acre.

MR. FAVILLE — How much do you sow to the acre?

MR. MCKERROW — When I sow wheat alone I sow about a bushel and three pecks to the acre. For several years I have been sowing for feed about ⅓ wheat and ⅔ oats. It makes good feed I sow about 2 bushels of this and 2½ of oats.

MR. CHANDLER — What time do you consider early for fall plowing?

MR. MCKERROW — August and the first half of September. It will do very well until September or even October if the ground is dry.

MR. CHANDLER — Won't the dragging after the grain is up kill the clover?

MR. MCKERROW — I said I only dragged where I did not sow clover.

MR. CONVEY — Does not cutting grain on the green side cause a deterioration of the seed?

MR. MCKERROW — I said it should be in the hard dough state. I believe there is substance enough in the stalk when this grain is put up properly to fill up those portions and bring them to their best condition. We get the most weight at that time. I don't want to cut it so green that it will shrivel up.

MR. BURKMAN — Must you not sow heavier when sowing broadcast then when sowing in drills?

MR. MCKERROW — I think that less seed will do with the drill.

MR. BURKMAN — This question of dragging small grain is entirely new to me. How much would you drag?

MR. MCKERROW — That will depend entirely upon the condition of the soil. If the soil is somewhat mellow so that the drag takes hold of it freely I would only drag once and I drag with a light smoothing harrow, not one that has large teeth. If the ground is pretty hard we drag twice. I start in one corner of my field and go diagonally across it. Then cross over this way [illustrating] and when I get through I have been twice over it.

MR. EVERETT — On poor soil would you sow thick or thin?

MR. MCKERROW — I would sow a little thicker.

MR. WILCOX — I have been told since I came here that it was injurious to plow under clover. I tried it on a piece of old condemned land that had been unused for 30 years, sandy soil and found it of great benefit. I got 9 bushels of No. 1 winter wheat off the land.

MR. MCKERROW — I would prefer to have the clover made into manure with stock.

MR. OLSEN — In driving a team over your field don't you cover up the plants, and destroy them?

MR. MCKERROW — Not to any great extent. We use the roller twice in putting in the grain. I have a little gang plow and where the soil is pretty compact, after our spring and fall rains we run it over before seeding, then roll pressing it down and leaving it level and fine. We sow the grain and roll again. The soil being compact the team don't make much impression.

QUESTION — How many bushels of oats do you raise to the acre?

MR. MCKERROW — We have raised as high as eighty-six, and as low as — well, I won't tell you, for it's not small crops we are striving for.

MR. RICE — Did you say you would sow more seed on low lands than on high?

MR. MCKERROW — Not low land. Poor land, I said.

MR. RICE — I find on heavy soils I could seed very heavy, and I could keep it from getting down.

MR. FISHER — I have studied on that point. I keep my land in pretty poor condition, but I have always found that I could seed heavier and get a bigger crop.

MR. MCKERROW — I was talking about land that is all in fair condition. How heavy do you call heavy seeding?

MR. FISHER — I put on 2 bushels.

MR. MCKERROW — I agree with you there.

MR. FISHER — Have you ever sowed land plaster on grain with the idea of finding out whether it benefited your grain?

MR. MCKERROW — We have years ago, and we concluded it was of but little benefit to the grain. When we sow in combination with salt we find good results.

MR. FISHER — That is my experience too. I sow salt and plaster now every time I sow grain.

MR. WILCOX — About 10 years ago I had a piece of wheat and oats mixed, and it was looking decidedly yellow. I had heard them say plaster would show a big difference in the color in 5 or 6 days. I went to Berlin and bought some and as I was going away from home I told my son to watch that grain to see how long it took to change the

color. I came back in about a week and I found it looking remarkably well. I asked John how long it took before it got there, and he said 4 or 5 days.

MR. NICHOLS — With land in a good state of cultivation, what kind of oats will I sow to pay the best, and how many to the acre?

MR. MCKERROW — I have been a long time seeking for a kind of oats that would stand up well, and I found one kind — the English Prolific, but they ripened very late giving me only about 32 pounds to the bushel while my white Belgian weighed 40 pounds. I never found a good yielding oat that would stand up well, but I sow spring wheat with my oats and that helps to keep them up, and I think they dry out better in the shock.

MR. BURKMAN — Did you ever leave your clover, and sow it, and drag it in when you dragged your grain?

MR. MCKERROW — We have done that, but with clover we get the best satisfaction from sowing as early in the spring as we can, and covering it a moderate depth.

QUESTION — Have you ever rolled it after it was dry?

MR. MCKERROW — We have, but generally roll it now as part of the seeding operation following the smoothing harrow.

QUESTION — How much wheat do you sow with your oats.

MR. MCKERROW — We mix the oats, and wheat together on the granary floor about ⅓ wheat and ⅔ oats by measure. I have a neighbor who has sowed half, and half for the past twenty-five years, more or less and has separated them with a fanning mill.

QUESTION — What kind of spring wheat do you sow?

MR. MCKERROW — It is generally termed the Lost Nation or Judson in our county.

QUESTION — Would you expect to get a good crop from land that was deficient in lime?

MR. MCKERROW — Certainly not, if it was deficient to that extent that there was not soluble lime enough to make a good wheat stand.

MR. BURTON — How long have you used your three gang plow?

MR. MCKERROW — About twelve years. It was made at Harriston, Ont. We use it simply in place of the cultivator when the soil is very hard on the surface.

MR. BENTON — It is used on the lake shore. They plow two or three times.

SUPT. MORRISON — The plow Mr. McKerrow speaks of is an English plow. We have better manufactured in the United States.

MR. MCKERROW — I had the first one that was brought into our county.

QUESTION — Is salt a preventative of the ravages of chinch bugs?

MR. MCKERROW — We think down in our county that it helps considerably in keeping down the ravages of the bug. Last season our salt gave out before we got the whole field salted, and the bugs worked right up to the line where we sowed the salt and the oats were down, of course, while just over the line where we sowed the salt they stood up fairly well.

MR. ROBINSON — Don't you think the clover helps that too?

MR. MCKERROW — Probably in some seasons. Still I don't think it is a cure-all.

MR. WILCOX — Eight years ago last summer I had a field of wheat sowed heavily with clover, and there were no bugs in that field, while right over the fence my neighbor's field was full of them.

MR. FISHER — Isn't it your experience that grain is shorter where you sow salt.

MR. MCKERROW — Where it is salted it stands up the highest with us.

MR. FISHER — I have always found it shorter. I have always considered that salt was a detriment to the growth of the stem and the leaf, but it was a benefit to the seed and the kernel.

QUESTION—How can you prevent smut on wheat?

PROF. GOFF — Two distinct species of smut attack wheat. In the "black smut," the entire head is changed to a black dust. In the "stinking smut" or "bunt," the smut is inside the kernel.

In order to have a crop of wheat free from smut, both the soil and the seed must be free from smut spores. Wheat should not therefore follow a smutted crop of wheat for one, or better for two or three years, and manure from the straw from a smutted wheat field or from stock fed on smutted straw or grain should not be used on land intended for wheat. Seed wheat known to be free from smut may be safely used without treatment; otherwise the seed should be treated before sowing.

For the treatment, dissolve ten (10) pounds of sulphate of copper, also known as blue vitrol and blue stone, in eight (8) gallons of water placed in a tub of convenient size. As this substance dissolves rather slowly, it is well to add it to the water the day before it is desired for use. Pour as much of the seed wheat into the solution as the liquid is able to cover readily, and stir until every kernel has become thoroughly wet. Whatever rises to the surface should be skimmed off. Then pour off the solution into a second tub, and spread the wheat on a floor to dry. More grain may then be added to the solution, and the process repeated until all has been treated. The grain should not be permitted to remain in the solution longer than five minutes.

It has been found that the treatment here described injures to some extent the germinating power of the seed, and experiments have shown that if wheat thus treated is afterward immersed for a short time in lime water, this damage is largely averted. It is recommended, therefore, that all wheat treated to the solution of blue vitrol be sprinkled with air slacked lime as it is removed from the liquid, and then shoveled over sufficiently to thoroughly coat each kernel with the lime dust. This will prepare the grain for sowing without much further drying. If the slacked lime is not at hand, land plaster or road dust will hasten the drying equally well.

As the wheat will swell somewhat in consequence of being wet, the amount sown per acre should be slightly increased.

NOXIOUS WEEDS.

By W. H. COLE, Waterloo, Wis.

Mr. Chairman, Ladies and Gentlemen: There is no subject more worthy the attention of farmers than that of noxious weeds, and few of us have given the subject the study we should.

The time is not far distant when we are going to spend more time to raise a partial crop, than it will take now to clean out those weeds from our state if we will make united effort in that direction. I have visited some parts of this state where the coming crop is going to be half Canada thistles, and the land is selling for $10 to $20 an acre less than if those weeds were not there. Unless we wake up to the necessities of the case, our state is going to be run over with them.

The Burdock.

The first weed I shall speak of will be the burdock. I find the general idea seems to be that the best time to cut the burdock is after the blossom is out This comes at a busy time, and the weed is generally very imperfectly cut, and they immediately propagate themselves. I have come to the conclusion that the best time to cut a burdock is the first time you see it.

The Cockle-Burr.

I next bring up for your consideration the cockle-burr, showing sample. This weed is not as bad as some others, and does not grow in many places, but it is better to know what it is, and declare war against it.

Velvet Leaf or Stamp Weed.

The next I speak of, many of you are not acquainted with yet, and yet it is creeping into our state, and the man who gets five acres of it seeded into his land will never live long enough to be rid of it. The seed has been known to live in the ground 25 years. It is the velvet leaf or stamp weed and there is no way of getting rid of it except pulling it out. The seed is heavy, does not blow around like the Canada thistle, but will lay in the ground and not come up till it strikes favorable circumstances. It appears about the first of June, and grows very rapidly and very high and throws out branches, and fills your ground full of seed.

The next is snap-dragon, or toad flax, and the sow thistle, weeds that propagate themselves from the root and seed. Get rid of them.

The same remedy that will rid your farm of Canada thistles, will also kill the snap-dragon and sow thistles, and as I shall give the best remedy I know of for killing the Canada thistles, you can apply the same rule to these pests.

Canada Thistle.

Next is the worst weed, all things considered, that we have to deal with for the reason that it spreads itself over our country so easily. There is a mistaken idea that Canada thistles don't take kindly to the soil.

I had a patch that I worked with, and didn't know how to get rid of, but I worked at them and made some stir, and the result was I was appointed thistle commissioner. I objected on the ground that I didn't know what to do with my own. I wished them to appoint a man who had had experience. They said "You make up in enthusiasm what you lack in knowledge; we will keep you right there." I took samples of this

weed and went around over the country and wherever I went I showed them to the boys, and the old men, and to everyone, and the result was I found thirty patches in our town, and there was not one in ten of those men knew he had the Canada thistle in town, and one patch covered some nine or ten acres. I found that every one had his own remedy. One thought to salt them, another to mow them off, another to put brine on and so on. I let each one do as he wanted but insisted on their being thorough in their work. If you will keep right after them, cut them down and burn them, then watch for the young sprouts and do it again, you will finally gain an advantage. A man who had had a patch of ten acres of them and had cleared them out this way told me he considered his farm worth $1,000 more than it was before they had been removed.

Death to the Thistles.

If I had a patch of Canada thistles, I would turn it into a pasture and salt my stock on that lot at least twice a week and I would cut off at or below the surface what I didn't salt. If I could not turn it into pasture, I would have a sharp plow, and plow it, and drag it thoroughly after it was ploughed with a fine tooth drag. Then the first thistle you see come up, put your plow in there and plow it up. Don't let them get up, they are carrying vitality back to the root and you are losing all that you have gained. If you will follow this up thoroughly you may kill them out in a year, and are very sure to in two years. You will have to keep that part of the field separate from the rest, and keep right after those thistles. I dug mine out twice a week with a spade. In the fall of the year the weeds come up thick, and for fear I might miss some I put the plow in and ploughed it up again and killed them the first year. Kerosene will kill them, and salt in a wet time will kill them. Brine will kill them.

Appoint a Weed Commissioner.

I wish every town that is represented here would see to it next spring, that there is a thistle commissioner appointed in that town and get the man who has got the most gimp in him. If possible get a man who doesn't want and never expects to hold any other office. Then stand by him and demand that the law shall be thoroughly enforced, and if you succeed in keeping these Canada thistles outside of the state, your children will never have occasion to thank you more heartily for anything than for that one act.

DISCUSSION.

QUESTION — How deep do you cut the burdock?

MR. COLE — Two or three inches below the crown. There will be a dozen more ready to come up but it will kill that one.

MR. CHANDLER — What is the differance between the snap-dragon and the yellow-dock?

MR. COLE — Yellow-dock resembles a beet in leaf and seed, snap-dragon has a down in connection with its seed. Prof. Henry says that like Canada thistles the only way is to pull it up or to cut it off.

MR. THOMPSON — Isn't it easier to kill burdocks the second year than the first?

MR. COLE — When they first come up they only run down two or three inches and then is the easiest time to get rid of them.

QUESTION — Describe sow-thistle.

MR. COLE—I supposed that I knew what sow-thistle was, but Prof. Henry says that it propagates itself from the root the same as the Canada thistle. It belongs to the milk-weed family. The seed blows over the country, so if you find something of the milk-weed family that propagates itself from the root you may call it the sow-thistle.

MR. HYATT—Isn't there a difference in soil in regard to killing out Canada thistles, by mowing them?

MR. COLE—We find that a gravelly loam is the hardest place to kill them out. We also find that in the ground next to a marsh we kill them easily.

MR. FAVILLE—Will not burdock grow when cut off below the crown?

MR. COLE—No, but in loose rich ground the crown forms several inches below the top of the ground, and unless it is cut off below the crown, it will grow.

PROF. GOFF—I am glad this subject has come up, for it is a very important one to Wisconsin farmers. Almost all of our noxious weeds have come to us from foreign countries, and many that have invaded, and we may almost say conquered, the older states of the east are just coming to us in their westward march. By taking the proper stand, and maintaining a vigorous fight against these pests, we may keep them from our farms for a long time if not indefinitely.

The Cocklebur.

I wish to call attention to some of the weeds that seem to be just gaining a foothold in our state. One of these is the cocklebur of which Mr. Cole has just spoken. I think Mr. Cole speaks of this too lightly. In Illinois it is regarded as their most serious weed. Two years ago in September, while visiting in Champaign county, Ill., I saw men going through the stubble fields and even the corn fields, and carefully cutting out every cocklebur. When it is remembered that the farmers of that state do not think it necessary to hoe their corn, we may be sure that they must regard a weed as pretty serious that compels them to go through their cornfields and cut it out in September.

The Sow Thistle.

The sow thistle is a more serious pest than many suppose. In the summer of 1890, I visited the farm of Ex-Senator Lochen. near West Bend, Washington county, and an examination of some of his fields convinced me that the advent of this weed into our state is a serious calamity. Mr. Lochen is satisfied that it is a worse pest than the Canada thistle, and I am by no means sure that it is not. More recently I was shown a small patch of this weed in the garden of Rev. J. P. Roe, of Oshkosh, and I advised him to dig out every root of it, if it cost him $100.

I will add that there is an annual species of sow thistle that is not to be feared, as it does not propagate from the root. There is also a species of wild lettuce that many have mistaken for the sow thistle, and which bears a rather close resemblance to it in its general appearance. When you see a plant that you suspect may be the sow thistle, dig it up and examine the root. If you find it sending out little white underground stems, about as thick as a wheat straw, the plant had better be taken care of at once.

The Quack Grass.

The quack grass, or couch grass, *Agropyrum repens* is another serious pest that is silently creeping into our farms. It is to be placed in the same category with the sow thistle, Canada thistle and snap dragon, so far as treat-

ment is concerned. Mr. Cole's remedy is all right if persistently followed, and no remedy followed in any other way is worth a farthing. Another weed that we should look out for is

The Wild Mustard,

or charlock, *Brassica arvensis.* This is the bright yellow flowered weed that is so often seen in oats and barley fields in June. It is nuisance because it not only robs the soil of moisture and fertility, but the seeds, which are often threshed with the grain, give the latter an unclean appearance. It is easily cleaned out of the field by pulling the plants while in blossom, and when once the field is freed from it, no grain containing mustard seed should be used for sowing.

Corn Cockle.

While speaking of the mustard, it will be well to mention the corn cockle, *Lychnis Githago.* It is this weed of which the seeds form the cockle so often found in wheat, and which injures the quality of the flour when present in much quantity. I speak of it here because I infer from the number of samples that have recently been sent to our station for name, that it is just invading some parts of our state. It should be treated like mustard. Its flowers though very showy, are less conspicuous than those of the latter plant, since they do not appear above the grain.

Pitchforks.

The beggar's ticks or pitchforks, *Bidens frondosa*, should be fought, for though it is already with us, and has undoubtedly come to stay, its forked seeds, which attach so readily to the clothing and the hair of animals, make it an intolerable nuisance. It is an annual plant, and if not allowed to seed, cannot perpetuate itself.

The beautiful oxeye daisy *Chrysanthemum Leucanthemum* is a plant that it seems almost a shame to place in the category of noxious weeds, and yet its prevalence in upland meadows and pastures often makes it a serious pest. It is a perennial, and so is not very easily eradicated without breaking up the soil. It quickly succumbs, however, to clean culture with hoed crops.

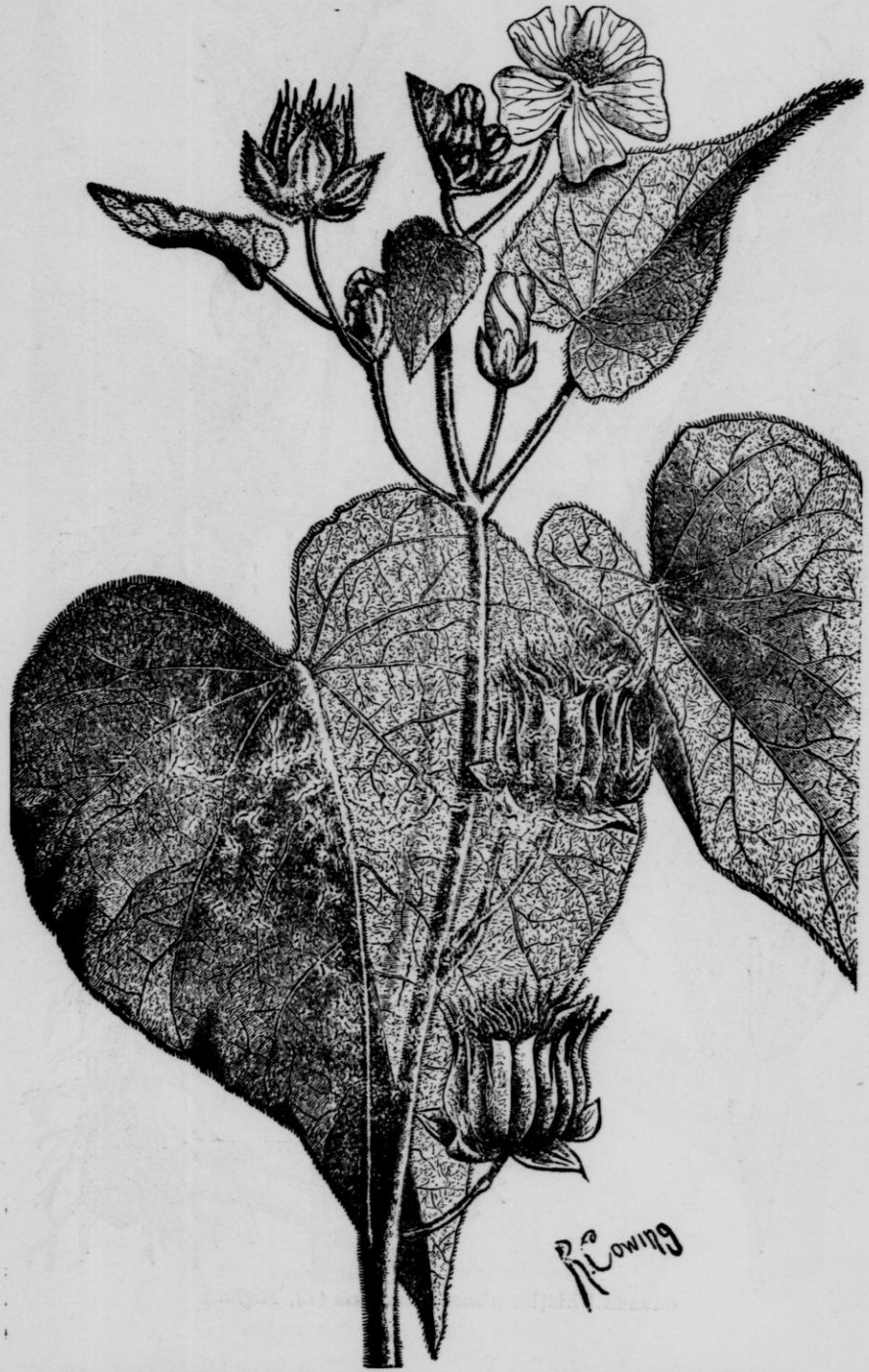
One more hint, and I am done. All farmers do not understand the value of a very wet soil as an opportunity for killing weeds. In a rainy period, while the soil is saturated with water, many deep rooting weeds may readily be pulled out by the roots, that in a drier time would break off just below the surface. I have seen a thick patch of wild carrot and wild parsnip cleaned out in this way that had resisted all other methods. I would recommend trying this for all deep rooting weeds, and especially for those that are not readily conquered in other ways.

To aid in identifying some of our most serious noxious weeds, illustrations are presented on the following pages.

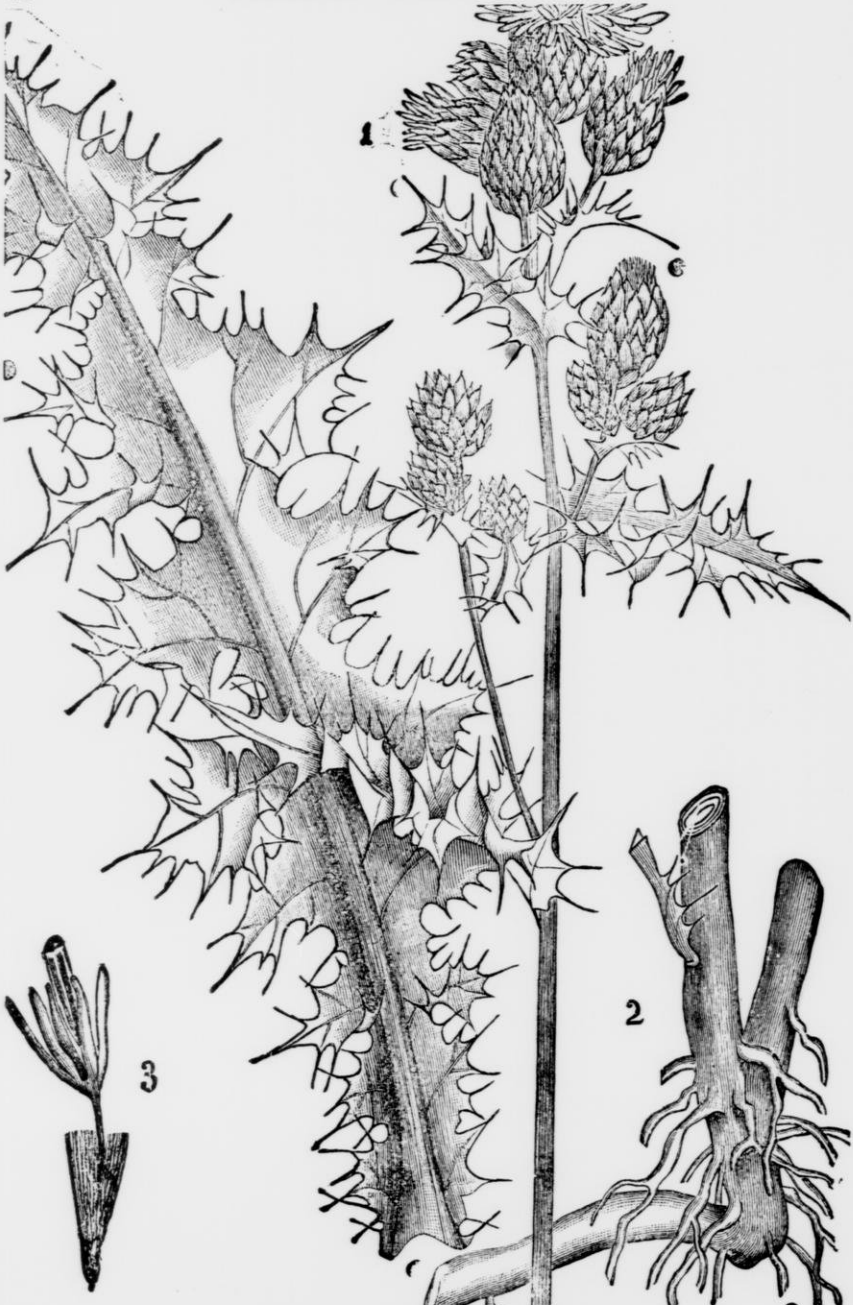
Oxeye Daisy.
(*Leucanthemum vulgare.*)

Burdock. (*Arctium Lappa, L.*)

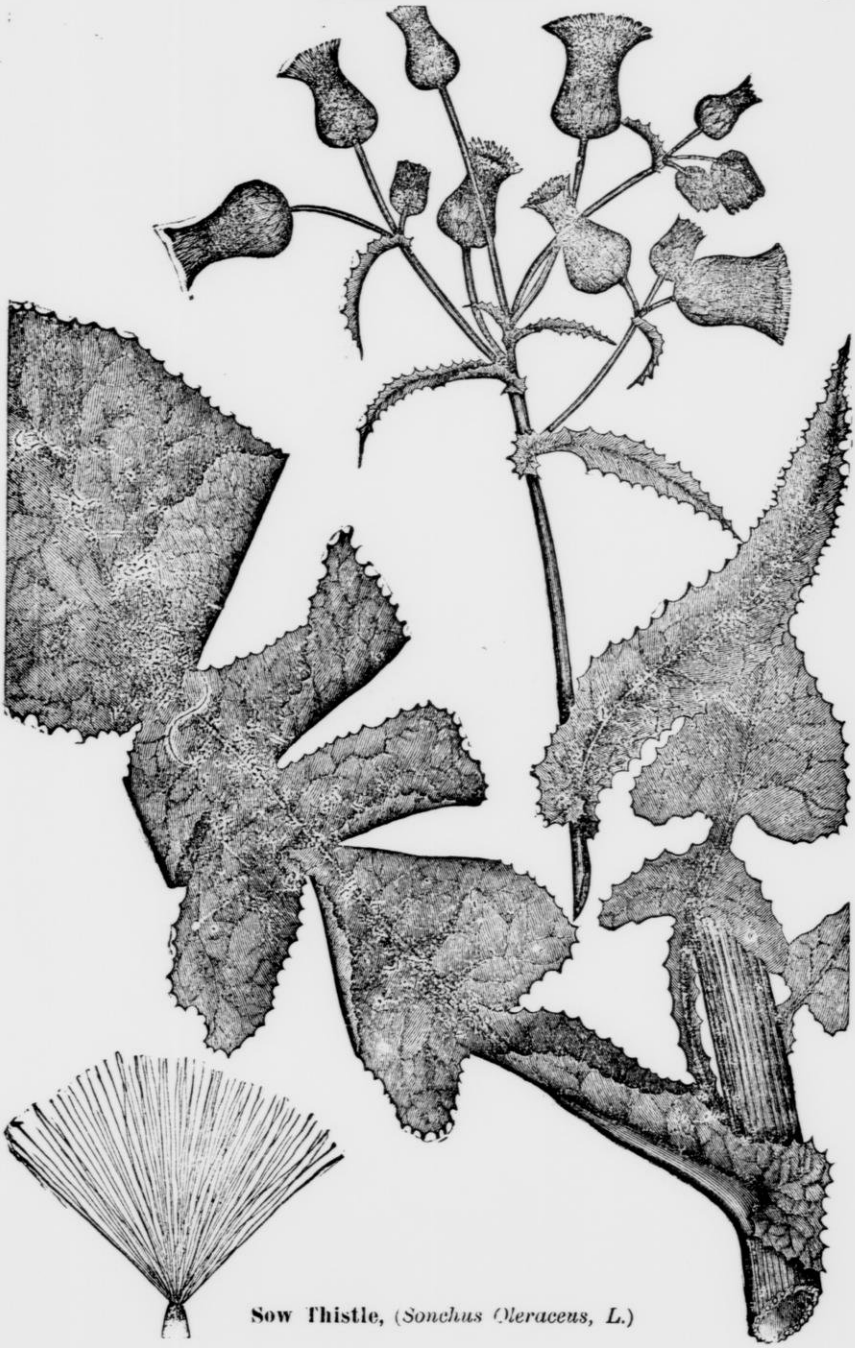
Cockle Bur, Clot Bur. (*Xanthium Canadense, Mia.*)



Velvet-leaf, Stump-weed, Indian Mallow. (*Abutilon Avicennae, Gaert.*;



Canada Thistle. (*Cincus Arvensis* (*L*), *Hoffm.*)



Sow Thistle, (*Sonchus Oleraceus, L.*)

Couch or Quack-grass, (*Agropyrum repeus.*)

Charlock, or Yellow Mustard, (*Brassica Arvensis* (*L.*) *B. S. P.*)

Cockle, or Corn Cockle, (*Lychnis Githago* (*L*), *Lam.*

5 Beggar's-ticks, Pitchforks, (*Bidens frondosa. L.*)

Toad Flax or Snap-dragon, (*Linaria Vulgaris.*)

EVENING SESSION—MARCH 17th.

The Institute met at 7:30 P. M. Sup't Morrison in the chair.

THE FARMER'S FOURTH-ACRE FRUIT GARDEN.

By M. A. THAYER, Sparta, Wis.,

President of Wisconsin State Horticultural Society.

If the farmers of Wisconsin fully appreciated the great advantage of a fruit garden, few would be without one.

You can get from it, more health, more comfort, more inspiration and more dollars for the same labor than from any other portion of the farm.

A farmer's home, with house plants in the window, flowers on the lawn, and a succession of small fruits, from a garden planned, planted, pruned and protected with aid of wife and children, giving each child control of a particular plant, bush or row, will do more to make children love the old homestead and keep the boys on the farm, than all the precepts ever taught them.

Horticulture is an important department of Agriculture, and its study and practice will certainly stimulate the farmer to better tillage, larger crops, finer stock and greater success in every way.

Now I have not come here to introduce some new, untried, high priced novelty. I am not here to sell plants of any kind, neither have I come to ask any considerable portion of your best land or very much of your time. I simply ask your attention to one little ¼ acre of land, and propose to illustrate how any person with ordinary intelligence can have fresh fruit, for the family or market, throughout the season, and produce thirty bushels on this ¼ acre.

The Fruit Garden.

Now I want to select this ¼ acre on your farm, near your house, where your wife and children can look after it.

It is your garden, now be generous and let us have a good piece.

I want it four rods wide and ten rods long, nearly level and well drained.

If you raised corn or potatoes on this piece last year, and it was rich, there is little to do to prepare it for planting, but if a part of an old meadow or pasture and all run down we have work to do.

First put on a heavy coat of well rotted manure, plow very shallow and cut the sod fine with a disk or acme harrow, then plow again deeply, manure as before and harrow until fine and mellow.

For several weeks we have, of course been studying the varieties we want and those that are hardy and do well in our vicinity.

We also want thirty bushels of fruit coming in succession throughout the season.

This may be easily produced by adhering to the directions and illustrations of *The Farmer's Fruit Garden.*

Our garden being 66 feed wide and 165 feet long and wishing to do all labor possible with a horse and cultivator, we stake off the ground in rows one hundred and fifty feet long and seven feet apart.

Strawberry rows to be one-half this distance, leave a head land 7½ feet wide at each end for turning. Make the first row three feet from the outside and set as follows:

	Production.
1st Row 13 Plums and Crab Apples —5 Desoto, 2 Cheney, 3 Transcendent 3 Hyslop	5 bushels
2d Row—50 Blackberries—40 Ancient Briton, 10 Snyder	3 bushels
3d Row—50 Black raspberries — 40 Ohio, 10 Gregg	2 bushels
4th Row—50 Red Raspberries, 25 Marlboro, 25 Cuthbert	2 bushels
5th Row—50 Currants—25 Victoria, 25 Red Dutch	4 bushels
6th Row—50 Currants and Gooseberries—25 White Grape Currant, 15 Downing, 10 Houghton	5 bushels
7th 8th and 9th Row—300 Strawberries—Warfield No. 2, Jessie, Crescent, Wilson	5 bushels
10th Row — 17 Grapes—3 Moore's Early, 6 Worden, 5 Delaware, 3 Concord	4 bushels
Total	30 bushels

These suggestions are based on practical experience in growing 40 acres of small fruit, 25 acres of same in blackberries and raspberries.

I have a love for the work and will without charge, cheerfully send an illustration of this garden with full instructions for growing small fruits to any person on receipt of name and address.

First in season comes the strawberry. The strawberry grows in every climate, on all kinds of soil, and with most any kind of treatment, but best results can be obtained only by good fertilization and high culture.

The ground should be covered with barn-yard manure, well plowed in and top dressed with rotted manure. This should be thoroughly mixed with the top soil by harrow or drag. Thorough

preparation will save much labor in caring for plants, and greatly increase the crop.

Use a line to get rows straight, and a spade or trowel for making holes.

Plants should be prepared for setting by trimming off old leaves and runers, straightening out roots and cuting back to four or five inches in length.

The roots should never be dry or exposed to the sun and wind, and should be set out as soon as possible.

Setting.

One man with spade or trowel, insert it to the depth of five or six inches, push forward while a boy takes plant and with fingers spreads roots out fan shape, and inserts same in hole, holding until the spade is withdrawn and dirt packed securely around plant with foot.

Care must be taken to have roots well spread, the earth firm around them, and just even with crown of plant, neither too deep nor too shallow.

If the season is dry, cultivate or rake over the ground at once, and wet or dry, every week during the season.

Weeds must not be allowed to grow. Frequent cultivation keeps the ground moist and mellow.

Permit no fruit to grow first season; pick off all buds and blossons.

First runners should be cut off; later ones allowed to grow and trained to form a matted row, with clean paths between.

When ground is frozen in the fall cover lightly with clean straw, marsh hay or coarse manure, and in the spring rake between the rows to hold moisture and keep the berries clean.

All plants are either staminate or pistileate (male or female), and pistileate varieties should have staminate planted with them about every third row.

Many fail to raise good crops because they do not understand this law.

Strawberry beds should be renewed every two or three years.

To do this in our garden, we will set only two-thirds of the bed this year and plant the balance to potatoes, next year the potato ground will be set to strawberries, with plants from your own grounds.

After second year, plow up one or two rows of oldest berries every year and plant to potatoes, following with new vines; thus always having a part new setting, a part bearing one year and a part bearing two years and a continuous renewal of healthy plants.

Black Raspberries.

After preparing the soil same as for strawberries, make straight rows seven feet apart, and plant three feet in row. The roots should be well spread out in their natural position and the dirt well firmed about the roots, but not planted too deep. Cultivate thoroughly, and keep free from weeds.

A mulch of coarse manure or what is better, green clover, cut in the blossom, will hold moisture, prevent weeds from growing, keep the ground rich and the berries clean. When new shoots are 15 or 18 inches high, pinch them off. This will cause laterals to grow, which should be cut back in the spring to 12 or 15 inches in length. When the fruit is all gathered, cut out old and young weak canes and burn them.

Red raspberries are treated in the same manner, excepting they should be planted deeper, and are not cut back in the spring. They spread very rapidly, and all plants excepting five or six stalks for main hill, must be treated as weeds and hoed out.

Blackberries

require same preparation of soil as strawberries and raspberries.

Plant in hills three feet apart, and in rows seven feet apart. Hoe, cultivate and mulch same as for raspberries. When new growth is 15 or 18 inches high, pinch tips back. Cut out old canes after bearing, and burn them.

Blackberries and most kinds of raspberries need winter protection in this climate, and are best covered with fresh earth. In laying them down (the rows running north and south), commence at the north end, remove the dirt from north side of hill about four inches deep, gather the branches in close form with a wide fork, press gently to the north, place the foot firmly on base of the hill and press hard, bending the bush in the root until nearly flat on the ground, and hold until second man covers with dirt. The top of succeeding hills will rest near base of preceding hill, making a continuous covering. This process is an important one, and will be easily acquired by a little practice. In the spring remove the dirt carefully with a fork, and raise the bush.

We support blackberries and raspberries by a No. 12 wire on each side, attached to posts at each end of the row, and resting on nails driven in stakes about twenty-five feet apart. This support protects bushes from heavy winds; the fruit from dirt, and makes hoeing, cultivation, mulching and picking much easier.

Blackberries require no trimming in the spring, excepting to prevent too large a growth of fruit. For large fruit trim freely.

Currants and Gooseberries

can be as easily grown on rich, deep soil as potatoes. Set in rows six or seven feet apart and three and one-half feet in the row. Cultivate them thoroughly, and keep center of bush well trimmed out.

Both are subject to the attack of the currant worm, which can be as easily exterminated as the potato bug, by using white hellebore (one ounce dissolved in three gallons of water) and apply with sprinkler on lower and center leaves at their first appearance, about the time the fruit forms. Repeat the application a second time, or even a third if necessary.

In the growing of small fruits, I make no iron clad rule to govern all minor details.

The selection of a location, the quality of soil, the varieties to grow, the manner of planting, trimming and many other things must be determined by circumstances and your own good judgment.

There are, however, certain essentials which cannot under any circumstances be omitted without loss if not certain failure.

The ground must be rich and well prepared.

The plants must be vigorous and adapted to your needs.

The roots must be well spread and the earth made firm about them.

The ground must be frequently cultivated and kept free from weeds.

Winter protection, for small fruit plants is an absolute necessity in Wisconsin except for the current and gooseberry.

In close connection with this subject let me say, the greatest need of Wisconsin farmers and horticulturists to-day, is organization and the adoption of more exact business methods.

Great success in banking is attained

only by exact business methods and absolute accuracy in every account.

The merchant succeeds best, knowing the wants of his customers and the proper way to display his goods.

The manufacturer's success is in producing the largest amount of the best goods at the least cost.

The commercial man's study is to distribute products to the best advantage and at lowest rates.

The good farmer or horticulturist should possess the accuracy of the successful banker, the tact of the prosperous merchant, the close economy of the manufacturer, the courage and energy of the commercial man.

Yes, more! He should have a pride and respect for his business.

He should feel that there is no position, no profession and no business more honorable than that of tilling the soil.

He should feel that in studying the possibilities of his farm, he is doing as necessary work as the doctor.

He should feel that in breeding his stock well, it is as important as the lawyer's work. He should feel that in feeding stock or farm to the best advantage, it is just as honorable as preaching the gospel.

The farmer or horticulturist is ruler over a miniature kingdom, and if he rules well and performs the rustic duties of the farm with intelligence and fidelity, forgetting not his duty to country, neighbor, family or self, he is the peer of any man who walks the earth, be he king, president, senator, judge, professor, lawyer, doctor or divine.

Our institute work is to develop just such farmers.

We can, however, have institutes only once a year, and they should be supplemented by the organization of local farmer and horticultural clubs to carry on this good work.

We need a good horticultural or farmer society in every good town and representatives to our state meetings from every locality.

We want hundreds of members where we now have tens.

We want acres of small fruit where we now have rods.

We are paying thousands of dollars to other states, every season for fruit that should be grown here, and the great northwest is clamoring for berries we cannot supply.

How easy to organize societies. A simple constitution that may be written on paper no larger than your hand, is all that is needed as a basis for your work.

Five or ten persons may organize a society as easily as a hundred and receive the same benefit.

There are many reasons for it. I mention only one or two.

Ten or more, decide to set out a fruit garden as recommended and organize a society.

Let the secretary subscribe for several first class agricultural and horticultural papers; let him also ask for the several state reports, agricultural, horticultural, bulletins, etc., etc. All will be furnished cheerfully and without charge.

In this way, you can provide a large amount of good reading at moderate cost for general circulation among your members.

These benefits cannot be measured in dollars and cents.

From an eastern retail price list of nursery stock, I find it will cost $52.50 to purchase plants enough for one of our farmer's fruit gardens.

Now mark well, what organization will do.

Let the same ten persons setting ten different gardens, make one order as a society, for all the plants wanted, demanding same at 1,000 rates and any responsible Wisconsin fruit grower or nurseryman will furnish them for $12 each, thereby saving to each member $40.50, and to the society $405, in this single purchase.

Therefore I say, organize at once, it will benefit you socially.

Subscribe liberally for good papers, it will benefit you intellectually.

Plant a small fruit garden, it will aid you financially and add comfort to your family and friends.

My faith in the citizens of Wisconsin leads me to hope that many new societies may be organized and that thousands heeding these suggestions, will soon rejoice in the possession of a model small fruit garden.

DISCUSSION.

MR. GIBBONS — Does it make any difference which way you lay those blackberries?

MR. THAYER — I prefer to lay them to the north, because in raising the bush in the spring you need not get them in an upright position and the new growth coming up on the south side partially shades the fruit. I also prefer to have the rows run north and south, because I get a better distribution of the sun and heat during the day. Whereas if they run east and west the south side of the bush gets all the sun and the north side all the shade.

QUESTION — Do you remove the dirt only from north side of hill in the fall when you bury them?

MR. THAYER — On my soil, a sandy loam, I find it necessary only to dig the dirt up on the side towards which I lay them down. On a stiff clay soil you will find it more difficult to do, but will easily acquire the needed knowledge with a little care and patience.

QUESTION — I should think you would be apt to strip the bark, or damage the stalk when you lay it down.

MR. THAYER — No, you injure very few bushes that way. I lay raspberries down in the same manner, even the most hardy; it pays to lay down. I know it seems like a great undertaking for a farmer to do this work, but I put down twenty-five acres last year. Two men when they become used to it will put down half an acre a day, and cover them. I cover them as shallow as possible.

MR. RICE — How far apart would you set the strawberries?

MR. THAYER — That depends on the variety you grow. I plant mine in rows 3½ feet apart and set the plants two feet in the row. In the fall after the ground is frozen, I recommend covering them lightly with clean straw, marsh hay or coarse manure, and raking that between the rows in the spring.

MR. PENNELTON — Why do you pinch your blackberries so close to the ground?

MR. THAYER — The blackberry grows on the end of the laterals, and by nipping them back when 15 or 18 inches high you largely increase the laterals, and the same with the raspberry. Also if your stalks grow in that way you lay them down easier than if in one big stalk.

MR. BRAGG — What time do you set out your strawberries in the spring?

MR. THAYER — Just as early as you can get the ground in good condition.

MR. POTTS — What time in the year do you pinch back and trim your raspberries and blackberries?

MR. THAYER — This pinching back is done whenever the new shoot is about fifteen or eighteen inches high. All bearing canes, both raspberry and blackberry are cut out and burned as soon as fruit is picked.

The raspberry is trimmed back severely in the fall just before laying down, and dead ends, if any, removed in the spring after taking up.

The blackberry I trim only after the fruit is set, and then to correspond with health and vigor of bush.

MR. GREEN — When do you you take them out of the ground?

MR. THAYER — I remove the dirt in the spring before the buds start very much.

MR. WILCOX—Mr. Barnes said in covering berries, he takes a fork full of dirt out of the front of them, and then takes the roots and presses them over. Do you push them over on the other side?

MR. THAYER—It is not necessary in my light soil. In a clay soil, and especially where the bush has run a number of years and become quite heavy, they may sometimes have to do that. I don't think it injures the bush very much.

MR. GREEN — After the blackberry fruit is set, what portion do you cut out?

MR. THAYER—That is a difficult thing to decide. Your judgment must come in there, but as a rule don't be afraid to trim. If set very full you can cut off one-third or one-half the buds, and your fruit will be much nicer for doing it. There is little danger of trimming too much.

MR. FAVILLE—Mr. Thayer, can you give us any recipe that will make the shiftless farmer like myself take good care of the garden after it is set out?

MR. THAYER—Well, for the average farmer I should begin and make him over first, but to a man who is a little further along I should say attend the farmers' institutes, and in a few years you will get up to a point where you will conclude it is best to do it. If you have fifteen cows, let one cow go, and put the work of that cow into this fruit garden. If you are raising fifteen or twenty acres of potatoes, drop off one acre. There are plenty of farmers fooling away enough time raising eight or ten bushels of wheat to the acre to plant three or four such gardens.

Here is a quarter acre garden that represents seventy-five or eighty dollars right in your pocket; it represents health, and comfort and inspiration, and everything good on a farm, and you say you have no time because you must half cultivate some corn or potatoes or old meadow that gives you a mere pittance in return.

MR. WILCOX — Do you recommend planting strawberries in the spring?

MR. THAYER—Yes, as early as you can; don't allow any fruit to grow the first season; your runners grow and form plants, and next year is your best season.

MR. FAVILLE—Isn't it a fact that the average farmer can buy fruit cheaper than he can raise and pick it?

MR. HYATT—I never was so tired when it came three minutes to 12 but I was glad to go and pick a quart of strawberies.

MR. THAYER—The trouble generally is, to prevent the fruit being picked. I don't care how tired a man is, a good fruit garden will rest him wonderfully.

There are some men like my friend Mr. Faville that it will take all their

time to attend the garden, and then it won't be done.

In all seriousness will it pay? We all know we can raise fruit ready to be picked for the table or market for three or four cents a quart. The farmer if he wants that fruit must pay sombody a cent a quart for picking it, a cent for boxes, about two cents for express, another cent for commission, and we fruit growers must have a cent or two profit. Thus we have to get six or seven cents out of it which the farmer can save if he raises it himself. It is a question for you to figure. It seems to me like a pretty big per cent, but if you want to pay somebody $75 for this quarter acre of fruit you will find fruit growers generous enough to furnish it.

QUESTION — How long do you keep cutting off the strawberry runners?

MR. THAYER — That is where judgment comes in. It takes more good common sense to run a fruit farm or any other farm to the best advantage than to run a bank. I should cut off the first runners until about August 1st, depending somewhat on the season and varieties grown.

MR. HOFFMAN — Provided one-third of the farmers in the state went into this fruit business raising one-fourth of an acre, would there be any money in it outside of his own use?

MR. THAYER — I would not advise a farmer to raise much for commercial purposes, or any one else either unless they are situated right. Near a little town you can often pick up a few dollars pin money or grocery money if you have more than you need at home.

MR. RICH — What treatment do you give your strawberry bed after taking off the first crop?

MR. THAYER — I would mow the vines off and remove them or burn them dry. Cultivate thoroughly and take out all weeds. The second year about all the treatment is to keep the weeds out.

MR. GREEN — Would you use ashes on strawberries or raspberries?

MR. THAYER — Yes, especially on light soil, ashes are a great benefit to all fruit.

MR. RICE — If farmers had to buy fruit, how many would buy a quart? I have been in the produce business several years and I know the farmers buy very little fruit. They often go into a saloon and spend enough to buy two barrels but they seldom take anything home.

MR. THAYER — I undertake to say it is more profitable for a farmer to raise his own fruit than it is his potatoes at $1.00 a bushel, his wheat at $2.00 per bushel or his pork at $6.00 per hundred. Why not buy your potatoes, your wheat or your pork? I believe a man will have to raise at least six acres of wheat to get as much benefit as he will from this quarter of an acre; I believe he would have to raise five or six acres of corn to get the same benefit.

MR. PIER — What remedy do you use to prevent the blight.

MR. THAYER — I never have been troubled with it. We have been troubled a little with rust. In that case I dig up the bush, root and branch, and burn it.

MR. HOLMES — As long as evaporated blackberries and raspberries bring from twenty to forty cents a pound I don't think you can overdo the small fruit business near the cities. The fact is the more fine fruit you raise the more people will want it.

SUPT. MORRISON — Mr. Thayer is doing good missionary work. Some of the finest farmers in this state don't have a garden and it is bacon and pork and potatoes, and potatoes and

bacon and pork the year around. I believe that over one-half of a farmer's living can come out of his garden, but he will say, "Oh, it don't pay." Any intelligent farmer who knows how to raise potatoes and corn can take an acre of ground and have part of it in fruit, and part in vegetables, and have it in long rows and raise vegetables very cheaply. I know one year I raised vegetables in my garden, and supplied to four or five families, and did it for less than many farmer's spend upon an onion bed. If I were a farmer's wife I would run away if I had to cook the way they do, and with the material they have year after year. I hope these talks will do some good, because it only requires a little gumption, a little common sense and industry. If you would spend one-tenth of the time you spend between your farm and the nearest village, you would have good gardens.

C. P. GOODRICH—I know of one farm which has a good fruit garden like the one just described as the result of hearing a horticulturist talk. My boy, then about 18 years old, heard Mr. Hamilton, I think it was, talk on "The farmers garden" at an institute. He was interested and wanted to plant one so that we could have more and better fruit than we had had. I told him he might have one-third of an acre of good land near the house, and I would furnish the money to buy the plants and the material to fence it, if he would promise to take good care of it. He promised, and the garden was planted. The plants and material for a lath picket fence cost about $30. The garden has been well taken care of, and managed according to the instructions of the horticulturist. Now we all have plenty of nice fruit to eat and some to give away. Some is sold occasionally for which *he* gets some money I have never heard any one complain, at my house of the hard task of picking the fruit.

MR. ARNOLD—Let me offer a suggestion. If you want a good garden, you want to marry a thoroughbred wife.

MR. THAYER—Will Mr. Arnold please tell what is to become of us poor mortals, who are already married, and didn't get a thoroughbred?

MR. ARNOLD — You want to get that wife interested in this garden, have it impressed on her mind that the family will not be healthy without it, and if you don't have a good garden in a little while, you will be pretty sure to have a continual thorn in the flesh?

SUPT. MORRISON—Isn't it the wife who generally has to get the husband interested?

MR. ARNOLD—Yes, quite often, and if she does become thoroughly interested, nine times out of ten you will have a fruit garden.

SUPT. MORRISON—I have been at Mr. Arnold's, and he has a fine vegetable and fruit garden, and I give all the credit to Mrs. Arnold.

Music—Solo.

SUPT. MORRISON—It gives me great pleasure to introduce the next speaker as a gentleman who does not believe that the vocation confers honor upon the man, but that the man confers honor upon the vocation. He is proud that he is a farmer.

Hon. C. R. Beach of Whitewater, one of the present regents of our state university, will give you a paper.

WHAT CAN THE GOVERNMENT LEGITIMATELY DO FOR THE FARMER?

BY HON. CHAS. R. BEACH, Whitewater, Wis.

Within the past few years there has developed among farmers through the country, a feeling of discontent. A belief that the cause of low prices of farm produce was attributable, in part at least, to wrong legislation, or to put it more mildly, to a want of right legislation, both state and national. That combinations, using large aggregates of capital, were either through governmental aid, or through governmental neglect, absorbing an undue share of the accumulated products of capital and labor, and that farmers had special grounds of complaint.

Farmers' Organization.

As a result of this sentiment there has sprung up various organizations, composed mainly of farmers who propose to act together politically, and perhaps otherwise, for the purpose of so modifying national and state laws, as to place farmers on better footing. These organizations extend over many states and their membership numbers many thousand voters. Indeed so strong have they become that in the last fall elections, they elected representatives in both houses of congress, and they also hold the balance of power in several state legislatures.

I, for one, rejoice in this movement, (not that I believe the evils complained of are as great as represented, or that prosperity can be restored to the farmer to any great extent through legislation). But, I believe that it is not only the right but the duty of every citizen, be he farmer, a day laborer, or in any other business to interest himself in all questions of public policy. We are very prone to forget that the people are the government, and if there are any laws in the land that in any way discriminate against the farmers they have themselves to blame. It must be either their ignorance or their indifference that makes legal wrongs against them possible. The farmer will never be a good citizen until he becomes a politician, not that he may hold office or simply advance his own prosperity, but that he may do his share of promoting the best good of the whole country. Although the farmers constitute a majority of the voters of the whole country, they have never, in either house of congress, had anything like a fair representation, and if they have been represented at all, it has been mainly by proxy, and I am inclined to the opinion that a right smart admixture of the granger element in both state and national legislation would not only be refreshing but invigorating.

We are all willing to admit the good effect of grange legislation in 1874 in this state. Since then no R. R. President, has by proclamation, openly defied the laws, as did the presidents of the St. Paul and North Western roads at that time.

Educational Factors.

But I rejoice in these farmers' movements mainly on account of their educating influence upon the farmers themselves.

Hitherto farmers have been more in-

clined to grumble and find fault than to point out clearly what they believed to be wrongs and show how to right them. They have never set up reforms. But if these movements mean a new political party, it must have clear and well defined objects and principles, and before those objects can be obtained, they must not only convince themselves that they are right, but also convert a majority of voters to the same opinions.

To do this will require a broader and more comprehensive knowledge of governmental affairs and a greater amount of intellectual activity than is now possessed by any considerable number of the most intelligent farmers.

There are many things in the platforms and resolutions that have been indorsed at various times and places by the various farmer organizations which seem radical, visionary, impracticable and perhaps revolutionary. But knowing how conservative the majority of farmers are, it is fair to presume that the sentiments these resolutions express may be attributed to the self-appointed leaders in these movements, rather than to the rank and file of the farmers. If the farmers expect any good they should not aim at *impracticable ends*. They should not claim for themselves any special favors, or attempt legislation, looking to their special benefit.

There is no more reason why farmers should have the benefits of sub-treasurers or money loans more than the manufacturer, or the merchant or the mechanic. Neither should they while denouncing trusts and monopolies and demanding their extinction, be planning to form trusts and monopolies compared with which those of which they complain so bitterly, dwindle into insignificance.

But let us try and get nearer to our subject, What can government legitimately do for the farmer?

That I may not be misunderstood, let me say that I entirely discard the idea that the farmer has any need of special legislation in his favor, but partly owing to the changed condition of things and partly owing to the indifference on the part of farmers, they are carrying some burdens that ought to be lightened, and one of these burdens is an unequal and an unjust proportion of taxation.

Just Taxation

Taxation, to be just, should be in proportion to the property owned by the individual or corporation taxed. But will anyone claim that such is the fact?

The total assessed value of the property in Wisconsin in 1888, was $581,000,000; $303,000,000 was on land outside of cities or villages, $152,000,000 on real estate in cities and villages, $126,000,000 on personal property, of which last amount $52,000,000 was on live stock and tools on farms, leaving $74,000,000 of personal, other than stock on farms for the entire state. So that the farmers of this state pay taxes on an assessed valuation of $355,000,000, as against $226,000,000 of all other kinds of property in the state, or three-fifths of the taxes in the state, and five times as much as paid by the entire aggregate personal property outside of farms, in the state. And when we remember that a large per cent. of these farm lands is mortgaged for sums, which in the aggregate will amount to many millions, we can form some idea of the unjust burden of taxation borne by the farmer. Is any one so unsophisticated as to believe that all the personal wealth in Wisconsin, its bank stocks, its mortgages and notes, and other debt obligations, its stock of machinery and mer-

chandise, and its millions of manufactured products, amount all told, to only one and one-half times the value of the live stock owned by farmers? Why! The yearly product of our manufactures will exceed by many million of dollars all the product of all the farms in the state.

Mr. Thim, president of the Massachusetts equal tax league, gives data by which he estimates the amount of chattel property in Massachusetts that escapes assessment not much if any less than two thousand million of dollars; he says farther, if this amount be lowered to 1,200 million, and was assessed and payed taxes in the same proportion as that which now pays taxes, the extra sum realized would amount to more than all the annual accumulated wealth realized from farming by all the farmers in the state.

A Bostonian died not long since whose estate showed that he had dodged the average tax of 5,000 tax payers.

A writer in the Prairie Farmer claims that in the state of Illinois there are 214 corporations with 150 millions of dollars of paid up capital that are assessed less than five per cent. on their capital stock while the farms are assessed on a basis of 33½ per cent. on their full value. That when farms of the state amounted to 75 per cent. of the property of the state, they payed 80 per cent. of the tax, but now when the farm lands constitute but 24 per cent. of the property they pay 85 per cent. of the tax. And here I might and perhaps ought to stop, but there is one more point that I wish briefly to call your attention to.

License Money.

Under our present excise system, license for the retail sale of liquors is granted by incorporated cities, and villages, and the moneys obtained from such license is spent for the sole benefit of said city or village. To how large a sum these moneys will amount, I have not now the means of knowing, but it is a very large sum, amounting to many thousands of dollars.

In the little city of Whitewater, near my home, a place of about 5,000 people, six thousand dollars is paid annually by twelve saloons. Of this sum I, as a farmer living outside of the corporation, secure nothing — but three-fifths of the pauperism, and crime inseparable from the drinking of the liquor sold, falls upon the farmer who has in no way secured any benefit. Surely the evils growing out of our unequal methods of collecting taxes is a legitimate sphere of legislative reform which, if carried out, would be of great pecuniary benefit to the farmers of the state.

Adulteration.

But there is another subject of equal, if not of greater importance, than unequal taxation. I refer to the selling of fraudulent and adulterated foods. Unjust taxation affects us only in our property, but the selling of fraudulent foods robs us of our money and may endanger our health. Tax paying comes but once a year, but these frauds find their way to our table three times a day. Tea, coffee, mustard, spices, vinegar, sugar, lard, confectionery, honey, molasses; these form only a partial list. Vinegar compounded out of deleterious acids, syrup mixed with glucose, candies made heavy with gypsum, pipe clay, chalk and yellow chromate of lead, red oxide of lead, white lead and vermillion, cream of tarter with no cream of tarter in it; I might extend the list indefinitely would time permit. As a consumer of

these products, the farmer suffers equally with other members of the community.

But these compounds, by skilful manipulations are made to assume the appearance and the name, and to take the place on the market, of legitimate products of the farm.

The farmer has just cause of complaint, and is justly entitled to governmental interference and protection.

Watered milk, filled cheese, oleomargarine sold as butter, compound lard, these so interfere with legitimate production, that profit of farms is turned into loss. That government is recreant to its duty that does not furnish both to the *producers* of pure food and to consumers, perfect protection against fraudulent compounds free of cost. No matter whether these compounds be harmless or harmful. To do less is to *debauch* the moral sense of the whole community. If fraud may be tolerated in one direction, where will you draw the line? And when will you stop?

The good work so well begun in this state should be perfected and carried out. The interests of the whole community require it, and the farmers have a right to demand it.

Improved Highways.

The value of any section of country for farming depends largely upon the character of its public highways, by which market towns may be easily reached. We have many things in our state of which we may be justly proud, but the list will not include our county roads.

Nothing can be more vicious and unbusiness like than our whole system of constructing and maintaining our county highways. These roads belong to the state, they are for the benefit of the whole community, and the state should keep them in repair; but under present laws the whole expense falls upon the farmers who own lands bordering these highways. The care of our county roads should be in the hands of thoroughly trained, practical road makers, whose special and professional business is to make roads. One-half, three-fourths, nine-tenths, fifteen-sixteenths of the money and labor expended under our presen methods is worse than thrown away.

Government could legitimately help the farmer and the whole community by making the care of roads a distinct department and then provide funds to maintain them.

Will The Farmer Become a Mere Tenant?

Hitherto the surplus accumulations of wealth have found investment in railroads, in bank stock, in mining, in manufacturing or in commercial enterprises. But it is the opinion of many thoughtful men, that as wealth increases and competition for places of profitable investment grow sharper, capital will seek investment in farming land. So that in the not distant future, those who work the land will be mere tenants at will, subject to the caprice of landlords. Should such a state be ever possible, then farewell to the bright dream of a coming millennium for farmers, but I do not take so desponding a view; but one thing is certain that while population and wealth are rapidly increasing, the soil whence coming generations are to draw their support, is a fixed quantity — and there is another fact that has much significance. It is claimed that there is already owned or held in this country by foreigners, individual capitalists or by syndicates, more than 40,000,000 acres, an area greater than the whole state of Wisconsin or Illinois. We

see then that the danger to which I have alluded may not be impossible.

The Land Should be Owned by Our Citizens.

I hold that the soil of this nation should be the exclusive property of its citizens. That no one who is not a citizen should *ever under any circumstances* be allowed the ownership of a single acre.

And more than that, the amount of land that could be owned by a single individual or corporation, should be so restricted and fixed at so narrow a limit, as to offer no temptation to acquire wealth through a tenant farming.

Here is legitimate work for government in the interest of farming, and in the interest of civilization, to preserve the ownership of the soil inviolate for the food producer of the land.

An Education for All.

There is one subject I rejoice to say, upon which there is little difference of opinion, and that is the right and duty of government to furnish the opportunity for every one to educate himself up to the highest possible efficiency in the line of work he has chosen for himself, even though it be farming. This is better than giving or loaning money, for it is helping one to help himself.

The central thought in modern systems of education is to make one better able to do *something* and on the score of educational opportunities, I think the farmers have no reason to complain, but rather to congratulate themselves.

The provision of the general government has been most munificent. First the liberal land grants for agricultural colleges. (And if these land grants have not been wisely used, no one is to blame more than the farmers themselves).

The establishment of an agricultural department of government, the granting of yearly appropriations for experimental stations, the monthly crop reports, the condition of foreign markets, the weather bureau, these and much more that I could name show how willing the general government is to respond to the needs of the farmers. And the state has shown equal liberality. Its appropriations for fairs, for dairymen's associations, and above all for farmers' institutes — all these show how ready government is to reach out a helping hand in giving to farmers the opportunity of learning the foundation principles upon which success in their business depends.

Impracticabilities.

The limits of my paper will permit me to speak only in a general way of those matters to which farmers' organizations attach chief importance, viz.: Corporations, transportation, monopolies, trusts and direct governmental aid to farmers by subtreasury schemes and direct loans of money to farmers. As to corporations, they have no natural, but only vested rights; and it is the duty of the government to watch with jealous care that the powers granted, should be in no way detrimental to the general good, and they should be held to the strict letter of the law that created them. And they should also be made to bear their full share of expenses incidental to governmental protection, and if at any time it is found that they are in any way working harm to legitimate business or personal rights, their charters should be taken from them. How many would cease to exist if the laws were enforced? I do not know, but I think a good many.

But transportation is as much a necessity to the farmers of Wisconsin, as the possession of land. As to railroads, I have long thought that there was a class of would-be reformers who, by general denunciation rather than by facts and sound reasoning, attempt to prejudice farmers against the railroads. I am not here in any sense in the interest of railroads. They were not built and equipped as a matter of pure benevolence and it is fair to presume that they are run in the interest of the stockholders; but it does not follow that there is any antagonism between farmers and railroads. Railroad men are sharp enough to know that the prosperity of the roads can only come through the prosperity of the business of the country, farming included. In the year 1888, the railroads in Wisconsin earned over seventeen millions of dollars by carrying freight at a cost of less than one cent per ton per mile. To have moved that amount of freight in England would have cost three times that amount. The decrease in the cost of moving freight in this state in ten years is over 50 per cent. What could Wisconsin farmers do without the railroads?

Whatever cause of grievance the farmers of other states may have against the railroads, the number in Wisconsin who cherish any feeling other than good will is extremely small. If the farmers have not for the last few years made all the money they could have wished, they will find it in other causes rather than in the extortion of railroads.

It is not to be presumed that our railroad laws are perfect, but in our effort to reform them let us be actuated by a desire to promote the good of the state rather than by a desire to punish the railroads. Perhaps a board similar to the Inter-State commerce commission, acting within the state, upon which should be a fair per cent. of railroad men, might help to correct abuses, and settle difficulties that may arise.

Trusts and Monopolies.

Standing here as a farmer and speaking in the interest of farming, I shall not discuss the question of trusts and monopolies until it is determined whether it is for the interest of farmers to establish them. If they prove good for the farmer, they must be good for everybody else, for I hold there can be no real antagonism between the legitimate business interests of any country.

The legitimate duties of government are mainly negative. To prevent the doing of wrong; to see that no individual or corporation encroaches upon the rights of any other individual or corporation; this is legitimate work.

Work Out Your Own Salvation.

Progress, wealth and civilization are not the result of governmental acts, but of individual effort. The individual is the unit of society.

To educate, train and develop the individual so that he shall by his labor produce the highest possible results, is the final end of the complex machinery of society; to make each individual man stronger, better and more self-reliant.

Says Carlyle, "In the end there is no help for a man, or any hindrance either, except what lies in himself." For a whole class to ask for government loans is a confession of weakness. It is acknowledged that the world is too strong for them. It does not argue well for the ability of the farmers to run the government if they cannot run their own business without governmental aid. And herein is the weakness of much of the organized effort to benefit classes. The personality of individual members is

lost sight of in the effort to benefit the mass.

How will the individual members of the great National Farmers' Trust, about to be organized, be better educated, and better equipped for doing their share in the world's work by banding together "in a combination whose spirit and aim they have hitherto so loudly denounced, and then for each farmer to sink his own individuality and appoint over himself a Lord High Captain who shall have the disposing of the fruit of his labor, to do the thinking for him, as to whom and when and at what place to sell the products of his farm? Is that the way to educate the farmers of the great north-west to self rule and judgment, and make them feel that they are equal to the work they have undertaken in managing a farm, and though it make their labor profitable to themselves and helpful to others, and if the wisdom of the leader fails, who stands the loss?

Don't Choose Demagouges For Leaders.

It is true now as it was three thousand years ago, that he that tilleth his land shall have plenty of bread, but he that followeth after vain persons shall have poverty enough, and the better the tilling the greater will be their profits. As I said in the outset, I rejoice in this new political awakening among farmers and I think good will come of it. But they must not expect to revolutionize the country at once. Were the farmers to be put in complete control of all branches of government, I should not expect any great amount of pecuniary benefit to come to them. Government never has nor ever can have any power over the law of supply and demand. It can never make a poor bullock worth as much as a good one or make a bushel of corn worth as much in Nebraska as in Chicago.

It is fair to presume that the laws against which farmers complain most loudly were not enacted with a view of discriminating against them, and that the changed condition of things which now make them unjust call for a corresponding change in legislation.

Society in its corporate capacity, does not arbitrarily discriminate against individuals or occupations; honest, intelligent and successful work in any business wins recognition. And if we as farmers do not exert as great an influence in the body politic as our numbers entitle us, may we not attribute it to our having failed to intelligently comprehend and systematically show by our practice the possibilities of our business? And before we claim the privilege of reforming the government, ought we not to prove our ability to do so by reforming our practice as farmers?

THE DAIRY TEMPERAMENT IN COWS.

BY EX-GOVERNOR W. D. HOARD.

Mr. President, Ladies and Gentlemen:

I am to talk to you to-day upon the dairy temperament in cattle, and in so doing, I want you to get a clear idea of what I mean. I shall not make an exhaustive statement of this subject, but simply touch upon a few points belonging to it. The farmer of Wisconsin ought to be, by virtue of necessity, a breeder of domestic animals, and he ought to do it intelligently, he ought to understand the lines of breeding just as they do in England. Out of that wonderful little island has come a marvelous number of breeds of domestic animals, the Shorthorns, the Devon, the Hereford, the Redpolled, the Sussex, all these breeds of cattle stand out to-day as embodiments of an idea. There are the different kinds of hogs and of sheep. The farmers of England have made a record which is authority for the whole world, and they have done it by virtue of hard study and intelligence. It is a grand thing to be a farmer in England, for the reason that the best minds of England are farmers. The land of England and the problems of agriculture were turned over to the very finest brain in it.

Unprofitable Cows.

With us, it is different. It seems sometimes that the farmer in the United States is the last man who pays any attention to the improvement of his domestic animals, and yet he ought to be the most interested, because it means prosperity to him. I will illustrate what I mean. Take the average Waupaca county cow, and my word for it, she does not make 125 lbs. of butter a year. That butter is worth perhaps on the average, fifteen cents a pound. Now, that cow is a representative of the intelligence of the man who stands behind her. What she is, he has made her. Like cow, like master, and if that cow does not make a profit, who is to blame but the man who bred her and owns her? That man never studied the meaning of a cow, never looked into her physiology, and make-up, and very likely he complains he is making no money, and the revenues of the whole state are set back because he refused to sanctify labor with knowledge.

Let us for a moment go onto the race-track. Is there a farmer in this country who would for a moment think of breeding horses for the race track by introducing draft blood? No, you have studied that subject enough to know better. Now, don't you know that breeding a cow is subject to the same laws exactly that the breeding of a horse is? Nobody ever saw a horse that had a draft form that was a trotter. Nobody ever saw a foxhound that had the form and shape of a bull dog, that was a runner. Nature invariably gives to every animal the form that is necessary for its function. Now, we must have dairy cattle if we are going into the dairy business, and nine times out of ten, in this country, we have commenced wrong. Farmers all over this state have gone into the milk business and have no idea half the time as to what constitutes a profitable cow. They go along mechanically paying no attention, and acting as though they

thought one cow is as good as another. This touches no man but the farmer. I have sympathy for him, and I want to stand him up and talk this thing straight into his face and into his comprehension.

The Home of the Dairy.

Wisconsin is a dairy state not a beef state. We need intelligent thought. We need to know how to breed a dairy cow, how to handle a dairy cow, and how to feed her, and the most essential thing to start with is the question of of breeding. Men will stand up in a meeting like this and sneer about breed and pedigree. They don't know what they are talking about. An old fellow jumped up in an institute once, and he says, "You may talk as much as you are a mind to about your breed, but I tell you the breed is in the corn-crib." That is half a truth, the hardest kind of truth to handle. I said to him, "my dear sir, by that I understand you to mean that you don't pay any attention to breed, but everything to feed." "Yes, that is it, sir." "All right, you are the man I have been hunting for. You have given me a short cut to success. According to your doctrine it don't make any difference what kind of a horse I have, I can feed him so as to make a trotting horse of him, can I? Won't you give me your recipe so I can make a Poland-China out of one of those old razor-back hogs that used to run in the woods? How would you feed him to make a Berkshire out of him? How would you feed a Jersey cow to make a Short-horn of her? How would you feed a Norman horse to make a race horse of him?" The old man stood and looked at me a moment, and then said: "Well, talk just as much as you are a mind to, I believe what I said." That is the position of many farmers to-day. They see the half truth and they don't want to see the whole truth. One old fellow said he didn't want to know any more, it might make him uncomfortable.

Temperament.

In cattle as in men, we have what is known as a temperament. A man with red hair and light skin belongs to the sanguine temperament. A man with black hair and a dark skin is classified in physiology as belonging to the bilious temperament. Another man is of a phlegmatic temperament. Now temperament governs function. The breeders of England, hardly knowing what they did, took the Short-horn and commenced to breed them for flesh and have continued to so breed them, encouraging the tendency to lay on flesh, and establish a form like this Hereford whose picture hangs before you. They have bred to fill out the ham, to square out the form, to close up the hip and to shorten and thicken the neck. Those men have bred that animal along the line of the phlegmatic temperament until to-day you have an established heredity in the beef line. That is the law of heredity, and we base all breeding operations upon that law.

Special Lines of Breeding.

Here is another line. The Hollanders took this cow a thousand years ago, and proposed to breed her for the production of milk. They were obliged to give her a totally different form. Here you see the open expression of the barrel; you have the lean bony outline of the nervous temperament. Dairy breeders breed for the enlargement of the nervous temperament. Now what do we mean by that? Thousands of men think we mean excitability. I want you

to remember that nervous means a strong, powerful, nervous machinery, and not excitation. You can make such animals very excitable, but they are not necessarily so.

The dairy temperament is built upon the nervous temperament. A cow having this temperament strongly developed carries all her food into the dairy function and does not take on flesh. The ordinary farmer has an opportunity to study this question even in the selections of his cows. You go to your neighbor to buy cows, and you must look at things from a dairy standpoint. I have been an auctioneer and sold thousands of cows, and I have been pained to see the lack of judgment on the part of farmers concerning a cow.

A Large Beefy Cow.

Lead out a large, fleshy, handsome cow and men will bid right up, and a man pays a good price for her simply because she is good looking while a little cow that apparently gives no indication of her quality will go at a low price. I went into the herd of a man to buy a cow and asked "What is your price for a good cow?" He answered: "If you take your pick I will charge you $60, if you take mine I will charge you $25." I asked him "Which do you think I would take?" He replied, "You will take that large grade Durham cow giving forty-five pounds of milk a day." "And which cow would you pick out?" He turned and showed me a little grade Jersey cow giving but twenty-five pounds of milk a day. He says, "She don't give enough milk." I looked her over and said I would take her at $25. I took the cow home and after I had wonted her I commenced testing her, and on the twenty-five pounds of milk she gave me one and a half pounds of butter a day and the other cow required thirty-two pounds of her milk to make a pound of butter. I believe this little cow was altogether the most profitable and yet that man had no clear idea of the value of a cow.

This question of temperament underlies the breeding of these cattle and so the dairy breeder breeds for the enlargement of the dairy temperament.

The beef breeders breed for the beef temperament, and my friends, for real profit there is no such thing as a general purpose cow. If you are the patron of a cheese factory or creamery, you are keeping your cow for the largest profits in milk and butter. You are not keeping her for beef, and yet hundreds of men say "I want a cow that when I am through with her she will turn out a good carcass of beef, so they will keep the cow until she is eight years old weighing five hundred pounds more, and constantly support that five hundred pounds of flesh for all those years in order to get for it one and a half or two cents a pound at the end of the time. Now the same feed that will make a pound of beef in a good butter cow will make a pound of butter. You know there are some horses that, if I feed them ten tons of oats, I could not get a mile in five minutes out of them. When it comes to the question of milk, you must figure on the machine. To the ordinary farmer who feeds cows for profit it is of the utmost importance that he study the temperament of the animal for the specific purpose for which he is keeping her. Does the farmer of Waupaca county go out hunting foxes with bull dogs? Of course not. Yet, what is the matter with him, that when it comes to picking out a cow he pays no attention to the breed.

The Dairy Cow.

I want to speak for a few moments upon some of the points of a dairy cow. I will suppose I am standing in your barn yard, and I have $50 in my pocket which I am going to change for a cow. Now, what are the points I will look for? A cow gives an exhibition of her ability, first, by the shape and condition of her udder. Here is the object of her existence. This cow lives, moves and has being for the sake of this organ. She is worth but little for anything else; she is bred for this purpose. She is a mother. The man who bred her, did so with the object that she would be a little better mother than her mother. This cow belongs to the nervous temperament and shows it in her build; she has a lean head, long from the eye to the brain. She is an active animal. She shows a full eye and that causes a hollow in the face, a dishing face. There is an alert, keen expression in those eyes. That indicates her temperament.

Milk is evolved from the blood, the blood is affected by the breath, and you know how important good lungs are, so she should have large open nostrils. She should be long in the head. I want a cow to show all the brain I can get in her because the brain supports the whole nervous system, and this udder is the final answer to the long chain of nervous machinery. The brain is the battery which operates all the time to keep this nervous machinery running.

When the nervous system grows weak it is an indication that the brain action is weak. From the brain go all the nerves of the body. I want my cow to show a strong back. The first thing I look for in a butter cow is a very strong expression of the back bone, and I want it because a large back bone indicates a large spine, the large spine indicates a strong nervous channel from the brain and I know then that that cow has a powerful nervous machinery.

Motherhood.

You will see in a moment why she needs a large nervous force. The deposition of milk is intimately connected with the brain. It is a question of motherhood, of maternity. If the brain is affected by any emotion it immediately affects the operation of the nerves here at the udder. Fear, fright, anger will affect it. This udder is enveloped with a net work of nerves called the sympathetic plexus. It is a wonderful piece of machinery. This net-work of nerves runs up here to the uterus. Think of it. Whenever you strike or abuse or deny comfort to this animal remember you are engaged in a piece of work against a mother. This net-work of nerves runs to the uterus, from there by way of the spinal chord, clear through to the brain.

Milk Fever.

One of the clear proofs of this is the action of milk fever. It is the same that in human mothers is called puerperal fever. It is a mother fever, and yet thousands of men pay no attention to it. I lost a beautiful thorough-bred Guernsey cow last spring, because the man I left in charge of her did not adhere to the rules I had given him. He allowed her to lay out all night in a low, damp place. She was a highly organized cow, bred to breed highly organized calves.

This terrible milk fever shows the importance of the study of the nervous machinery. It starts in the uterus, it is a septic poison. At once Nature telegraps to the udder, "Stop secreting

milk," and it is stopped instantly. The disease progresses, and the inflammation begins to extend along the line of the plexus and finally it goes on until it reaches the spinal marrow, and the moment it reaches that, the cow drops. Paralysis ensues, and it keeps progressing, involving the spinal marrow and approaching the brain, and by and by the cow will knock her head against anything, and act as a person does who has brain fever. By and by she swings her head to one side and dies.

Such an emergency calls for dairy intelligence and handling. The man who handles dairy cows and does not understand how the functions of milk-giving are affected by care, stands in his own light. I heard old dairymen down in New York state last winter growling and cursing about the tariff, while their cows were out wading ankle deep in snow, and the thermometer seven degrees below zero, and they wondered why they got no milk. Why, any mother, any wife could tell him. Indeed, women know more about a cow than a man does. She understands the laws that govern motherhood. Remember that a cow needs warmth. The farmer forces her out into the cold and storm to drink ice water, or he keeps her in a barn cold enough for the excrement to freeze. Then he says, "I can't get any money out of this cow." You must give the mother comfort, you must give her cleanliness. There is hardly a stable in Wisconsin but what ought to be indicted. Why, my friends, you cannot make a cow profitable the way many of you are doing. You are standing in your own light. The cow needs dairy handling as well as dairy breeding.

Feed Dairy Rations.

Just one point more. You must feed dairy feed. Bran, cotton-seed meal, or linseed meal, or some other protein food. I want half a dozen of you farmers in Waupaca county to sow some peas this spring. I have been studying up that subject for two years, and I find peas are a wonderful feed for the dairy cow. Two pounds of pea meal are the equivalent of six pounds of ordinary bran. Any good farmer can grow from twenty-five to forty bushels of peasto the acre. They must be planted deeply. You must not sow on the ground and drag them in. If you grew forty bushels of peas to the acre you would get the equivalent of $70 worth of bran according to present prices. Another thing, peas need to be sown about twice as thick as the ordinary farmer generally sows, from two to three and a half bushels to the acre.

Now, if I have said anything that is of any use to you, you are a thousand times welcome, and if I have said anything that hurt your feelings, remember that they were the plain words of a friend.

Adjourned to meet at 9:30 A. M.

MORNING SESSION—MARCH 18th.

The Institute met at 9:30 A. M. Sup't Morrison in the chair.

SOME NEW EXPERIENCE WITH THE SILO.

By THOS. CONVEY, Ridgeway Wis.

I am afraid this audience will be disappointed with my remarks concerning the silo, as I have no new experience to relate except it be the experience of others. In building, filling and feeding from a silo, it is much safer to follow than lead, for there is no occasion for blundering in any part of the business, as explicit instructions are easily obtained. Siloing is now established on a substantial basis, and those parties who are inclined to experiment have to take their chances of success or failure. There has been a great deal of cheap talk about cheap silos, but a cheap silo is like other cheap articles, correspondingly poor, and I fail to see where it cheapens the cost to use part of an expensive barn in erecting a silo. It is simply a matter of convenience to have a silo in a barn. I built a silo adjoining the barn, and it cost, including labor, at least $2 for each ton it would hold.

A silo should have a good foundation, be air tight at bottom and sides, and sufficiently strong to resist lateral pressure. It should have a good roof, and be well painted on the outside, and well tarred on the inside. Should have three courses of lumber and one of tar paper and should be made of seasoned lumber. If put up in this way the roof will be the first to decay. The silo is now no experiment and should be substantially built. Mine is square but would be better in the rectangular form and still better if round. I know of one in Grant county built cylindrical in shape. With fence boards standing on edge, nailed together of sufficient thickness to form a sill for 2x4 studding, with three courses of ship lap, the outside course put on horizontally as was also the first course inside, then a course of tarred paper and the last course of ship lap inside, put on perpendicularly, this building cannot be sprung, as each board forms a hoop, and it may be built of any desired height, by spiking on additional studding. The circular form is the most capacious, it takes less lumber in its construction, is stronger, and has no corners in which the ensilage can spoil. It can scarcely be questioned that good corn fodder is nearly or quite equal in feeding value to good corn ensilage, yet it is more difficult to obtain good fodder than good ensilage, as good ensilage may be put up every year, while good fodder may only be obtained in favorable years. The amount of labor involved is in favor of the ensilage. To get the best results, feed-preparing machinery is necessary in either case, especially in stable feeding. The argument that it does not pay to feed grain to cattle, is a humbug, and the sooner we realize this the better.

It is only the grain fed cattle that pay for their keep, especially in winter feeding, and if the grain fed cattle do not pay, it is because they are poorly bred, or unskilfully handled.

I always want to have as much grain as possible in the ensilage, as I know of no way in which corn can be handled so as to preserve its palatability and digestibility better than in the silo.

It may be that the fermentation it undergoes in the silo, destroys as much of its feeding value as field curing. Yet I venture the assertion that intelligent feeders are almost unanimous in stating they get better results from feeding ensilage. I have tried soaking, shelling and grinding, feeding the fodder and ground feed separately, but gave it up for the much better method of cutting up corn and corn fodder together, feeding in this way and having hogs follow the cattle, but consider the silo as much of an improvement on the latter, as it was preferable to the first method.

Hauling fodder from the field as it is required, has never suited me. Storing it in the barn is the most convenient way and this is sometimes attended with bad results. Stacking outside is the method usually resorted to, in the latter case, or in case you wish to cut the fodder, it involves a great deal of handling, as it is not safe to cut more than a week's supply at a time. This requires the frequent use of machinery, which is sometimes disagreeable in cold weather, and besides where you feed heavy on fodder there is considerable waste. Although the silo costs more with regard to size than a barn, we should not forget that ten tons of ensilage can be stored where we can store one ton of hay.

Heating up in the preservation of ensilage does not appear to be a necessary condition, it is simply unavoidable; hence rapid filling gives the best results, wilting corn that is sufficiently mature injures the quality of the ensilage. Wilting immature corn removes some of the surplus moisture and produces better ensilage. Immature corn or fodder without grain cannot make good ensilage for it lacks feeding value in the first place, and fermentation adds nothing to it, on the contrary, fermentation always takes place at the expense of more or less of the feeding value. There are two conditions to be guarded against in putting up ensilage. We must not put up ensilage so mature that it will heat up too much, which you can detect by the discoloration of the ensilage; on the contrary we must not put it in so immature that it lacks feeding value. This can be readily detected by excess acidity in the cured ensilage. The advisability of putting up clover ensilage is questionable, putting it in before too ripe, cutting it up, and weighting would seem necessary. Then I doubt if it would compare in feeding value with good clover hay. I have tried cutting corn with a reaper, but in heavy corn it leaves it in such bad shape, I would just as soon cut by hand. With a tread power, three men and two teams, and short hauling, I can put in a ton in thirty minutes, and with less labor than I could handle that weight of dry fodder. Even distribution of the ensilage in the silo, and treading down well, especially near the walls, secures an even settling. This excludes the air, the only mystery about the curing of ensilage.

DISCUSSION.

MR. FLEMING — What kind of corn do you raise for the silo?

MR. CONVEY — I raise a dent corn. I have visited all parts of the state except the southern, and I have never yet seen what I considered a perfect sample of ensilage from the larger varities of corn. I use what is called Litch's dent corn, which has heavy foliage. I put from three to five kernels in a hill. I have not tried Stowell's Evergreen.

MR. FLEMING — Why not use another variety that you may have corn at the same stage of maturity during tne entire filling?

MR. CONVEY — It would be better but you can secure this by planting the same variety of corn at different times.

MR. GOODRICH — Evergreen sweet corn is an excellent corn to raise for fodder in the fall, but it makes ensilage that is more sour.

MR. POTTS — What length do you cut your ensilage?

MR. CONVEY — Seven eighths of an inch. I lift it with a carrier attached to the feed cutter. I have been using sweep power, but shall use tread power hereafter. I think the cylinder cutter is better than the balance wheel cutter.

MR. FLEMING — What do you cover with?

MR. CONVEY — I have put lumber on, then tarred paper and then cut hay, but this year I covered with grass without using the tarred paper and had more damaged.

QUESTION — How should ensilage be fed to get the best results from it?

MR. CONVEY — Always in connection with other feed. I am feeding clover, hay and bran.

MR. GOODRICH — Do you think you can carry more stock on a given number of acres by the use of the silo than without it?

MR. CONVEY — If you take the labor into consideration, I can. Still, I know that where they have made tests as to the comparative value of corn fodder, and corn ensilage, there don't seem to be anything in favor of the ensilage.

MR. GOODRICH — But it is impossible to get such fodder as they test with. I can carry more stock with the use of the silo, and it takes less work.

QUESTION — What is the cost of a ton of this ensilage in the silo?

MR. CONVEY — I would consider in the neighborhood of a dollar.

MR. GOODRICH — I have submitted that question to a great many in this state, and they figure it at 75 cents, 85 cents, 95 cents and a dollar a ton. I figure it a dollar.

SUPT. MORRISON — Can you make butter any cheaper by this silage than dry fodder?

MR. GOODRICH — I can, because I provide the feed cheaper; it cost me sixteen and two-thirds cents to manufacture a pound of butter before, and now it costs me thirteen cents.

MR. CHANDLER — What is the proper time to cut ensilage corn?

MR. GOODRICH — When the corn begins to glaze or dent.

MR. CHANDLER — Do you let it heat or fill right up?

MR. GOODRICH — Fill as fast as I can.

MR. HYATT — Is silage of any value as feed to other stock?

MR. GOODRICH — I think it is. I have, however, concluded not to feed ensilage to brood mares. I have fed it to work horses.

MR. ELLIOTT — What kind of a rack do you use in the field? Also, how do you fill and tread in the silo?

MR. CONVEY—I use a flat rack on low trucks. One man loading in the field, and another hauling.

QUESTION—In filling, do you believe it is better to keep the silo level or to keep it oval shaped and well tread?

MR. CONVEY — It would probably be better to keep it level and well tread.

MR. ELLIOTT — I have a rack for hauling that I constructed myself. I call it a low down-rack, it is about sixteen feet in the clear, and only about six inches from the ground. Two of us go into the field and each take a row, and as the team goes slowly along, we each throw into the rack until we have all the team can get out of the field with. We go directly to the cutter, which stands on a level with the platform of this rack, and we fill right into the silo, and tread it all over. Three of us, with three horses, put in ten to twelve loads a day. The team is changed from the rack to the power every time.

MR. ARNOLD—If you let the corn take care of itself as it comes from the carrier, won't it fall unevenly?

MR. ELLIOTT—I don't let it take care of itself in the silo. The man in the silo distributes it, and it is tread all over the whole surface. I think it should be kept oval in the center and well tread, or after it has settled it will tip away from the walls, and that lets down the air and makes a big loss. In building a silo a man wants to be careful that it is not larger at the bottom than at the top, if anything, it is better to have it a little smaller.

MR. ARNOLD—Isn't there danger from lateral pressure in that case?

MR. ELLIOTT—Yes, mine is only four inches in twenty-four feet.

MR. ELIASON—Do you fill your silo every day till you get it full?

MR. ELLIOTT—Yes, rapid filling, and I cover with green slough hay run through a feed cutter and put on one foot in thickness. We tread it for the first two days, but keep off from it after that time, because it begins to seal itself. It forms a slight mold, and if you tread after that, it breaks that mold.

MR. COLE—Wouldn't it be a great advantage to have a wide tired wagon in hauling that corn from the field?

MR. ELLIOTT — Most assuredly it would.

MR. ROE — How do you account for moldy spots or bunches in silos.

MR. CONVEY—I think it was due to putting in the corn with external moisture on it.

MR. FLEMING—I believe that would not hurt if the corn was in the proper stage of maturity. I have filled for six or seven years and always had rain on it, and it never moulded a bit.

MR. GOODRICH—Last year, in filling my silo there were several tons cut down when there was a shower on it, and it had to be put in wet, and there is no mold on it; it did not hurt it a bit.

MR. ROE—There are spots in my silo about as big as my hand.

MR. ARNOLD — I think that is occasioned by not filling continuously.

MR. FLEMING—It might be attributeable to the accumulation of some dry foliage.

JOHN RHODES—with a view of testing the value of silage, independent of dairying, we began feeding silage Nov. 24, 1890. It consisted of corn cut to one inch length, Smut Nose for early, and White Dent for late. It was grown for the corn. The tile drained portions would yield one hundred baskets of ear corn per acre. It was siloed when ripe enough to cut for ordinary field curing.

The results of feeding this silage to horses, cattle, sheep and hogs, were entirely satisfactory, except to the hogs. With swinish obstinacy they set their noses against it and refused to eat. We failed to convince them that it was good. Possibly the sight of a crib full of ear corn close by, warped their judgment.

The horses did not like it at first, a few oats were sprinkled on top and in about two weeks they grew very fond of silage. Two were work horses, one brood mare in foal, one driving mare and three colts. Their rations averaged daily 30 pounds of silage, 2 quarts oats, and as much slough hay as they would eat. They are now in fine condition. The average weight of four of them was 1447 pounds each, on April 14, 1891.

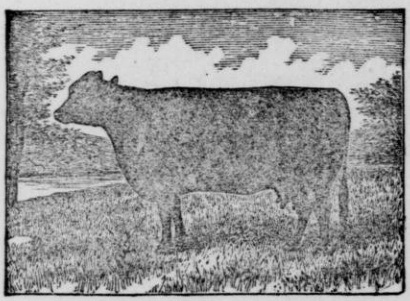
The cattle were fed nothing but silage and hay. Steers three year old this spring, ate daily 68 pounds of silage each, and 4 pounds of timothy hay. After three weeks of preliminary feeding two heifers and two lots of steers were weighed, Feb. 23. Thirty days later they were weighed again. The average daily gain of each animal was as follows: Heifers, 2 pounds each; first lot of steers, 4 1-10 pounds each; second lot, 2 8-10 pounds.

The sheep (146) were not weighed, but are in much better condition now than last November. They were fed 12 bushels (about 408 pounds) of silage daily and all the hay they would eat. Feeding silage to sheep in small grain troughs is a failure. They throw it out and waste it. Tight bottoms put in hay racks answer well.

Think we can obtain better results by feeding clover hay with silage than timothy hay. Our silage was spoiled on top and around the sides, and the surprise was that our cattle and sheep had no more sense than to eat the mouldy, loud-smelling stuff with as much apparent relish as the best. We intend to remedy this spoiling, or know why we can't.

Silage is heavy to handle, and the man who feeds 3,000 pounds daily, can use brains to great advantage in both filling and emptying his silo.

SUPT. MORRISON—The farm institutes have from the very first winter's work in 1885-6 advocated the silo, not as thoughtless enthusiasts but by careful investigation, and by the feeding trials of some of our best feeders. The following issued in July by our Experiment Station brings the latest obtainable information of the silo down to date and we gladly insert it.



THE CONSTRUCTION OF SILOS.

BY PROF. F. H. KING, Madison Wis.

Silo experience in the United States now covers more than ten years, and so far as the economy of producing silage and the advantages of feeding it are concerned, there appears to be everywhere, among those who have operated successful silos, a strong conviction that good silage is a superior and cheap feed; but the same experience is now fast demonstrating serious imperfections in the construction of perhaps a majority of existing silos in this country. Some silos have so rapidly deteriorated as to become utterly useless for the purposes for which they were intended inside of three or even two years, unless they are subjected to extensive repairs, while others have never successfully preserved the materials placed in them. With a view to obviating these difficulties in the construction of future silos, and of suggesting remedies for the defects of existing ones, a study of the actual construction and condition of silos now in use has been undertaken. It is the purpose here to record some of the facts observed and to make such suggestions as the present state of the study appears to warrant.

1. No. of Silos Examined.

Thus far 93 silos have been examined, of which 70 are in Wisconsin, 6 in Michigan, 6 in Ohio, and 11 in Illinois. Of these, 67 are lined wholly or in part with wood; 10 are lathed and plastered with water-lime; 14 are stone, grout or brick, with cement facing; two are lined with metal, and one with tarred paper.

2. Kinds and Conditions of Wood-Lined Silos.

Of the 67 silos lined wholly or in part with wood, 34 or more than one-half, showed some rotting at the time of the examination. The oldest of these silos have been filled only five seasons; seven are rotting at the end of the second filling, and one, which was relined at the end of three years, has the new lining rotting after a single year's use. This appears like a dark record for the wood-lined silos, but there is a brighter side when the subject is studied in detail.

We have found five varieties of wood lining now in use, as follows:

1. A single layer of matched boards, of which there are two; one of these is rotting where it comes against a beam in the barn, and the other has been used one year only. In the latter of these, the silage spoiled a foot in at the corners, and from two to four inches on the sides.

2. Two layers of common boards without paper and unpainted. But one of these was examined, and this was rotting in several places after three years' service. The silage had spoiled to a considerable extent in it, but it should be said that it was built of cull boards, many of which were worm-eaten and even spongy in places.

3. Two thicknesses of boards sepa-

rated by strips of furring laid upon tarred paper. Of the six silos containing this type of lining, their average age being 8.33 years, every one has rotted, two of them so badly as to require extensive repairs before the silos are suitable for service again.

4. One thickness of matched boards with paper on the studding. Thirteen of these silos have been visited, six of which, with an average age of 3 years, are in good condition still, while seven with an average age of 3.43 years, are rotting more or less.

5. Two thicknesses of boards with paper between, nailed closely and firmly together. There are 45 of these silos, 26 with an average age of three years, in good condition, while 19 with an average of 3.4 years are rotting to some extent.

The rotting which has occurred in most of the cases noted is by no means general and the conditions under which it has occurred may be thus stated:

1. Rotting where there has been inadequate general ventilation,— eight cases.

2. Rotting where stone walls have been faced with wood,— eight cases.

3. Rotting where boards came against beams or sills,— twelve cases.

4. Rotting where spoiled silage is left piled against the boards,— four cases.

5. Rotting where dirt is piled against or lies behind the lining,— four cases.

3. Importance of Thorough Ventilation.

I believe that the rotting in every case we have thus far observed in the walls of wood silos is attributable to imperfect ventilation, and that it might have been greatly delayed if not entirely prevented by different methods of construction.

Wood kept perfectly and continuously dry, or perfectly and continuously saturated with liquids which do not act chemically upon it will resist decay for generations; while almost any natural wood, containing a suitable amount of moisture and possessing the right temperature, may rot in a very brief period provided only that there be present in it the living spores or germs which develop and multiply at the expense of the wood tissue.

The ordinary kinds of wood-decay are processes of disintegration due to forms of life which develop from spores and do their destructive work where conditions are favorable, that is, where the temperature is right and the wood is, for considerable intervals of time, neither too wet nor too dry. This being true it is evident that wood-lined silos should be so constructed that all lumber against which the silage does not lie, shall be continuously too dry to permit of decay, while the lining itself should be permitted to become dry, and remain so, as fast as the silage is removed from it. These conditions may be maintained in all comparatively dry climates, I believe, by adopting modes of construction which insure very thorough ventilation both of the silo pit and within the silo walls immediately behind the lining; but it may be seriously questioned whether in damp climates, where the shingles of houses are largely moss-covered most of the summer, a simple wood lining can last long in any solo.

4. Paint For the Wood Linings of Silos.

The linings of wood silos have been treated in various ways to render them less liable to rot, and the following have been observered:

1. Linings without paint of any kind.

2. Linings painted with hot coal tar.
3. Linings painted with coal tar dissolved in gasoline.
4. Linings painted with hot coal tar mixed with pitch.
5. Linings painted with pitch alone.
6. Linings painted with linseed oil and red ochre.
7. Linings painted with linseed oil alone.

As far as can be deduced from a study of the cases visited, there appears to be very little if any advantage derived from the use of the paints mentioned. Some of the very oldest wood-lined silos I find unpainted, and at the same time perfectly sound, while on the other hand the silo having apparently the best coating of paint has rotted more than any other and inside of three years.

If a perfectly impervious coat, which would remain so, could be applied to the wood lining, this would, without doubt, be of great advantage; but the coats mentioned, applied as they have been, leave innumerable places for the silage juices to enter the wood, and when this is the case there are two ways in which the paint may actually hasten the rotting rather than retard it, thus:

1. By preventing the boards, in places, from becoming wet enough to keep the fungi from growing there while covered by the silage.

2. By holding moisture in the boards long enough after the silage is out to allow the spores to develop and destroy the wood.

5. Stone and Grout Silos.

We have examined fourteen silos which are stone or grout and twenty-five which are stone or grout below and wood above. The masonry of nearly all of these silos is plastered with one or more coats of some variety of water-lime or cement, and where the work is well done the great majority of the testimony goes to show that the silage is just as good in contact with the masonry, or even better than against the wood.

The water-lime coating, however, is not permanent. Both the acetic and lactic acids of the silage juices act vigorously upon the lime, in all varieties of cements; dissolving it out and leaving the mortar a layer of porus sand, which is easily and deeply scarred with the fork in removing the silage and which crumbles and rubs off under the hand. When this condition is reached, the layer of cement becomes saturated with the silage juices, and if the walls are not protected from frost, it freezes and cleaves off; where this is not the case, in the older silos, the absorbed juices undergo a change, which results in the development of a very strong and disagreeable odor, which I have rarely detected in the wood silos. The quantity of juices absorbed by the porous cement is enough to develop a thick layer of mould, sometimes covering the entire walls in the poorly ventilated silos and this, on drying, cracks and rolls up as mud does in the sun. While it is true that the acids of the silage decompose the cement of the stone silos, still the life of a single heavy coat, well put on and protected from frost, appears to be at least ten years, and with a yearly white-washing with pure cement, I have no doubt that a single coat of plastering might last twenty to thirty years.

Where the walls of stone silos have been left rough and uneven through insufficient pointing or not plastering them, the settling of the silage develops air spaces against the walls, which result in more or less silage spoiling; this fact coupled with another, namely, that

the earlier stone silos were comparatively shallow, has been, in my judgment, the chief cause of unfavorable criticism of these structures. The only serious objection I can urge against a well built stone silo is its relatively high first cost.

6. Lathed and Plastered Silos.

Of this class of silos I have visited ten; one has been filled four times, three, three times, and the remainder only once or twice. No one of these silos could be pronounced unqualifiedly sound at the time of my visit. Indeed one had been relined with wood after two years' service; one was being replastered in places, and three others had some of the plastering off, two of them large areas, when they were examined. They all showed cracks and the disintegrating effects of the acids described under the stone silos. There are several very serious objections to this type of lining:

1. The springing of weak silo walls, the treading and packing of the silage tend to break the clinches and loosen the plastering.

2. Careless use of the fork in removing the silage will necessarily perforate and break away the cement.

3. The softening effect of the acids renders the coat liable to destruction from freezing and permits the silage juices to wet the lath and woodwork behind, and by holding moisture against them after the silage is removed, increases the danger of rotting. In the silo which had been relined with wood it was stated that the boards were damp when the plastering was removed a month after the silo had been emptied and that some of the boards were already rotting. The silo which had been in use four years had been whitewashed with pure water-lime each season, and this appears to have nearly neutralized the acids and thus protected the lining, for the only softening in this case was near and at the bottom. Three of this class of silos visited are round, thirty feet in diameter and plastered with hair mortar to which cement was added when it was applied. Here the greater rigidity of the silo walls, the arched surface of the mortar and the hair in the clinches all conspire to give greater permanence to the lining than in the rectangular silos, and I have no doubt that with very thorough ventilation both of the silo pit and of the walls behind the lath, together with a yearly application of cement whitewash, the lining may last a long time.

7. Metal, Shingle and Paper-Lined Silos.

We have at the Experiment Station two silos lined with metal, one with sheet-iron and the other with roofing tin. They have each been in use one year, and in my judgment are not likely to prove satisfactory. None of the available metals are in themselves proof against the acids of the silo, and it is difficult to coat them in such a way as to entirely shut off the acids. The two varieties of paint used on the linings mentioned came off quite generally and the rusting of the sheet-iron is very noticeable. Roofing tins are now mostly coated with lead, and its compounds are poisonous. I have found it very difficult to coat sheet-iron, even with coal tar which the acids do not attack, so as to protect it on account of the small cavities in the surface, containing air which expands with changes of temperature and blows out, leaving minute pores through which the water and acids enter and eat under the rest of the coating. There is less trouble of this sort with tin,

but in either case the fork is certain to cut through the paint and expose a fresh surface to the action of the silage juices; and besides neither of them can be applied for less than $50 per thousand square feet.

I have seen but one paper-lined silo, and it is very unsatisfactory. The paper was held in place by cleats extending both up and down and horizontally. The paper was badly warped and much torn. The cleats interfere with the settling of the silage and tend to develop air spaces which cause the silage to spoil on the sides.

The two shingled silos were in a fair state of preservation, and the silage is reported to have kept well in them. In these cases cull shingles had been used at 60 cents per thousand.

Such a lining is necessarily less perfect, and I believe, not as lasting as plain boards, and when good shingles are compared with good lumber, the lumber is cheaper.

8. *The Form and Dimensions of Silos.*

An ample depth of the silage is one of the first requisites of its keeping. I have visited silos 30, 34 and 36 feet deep, and all the evidence goes to show that the best silage and the least absolute waste is found in deep silos, while other conditions being the same, the poorest silage and the most waste occur in the shallow ones. My conviction is that the best results can hardly be secured with a depth less than 24 feet unless very heavy and careful weighting is resorted to. The importance of depth increases when clover or other loose-lying material is cut in, and such materials should, as a rule, be covered with a considerable depth of corn to insure closer packing and a more complete expulsion of entangled air.

In form the silo should be either round or as nearly square as it is practicable to make it, because these forms give the greatest capacity with the least amount of side exposure. The long, narrow silos are needlessly wasteful, both of silage and of lumber. I have visited one silo 12 x 27 feet, only 12 feet deep, and another 16 x 48, 22 feet deep. Now a silo 32 feet square will have the same amount of side exposure as the one 16 x 48, and for the same depth, will hold just one third more; while the same amount of side in a round silo will enclose more than two-thirds more silage and will require much less lumber to build it, because 2 x 4 studding may be used, the siding and lining acting as hoops giving the needed strength.

9. *The Importance of Feeding From the Top and the Use of Partitions.*

In the construction of silos, careful attention should be paid to the area of surface exposed in feeding the silage. Silage wastes much more rapidly when fed from the sides than from the top, and since the most economical construction demands the largest possible feeding surface, it follows that the feeding should be, in general, from the top.

The proper horizontal area of the feeding pit depends upon the amount of silage fed daily and the rate at which silage becomes seriously injured when exposed. I have not been able to gather facts enough to settle this important point. The spoiling is certainly more rapid in the shallow than in deep silos, and more rapid when corn or clover is put in whole than when cut, because it is impossible to feed the surface down as evenly and keep it as smooth. My impression is that the silage should be lowered at least two inches daily, and that three would be better. Taking three inches as the depth

fed daily, forty as the number of animals, 150 days as the feeding period, and 1.5 cubic feet as the amount fed to each animal daily, a round silo 17.5 feet inside diameter and 37 feet deep would be required. The same conditions would also be met by a round silo 22 feet inside diameter 24 feet deep with a partition through the center.

Where all the silage can be fed conveniently from one point and a large amount of silage must be stored, one silo with partitions is not only much cheaper, but better than separate structures because the additional corners cannot admit air from the outside when the pits are full and the round silo with partitions makes less corners than the rectangular one does.

Two inch partitions give ample strength where the filling takes place on both sides at once. And if it is desired to fill one pit faster than the other, temporary braces may be placed in the empty pit and removed as it is filled I believe that two thicknesses of boards with paper between make a better partition than the two inch plank which appears to be more commonly used.

10. Smoothness of Silo Walls Essential.

Whatever tends to the expulsion and exclusion of entangled air must conserve the silage, and whatever tends to leave or form cavities in which air can lodge in bulk, experience shows, leads to spoiled silage. Cross-rods, overhanging ledges and projecting stones should be avoided as they hold up the silage, forming cavities into which air collects, enabling the molds to grow.

11. The Covering of Silage.

When the feeding of the silage does not begin very soon after the completion of the filling, a good covering lessens the waste. I have found the following practices in regard to covering:

1. Some do not cover at all, and have six to twelve inches of waste.

2. Some have used straw with no gain and possibly greater loss.

3 Many use green marsh hay cut on, and sometimes wet, with good results.

4. A few use chaff with good results.

5. One has used boards covered with eight inches of dry earth, which is used afterward in the stables as an absorbent. Silage keeps well.

6. One used straw and weighted with stone with poor results.

7. Some use cut marsh hay covered with plank, the cracks between plank covered with boards, and the whole weighted with stone. Little loss except at edges and corners.

8. Others use a layer of cut straw, then boards, then tarred paper and boards again. Keeps perfectly except at edges and corners.

9. Still others have used first paper, then boards, and these weighted with stone, with good results.

The testimony in regard to covering is quite discordant. Some claim good results with a given method, while with others it has failed. Some have good results one season, and very different results another with the same method. We need much more positive knowledge on this point than is now available.

12. Protection Against Rats.

Nine of the silos visited have been invaded by rats. They enter usually by burrowing under the foundation walls, coming up inside even where cement has been used. But in some cases they have found entrance to the dead air spaces, then cut holes through the linings, usually at the corners. Their de-

structive effects result from the admission of air to the silo, and when it is said that one man reports killing twenty-six rats in a silo, the possibilities of damage to silage by this nuisance can be appreciated.

The surest safeguard against them appears to be covering the bottom of the silo with a layer of small stones or grout, before the cement is applied. When the cement is applied directly upon the ground the action of the acids soon softens it to such an extent as to permit the rats to penetrate it without difficulty.

13. Protection Against Freezing.

If we should be guided in the construction of silos by the general testimony in regard to the liability of silage freezing, the statement would be that very little attention need be paid to this point.

It must be borne in mind, however, that most of our silo experience has been gained during the past three years, when the winters have been exceptionally mild. Those owning older silos do speak of silage freezing, and some of the stone silos testify to the destructive effects of frost. The general verdict is that the freezing, so far as silage is concerned, is more an inconvenience than a serious loss. When the frozen silage is mixed with the rest it quickly thaws, and is apparently relished as well as if it had not been frozen. All types of cemented silos must be built frost proof to prevent the cement from cleaving off; but with wood silos the construction required to preserve the silage and to protect the frame from weather, appears to be sufficient to prevent any serious freezing during all except protracted extremely cold weather.

14. Construction of Wood Silos.

At present prices there is no available material on the market which can compare with wood in cheapness of first cost; and if a mode of construction can be devised which will insure permanancy to the frame work, and at the same time give an effective service of, say, ten years to the lining, the essential demands of a material for silo-building will be met by it. The fact that we have perfectly sound all wood silos of five years' standing which embody only a portion of the principles essential to long life is encouraging for this type of construction. I believe there need be no question about the entire adequacy of the wood frame and the covering outside, above ground, and I have great hopes for the wood lining.

In the construction of a wood silo it is important to have in mind the conditions essential to durability, and some of them will be here stated:

1. Only sound and well seasoned lumber should be used. I have mentioned the case of a second lining rotting in a single season. In this case the new boards were placed directly against those which were rotting, an equivalent to adding wood to fire; and when unsound lumber is used it is very likely to contain either the spores or living fungi which only require the dampness of the silo and its warm temperature to carry forward their destruction. Sapwood, too, is much more subject to rot, because it contains more food upon which the fungi subsist; hence the sappy ends of studding should be turned up and the sappy edges outward. The soundest boards should be reserved for the lining and the very best placed at the bottom.

2. Whenever the conditions are favorable for the rotting of silage there it is quite possible for the silo lining to rot also, as my observations have shown,

and since ample depth insures better silage, it may also be expected to better preserve the lining. I have not met a man who unqualifiedly says his silage is as good in the corners as at most other places along the sides, hence I feel that rotting of the linings of these places is likely to take place, and for this reason and because it is stronger and cheaper, the round form, wherever it can be used, is preferable to the angular silo.

3. The large number of observed cases of rotting where dirt, stone walls, beams or sills hold dampness behind the silo-lining, coupled with the cases of rotting which have occurred where there has been imperfect general ventilation, show that perfect ventilation on both sides of the lining is one of the first essentials to its preservation, hence, horizontal studding and the placing of linings directly against beams or sills should be avoided as well as the lining or stone walls with wood.

Silo Linings.—In the majority of cases the best results have been associated with the lining consisting of two layers of boards with tarred paper between them, but it does not appear essential that either should be matched; they should be of uniform thickness, however, and the narrower widths are best. On account of the conditions which work for and against the rotting of linings I believe a still more effective and durable lining may be secured by painting both layers of boards *on one side only with hot coal tar boiled until it is not sticky when cold.* The tarred sides should be placed *face to face* in the silo, tarred paper between them, and I would urge the painting of the paper with cold coal tar after it is in place but ***no faster*** than the inner lining is put on. The coating of the boards may be readily done by boiling the tar in an iron kettle three feet in diameter letting one man slide the boards across the top while another paints them with a well worn broom. The tar should be laid on smoothly, and the boards placed horizontally to cool. After boiling the tar down to the proper consistency, there should be enough fire only to keep the tar hot. A wide board should be at hand to throw over the top of the kettle to smoother the flames in case the tar should take fire from overheating.

It would be less trouble, perhaps, to put on the first layer of sheeting and paint it, in place, with coal tar boiled until it is as thick as it will spread readily when cold. By painting the first lining and placing the paper, and painting this just before the second lining is put on, a very impervious wall must be secured. Such a treatment of the lining would prevent the outer layer from becoming damp, allow the inner to dry more quickly after the silage is removed, besides rendering both more impervious to air, and it would seem, must be a great improvement at small expense, but only a trial for a series of years can positively settle the matter.

The Sills.

These should rest on a good stone wall, well bedded in mortar after having their under sides and inner edges painted with coal tar, as described for the lining, and they should be everywhere at least six inches above the bottom of the silo inside, and eight inches above the earth outside.

In the rectangular silos, where they are deep, the sills must be anchored with iron rods as shown in Fig. 4, but in the round silo this is unnecessary. Fig.

4 shows how the studding should be placed on the sills and beams, if in a barn, to insure ventilation.

15. The Construction of Stone Silos.

I have visited some very excellent stone silos in Dodge county, Wis., one of which is 14x24 inside, and 30 feet deep 22 feet above ground. It is covered outside with dimension boards battened, extending up and down and nailed to 2x4 studding, held in place by hooked pieces of band-iron laid in the walls; its cost was $500. There are several silos built on this general plan in the same locality, one of ten and another of seven years' standing, which have not frozen, They keep the silage excellently, but the cement is fast softening.

16. Cost of Three Types of Silo Compared.

We give below the cost of a thoroughly built rectangular silo, and of a round one having the same capacity and depth as the stone one whose cost was $500.

In these bills the prices of materials have been set at the present local rates here, and the cost of carpenter labor has been placed sixty-five cents per M. above what I know similar work to have been done for where the carpenters were boarded.

RECTANGULAR SILO, 180 TONS.

14x24 inside, 30 feet deep.

Foundation, 13.44 perch, at $1.20	$16 13
Studding 2x12, 28 ft., 4,704 ft., at $20	94 08
Sills, etc., 2x10, 26 ft., 206 ft., at $19	4 94
Sills, etc., 2x10, 16 ft., 426 ft., at $14	5 96
Rafters, etc., 2x4, 20 ft., 400 ft., at $16	6 40
Roof boards, fencing 450 ft., at $15	6 75
Shingles, 5 M., at $3	15 00
Drop siding, 8 inch, 2,779 ft., at $16	44 46
Lining sur. fencing, 4,266 ft., at $15	63 84
Tarred paper, 426 lbs., at 2c	8 52
Coal tar, 1 barrel	4 50
Painting 60c. per sq.	15 00
Nails and hinges	10 00
Cementing bottom	5 00
18¾ inch bolts, 18 inches long	2 70
Carpenter labor at $3 per M. and board	41 16
Total	$344 44

ROUND SILO, 180 TONS.

20 feet inside diameter, 30 feet deep.

Foundation, 7.5 perch, at $1.20	$9 00
Studs 2x4, 14 and 16 ft., 1,491 ft., at $14	20 93
Rafters 2x4, 12 ft., 208 ft., at $14	2 91
Roof boards, fencing, 500 ft., at $15	7 50
Shingles, 6 M. at $3	18 00
Siding rabbeted, 2,660 ft., at $23	61 18
Lining, fencing, ripped, 2,800 ft., at $18	50 40
Tarred paper, 750 lbs., at 2c	14 80
Coal tar, 1 barrel	4 50
Hardward	6 00
Painting, 60c. per square	13 20
Cementing bottom	5 00
Carpenter labor at $3 per M. and board	33 17
Total	$246 59

The three silos are outside and wholly independent structures except the entrance and feeding chute shown in fig 2, which connects with the barn. This method of connection for outside silos, while a little more costly, I feel confident, is much the best in the long run.

There is no practical difficulty in filling a silo 30 feet above the cutter, I have visited one filled 28 feet above, and several 24 feet. The carrier, of course, must be longer, but the increased labor is relatively small. A filling window at a lower level may be and is in some cases provided, to be used at first.

17. Building a Good Silo by Degrees.

It is much better, and cheaper in the end, to start with the intention of building a thoroughly good silo, and it is possible to do this when money enough cannot be commanded at the outset. In building the round silo referred to, costing $246.59 it may be put up and used one or even two years before it is completed. To illustrate, in this case, the siding, outside paper, painting and cementing the bottom may be deferred one or even two years if really necessary, the only serious inconvenience possible being the freezing of the silage. This would diminish the immediate cost, $94.76, making the first year's expense $151.83.

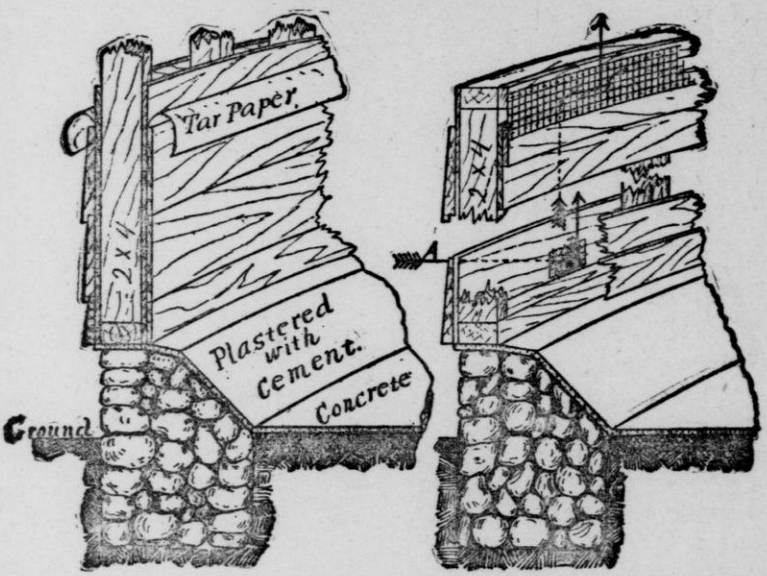


FIG. 1.—Showing the construction of all-wood round silo. Sills 2x4's cut in sections on a radius of the silo circle, bedded in mortar and toe-nailed together. Plates the same, spiked to tops of studding. Studding 2x4's one foot apart. Short lengths may be used lapped to get the depth. Sixteens and fourteens will give a silo 30 ft. deep. Lining made from fencing ripped in two. Outside sheeting the same. Siding for silos under 28 feet, outside diameter, common siding rabbeted; for silos more than 28 ft. outside diameter, common drop siding or ship lap may be used. A, shows ventilators between studding. Auger holes are bored at bottom between studding, and the boards lack two inches of reaching plate at top, inside. Both sets of openings are covered with wire cloth to keep out vermin. There should be a line of feeding doors from top to bottom, each 2 or 3 ft. by 5 ft., and about 2.5 ft apart.

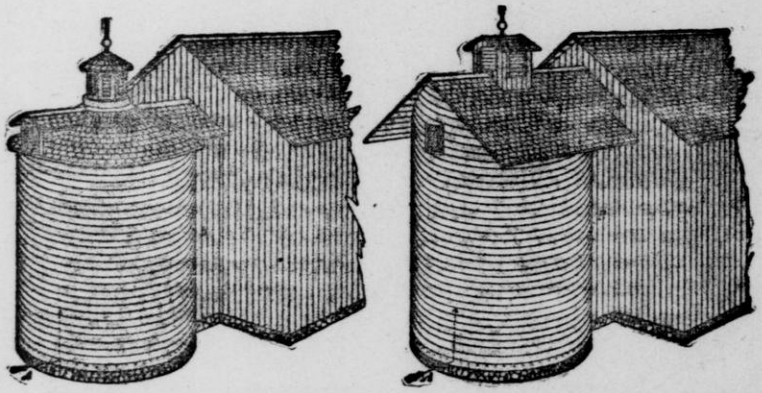


FIG. 2.—Showing two methods of roofing round silos and the manner of connectiug them with a barn. A A shows where air is admitted between the studding to ventilate behind the lining. B B, the feeding chute. C C, filling window. The cupola is essential for perfect ventilation.

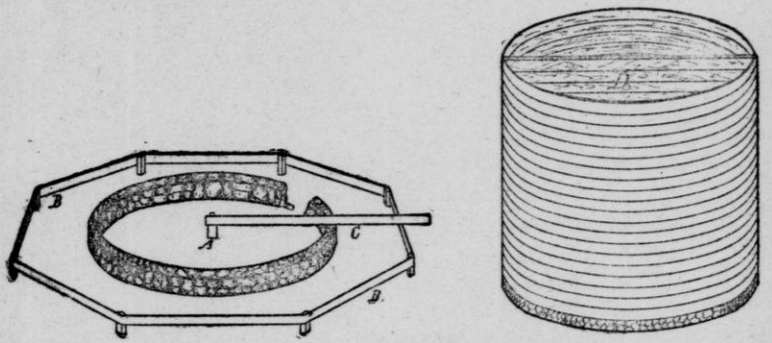


FIG. 3.—Showing method of laying and leveling foundation of a round silo, and a round silo with a single partition. A, center post with top of proposed wall. B B, straight edge boards nailed to stakes driven it ground. C, straight-edge fixed to turn on a pin at A. B B, are all nailed level with top of post A. D, partition in round silo. It may be placed so as to come in the middle of the single line of doors, letting the same doors answer for both sides.

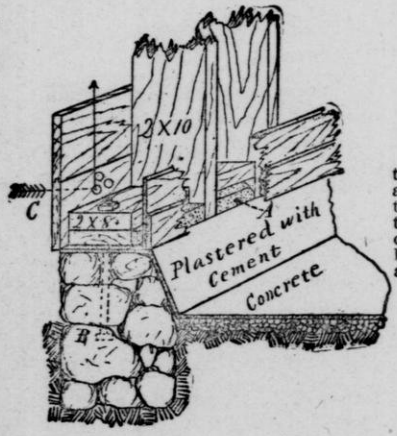


FIG. 4.—Showing the construction and ventilation of the walls of a rectangular silo. The sills are two inches narrower than the studding, to leave air space between sills and lining. A, is two inches of mortar made by stirring sand into coal tar, boiled until it is hard when cold. B, is bolt anchoring sill to wall, placed about four feet apart. C, ventilator between studding.

18. Suggestions Regarding the Repair of Existing Silos.

The matter of ventilation is the first point requiring attention. This can be secured in most of the silos which have carefully constructed dead air spaces, by removing the upper board next to the plate or by sawing out sections between each pair of studding. These openings may be covered with netting as shown in Fig. 1, if desired.

Where paper has been placed against the side of the barn and strips of furring used to carry the lining, I believe the best way will be to remove the lining, take of, the strips of furring and apply sound lining directly to the paper, putting on new paper where the old is injured.

Where stone walls have been faced with wood and the lining is rotting, the wood should all be removed and the wall plastered, so as to be a little more than flush with the lining above, and those who have walls which set back under the lining above should face them out flush. A jog outward into the silo below is often admissible, but the reverse never.

Where only small patches of lining are rotting, it may be best to cut out the rotting wood and paint the edges well with carbolic acid or creasote oil to kill the germs. Then fit in a block and nail over it a piece of tin and paint this with a coat of hot thick coal tar.

Where dirt has been banked against the lining, it should be removed and the bottom lowered enough to let the boards become dry when the silage is removed.

Rotting silage should not be allowed to remain in the silo. When it must be left for a time, it should be thrown into the center away from the walls.

The cases of rotting against sills and beams are the most difficult to meet. It is, of course, important to prevent the rotting from extending to the sills, and in some of the cases this may be done by providing ventilation behind the lining and then removing the lower two feet of lining, facing each stud with a wedge shaped strip about an inch thick at the bottom, letting it extend downward across the sill. Then, when the lining is restored, and the wall below made flush with it, the ventilation will help to protect both sill and lining.

DISCUSSION.

QUESTION — Is adamant a good material for plastering silos?

I have examined this material with reference to the action of acid upon it, and find that it is not acid proof; it is attacked by the acetic acid of silos and more vigorously by muriatic and sulphuric acids, each rendering it softer and less impervious to water and air. I am not certain, however, that it will not prove as satisfactory for the silo as any of the cements, for in the laboratory it is acted upon less rapidly than most of the cements, but I know of no actual test in the silo.

QUESTION — In painting with coal tar, which is best, to thin with gasoline or put on hot?

My observations convince me that simply painting plaster, brick or wood surfaces with coal tar, or "gas tar," thinned in gasoline does not completely fill the pores of the materials to which it is applied.

I have immersed dry brick in boiling "gas tar," and then, after they became cold, suspended them in water. Treated

in this much more effectual manner, they increased in weight nearly as much as other brick not treated, but of course, much more slowly. When the "gas tar" is thinned with gasoline it penetrates the surfaces more deeply, but leaves all of the larger pores and cracks open, acting much as oil does which has no paint in it to make it thick.

On the other hand, if the "gas tar" is boiled until it is not sticky when cold and then applied hot, it adheres perfectly and closes up all the large and small pores and holes alike, making the surface so treated, almost completely air and water tight. This treatment, however, cannot give a perfect lining to a lathed and plastered silo. My observations show that the springing and jarring, incident to filling and emptying silos, are almost certain to break the clinches on the lath, and allow the plaster to fall off. Such a treatment will certainly make a much more effectual lining as long as it lasts, but aside from the danger of flaking off, the fork may be thrust through the coating of tar at any time, thus exposing a place for the juices to act. When this coating is applied to the stone plastered silos, and to brick lined silos, I feel that it must prove very effective if care is taken to patch up such breaks as may occur from year to year with the use of the fork in emptying the silo.

Question — What is the best shape for a silo?

For preserving the silage in the best condition, for cheapness of construction, for strength and for facility in filling, I regard the cylindrical form far ahead of any other, and where a separate structure is to be built, in most cases this form will be found the best.

Question — What is the best depth for a silo?

If it is practicable to avoid it, no silo should be less than 24 feet deep.

Question — Is it necessary to build the silo walls very strong?

Yes. The pressure might be unusually large where the filling is uneven, and especially where the silage is dropped constantly in the center and only distributed once a day. In such cases its center is highest and the silage tends to slide outward against the sides. We used a strong side pressure upon the walls to prevent the silage from shrinking away, leaving space for air to circulate.

HOW I FEED DAIRY COWS.

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

Intelligent Feeding.

I believe that the true way to feed dairy cows for profit—and profit is what we are all after—is to feed the proper food for the production of milk, to the full capacity of the animal's power to digest, assimilate and manufacture these foods into milk. This way of feeding or "foroing," as some term it, is objected to by some on the ground that this cow machine will sooner be worn out. Suppose for a moment that position is correct. Is there a sensible man here who would

think of running any other machine that takes a certain number of hands to attend, and a certain amount of power to get up speed enough to do any work at all, who would run his machine at one-fourth or one-half its capacity, for the sake of making his machine last a little longer.

Profitable Feeding.

Then suppose you had a steam thresher that could do first class work up to 1,500 bushels a day as its limit. Is there any man here who would think it economy to run such a machine with only steam enough to thresh 500 bushels a day for the sake of prolonging its life a year or two. It would take nearly as much fuel to get up steam, the same engineer, the same feeder and other attendants, but his machine might last 11 years instead of 10. Such a man you would unhesitatingly pronounce foolish; but in my opinion he would be wise indeed compared with the man who would run his cow machine at anything less than its full capacity. The cow, unlike the thresher, improves by use, for animal nature has the faculty to adapt itself to the uses to which it is put, up to a certain limit. In other words, the more and better milk you manage to make a cow give, the more and better milk she *can* give until that limit is reached, as you develop her capacity to do so, and this improvement will be, in a measure, transmitted to her progeny, so that the heifer calves of a cow will be better than those produced before such development has taken place. In that way each generation will be better than the preceding one. These facts I have demonstrated to my satisfaction in my own experience. Others have done the same thing and I cite you as very high authority on this subject Prof. E. W. Stewart. You will find the subject quite fully treated of in his work on "*Feeding Animals.*" But it is not true that high feeding of cows if judiciously done, so as not to impair their digestive organs, will tend to "wear out the machine." More cows are "worn out" by under feeding than by high feeding. I have had them last with high feeding, with scarcely any diminution of their powers, till they were 15 years old.

Milk Producing Food.

To make the greatest profit in dairying the cow should be fed and managed in such a way as to make her consume as much as possible of good milk-producing foods. To do this she should have the greatest possible variety of foods. Her appetite — her likes and dislikes — should be catered to as much as can be consistently. In summer her pasture should contain a great variety of grasses. And when my cows are put in the stable to milk twice a day they have some good clover hay, and they never fail to eat some, no matter how good the grass in the pasture is. They also are fed in summer, except some of them that are dry a short time at that season, all the grain — corn and oat meal or bran — they will eat, which, of course, is not nearly as much as they eat in winter. In winter they have as great a variety of fodder as possible each day — clover and meadow hay, corn fodder and straw, with a grain ration, in two feeds of from 12 to 15 pounds. I observe the greatest regularity possible in feeding, having the same kind of food given at exactly the same time each day, so that they are never worried or disappointed by having one kind of food thrust before them when they are expecting another kind.

Economy.

To produce milk as economically as possible I try to provide the necessary elements in that food which will cost the least, having due regard all the while for the likes and dislikes of the cow herself, for I believe her pleasure should be consulted as much as the housewife consults the pleasure of her family when providing food for them. If oats are cheaper than corn meal and bran, I feed oats mainly for a grain ration; but if two tons of oats will buy three tons of bran, then I make the exchange. Chemical analysis seems to indicate that good clean wheat bran is fully as good as oats for milk production, but my observation seems to prove that oats are, at least, a little better. Corn is usually a very cheap grain food, but it is too carbonaceous and should not be used for more than about one-third of the grain ration. Corn ensilage made from well eared corn is the cheapest food I can provide for my cows, but it is not of itself a perfect ration but needs to be balanced up with bran or oats and clover hay.

Carefulness is Profit.

I have been trying to tell you how I feed my dairy cows, but I am sensible that I have failed to give more than a slight general idea of it, for each cow has her own individual capacity which differs from every other cow, which must be studied by close observation and acquaintance, before the feeder is able to do the best that can be done. I never could tell anybody just how to feed my cows. I never dare give instructions to have as much grain fed as I feed, for no one who is not intensely interested in it and in full sympathy, I might term it, with the cows, will be able to feed just right. Some cow might be fed a little too much grain and it not be observed until she refuse to eat, when it will probably be too late—her digestive organs permanently injured. When I wish to instruct anybody how to feed my cows I have to go, taking him with me and *show* him, and show him more than once, too.

I will see what I can do to further give an idea of how I feed. If I only had my cows here I believe I could show you. If I only had you down there it would do as well, and I will have to take you there in imagination.

You may stay just as long as you have a mind to, if you only treat the cows well. Now, just imagine yourselves all down at my house three years ago, before I had a silo, because silos are not very plenty yet, and I want you to know how I fed them then. You will have to get up at half past five in the morning, and go with me to the stable. I shall take some good clover hay and put it in the manger. You observe that I give more to one cow than I do to another. I know just about how much they will eat, and I want to give each cow all she will eat up without leaving any to breathe on.

Order and Regularity.

After the clover hay is fed the milking is done. Every milker has the same cows to milk each time. He commences in the same order, and milks about the same rate, never hurries and never lags, but as near as possible every time alike. If they are going to talk at all they must talk all the time. Sometimes we have had a boy and a girl out there milking. Now then if they are going to do any sparking, they have got to keep it up, but as a rule that does not work very well. The best milker I ever had was a very musical fellow. He used

to sing, but he had a different tune for each cow. Now if he should have changed his tune and sung Old Hundred to the Yankee Doodle cow you see the motion of his hand would have been slower, the milking would have been different, the cow would not have been pleased at all, would not have given so much milk, and it would not have been as good. After the milking is done I take a basket with some grain which is ⅓ bran, ⅓ ground oats and ⅓ corn meal by weight, and I come along to the cows. You will have to allow me to forget that I am here. I am going to be down there and I shall talk to my cows just as I do there. Now here is Beauty. "Beauty, you are a pretty nice cow. I don't just exactly like you because you are a little bit dainty, you can't eat quite enough to suit me. You don't act very hungry, you have been having six pounds of grain at a feed, here goes five pounds, that will do for you now." The next one I come to is Mollie. "Well, Mollie, you act as though you could eat; you are a fair cow, but there is considerable shorthorn about you, you are taking on flesh; that won't do, but then I cannot starve you, I can't do that, here she goes, seven pounds, you can eat that, and Mollie you will go to the butcher in the spring. If you want to live with me you musn't put your food into flesh."

Next is Jane. Jane acts hungry, she wants more than I will give her. The fact is she has been giving milk about ten and a half months and she has got to dry up. "Jane, I am sorry for you I can't give you much. If I give you all you want you will have the milk fever when you come in; be reasonable and satisfied." Now, here is Lizzie. How good I feel every time I see Lizzie.

"Lizzie, you act as though you were most starving; what ails you? I have been feeding you 9 pounds at a feed twice a day and yet you don't act satisfied. You are all right, you make good use of it. Here goes two measures. I don't know but there's ten pounds. Never mind, you shall have as much more as this at night if you want, you are making good use of it." I want you to take a look at this cow and see how bright her eyes are. She has a long face and strong jaws, she can crunch an ear of corn down with perfect ease.

"Oh," but you say "How sharp her backbone is." That is true; it sticks up six inches. But come around here and see what an immense girth she has; such a capacity for eating; how broad she is. "Yes," you say "how her hip bones stick out." I tell you those are points of beauty about this cow. Her hams are thin, there is a place for an immense udder, and she has one. "I don't see as that is much of an udder." Yes, but I have just milked twenty-one pounds of milk, and that milk has one and a half pounds of butter in it. Think of that. Now, this Lizzie cow is the delight of my eye. But you say. "Is she hardy?" Ain't a cow hardy that will make 3 pounds of butter a day? But she can't stand hardship, she can't stand cold; the fact is I don't believe she has ever been where it was cold enough to freeze. In September as soon as there are frosty nights she and all the rest of them are put in the stable, and kept in nights if the weather is cold or stormy. I let them out to drink in the day time, but they drink and come right back. Lizzie will be just crazy to get back to the stable. This feeding and milking is all done before breakfast you understand. After breakfast, say eight or

nine o'clock we go and let the cows out to drink and they drink pure water that is warmed up, to say, fifty or sixty degrees, so that the chill is off, and if it is cold weather only a few are let out at a time so they don't have to wait. If it is pleasant they stay out in the yard a little while and have some marsh hay. At noon they are given a good feed of cut corn fodder, and at night about four o'clock they are turned out to drink again, and what is left of this corn fodder is thrown out for bedding, and by the way, every time they are turned out there is a good lot of straw put in so they have good bedding all the time. The last thing at night the mangers are filled up pretty well with good clover hay. All this is gone through with every day until they go out to grass.

They have good pasture and all they want to eat besides, and they will eat just about half as much grain in the summer as they will in the winter, except those cows that are nearly dry.

DISCUSSION.

MR. CONVEY—How do you salt?

MR. GOODRICH—I intend to let them have what they want, all the time. I don't want it mixed with the food so that they get more salt than they want. Now, I give ensilage twice a day instead of feeding dry corn fodder. I feed about sixteen to eighteen pounds of ensilage at a feed twice a day to each cow.

MR. MCKERROW—Do you have any better results?

MR. GOODRICH—I think they hold out better than they did. I feed them cheaper. Of course I don't feed as much grain as I did. I feed about eight pounds, and there is four pounds in the ensilage.

QUESTION—How long does it take to milk?

MR. GOODRICH — It is done as quick as can be without bothering the cows. I have held the watch on the boys, and it averages about six minutes to the cow.

QUESTION — How do you break a heifer?

MR. GOODRICH — There's very little breaking to be done. I have very little trouble.

MR. POTTER—If one of your cows has injured a teat do you recommend a milking tube?

MR. GOODRICH—No, I think you are likely to do more damage than good.

MR. MCKERROW—If a cow kicks the hired boy, which do you discharge?

MR. GOODRICH—If a cow kicks the hired boy I blame the boy every time.

QUESTION—Do you ever try to harden your cows by letting some one have them who would abuse them?

MR. GOODRICH—Three years ago on a farm I own, a little way from where I live, I had a tenant who was to furnish half the stock. My cows didn't do well, I was sure they were going to die and I took them away, those that were not so hardy. The one I left there I thought could stand it. After a while a boy came down and said that the cow was sick. I went over to see and she was just breathing her last. That is the way my cows stand hardship.

QUESTION—What age do you prefer to have a heifer fresh in milk?

MR. GOODRICH—Two years. I want to set them at work at the business of their life when they are young so they can develop a good capacity for giving milk. I think I can develop them into better cows coming in at two years old

when they have been forced right along and get good growth.

If they have been under fed they won't be any better developed at three years than they ought to be at two.

QUESTION—What breed of cows do you keep?

MR. GOODRICH — I have no full blooded cows of any kind. My cows nearly all descended from Ayrshires, but they are graded up pretty well with Jerseys.

QUESTION—In case the milker sings the wrong tune do you lose in quantity or quality?

MR. GOODRICH—A little perhaps in quantity, but more in quality. I believe that the variation in the butter from day to day is due to some excitement or disturbance to the cow. If she can be kept perfectly quiet, and contented, the flow of milk and the amount of butter fat will be almost the same, other conditions being the same.

QUESTION—Do you think that being out in a little storm injures a herd of cows any.

MR. GOODRICH — I know it does. I know that whenever the flow of milk is checked it cannot be gotten back again without very much trouble. It cannot be gotten back to where it would have been had not the shrinkage occurred.

My youngest son, about 21 years old, has charge of the farm, and as he has a good share of the money that comes from it, he is pretty careful.

Last October one morning they were turned out of the stable, and there came one of those drizzling rains. I suggested to my son that it was rather uncomfortable weather for the cows to be out. He said, "Yes, but I guess it won't rain a great while." Now I really hoped it would rain all day so he would learn something by it, and it did. Every little while the boy would say, "Well, I guess it will clear up pretty soon," but it didn't.

I had twenty cows that were making twenty-eight pounds of butter a day regularly. I knew to a quarter of a pound how much we were going to have. It dropped right down to twenty-five pounds a day and never was gotten fully back. I couldn't help it by feeding for I was feeding to their fullest capacity already. You can believe they don't stay out now in storms.

Now, suppose they had been left out in another cold rain and another shrinkage had occurred. And then the next day suppose they had not been fed all they wanted, still more shrinkage; then after that suppose I got a stranger who was a little rough with them to do the milking, there would have been still more falling off.

You see I couldn't stand but a few such before the cows would not pay for their feed. I went away from home once for a couple of weeks, and left a stranger to milk the cows I had milked, and there was a shrinkage of ten per cent. in the whole herd. The shrinkage in the cows I had been milking was 20 per cent.

MR. EVERETT—Did you ever have a cow ill used by hired help, and while there would be a good flow of milk there would not be any butter fat in it?

MR. GOODRICH—I have found that ill usage reduced the per cent. of butter fat.

MR. WILSON—How do you warm the water?

MR. GOODRICH—With a tank heater.

MR. MCKERROW—Can you take marsh hay and straw and feed them and get as good results as if you feed ensilage and bran, and cotton seed meal and all those things?

MR. GOODRICH—I never tried it.

MR. MCKERROW—Do you think the milk would be just as rich on poor feed as on good feed?

MR. GOODRICH — I don't know. I can tell you some things I do know. I know that feed will make a difference in the composition of milk, and I don't care how many scientific Germans or Americans say to the contary. I know I turned my cows out on grass one spring, but gradually stopped feeding grain. When they were having both grass and grain 15 cows had given four hundred pounds of milk a day, making 18 pounds of butter. In two weeks after I commenced stopping off the grain, on the good grass, mind you, the quantity of milk had not shrunk at all, but the amount of butter had gone down to 15 pounds a day. I fed the grain again, and after a while brought it back to 18 pounds. I simply watered my milk by withholding the grain.

MR. BURKMAN—Is there any benefit in feeding grain when you send your milk to a cheese factory?

MR. GOODRICH—They ought to test the milk and pay for what they get.

MR. MAY—Do you have any trouble with cows leaking milk?

MR. GOODRICH—No, I don't. My cows are nearly all descended from one cow, and that don't run in the breed.

MR. MCKERROW—You evidently think there is a good deal in feed. Do you think there is anything in breed?

MR. GOODRICH—I believe that breed is produced originally by feed and care. I believe that after a great many generations of good feeding, feeding for rich milk, you would have slowly but gradually developed a type of cows so that a character for giving rich milk would become fixed, and they would transmit it to their progeny with reasonable certainty. In this way you would establish a breed. Somebody over here objects to stanchions. My cows are put in stanchions before they are six months old, and they are brought up to them and do well.

QUESTION — Do you milk with dry or wet hands?

MR. GOODRICH — Dry hands every time.

MR. BURKMAN — Do you believe it is well to have them dehorned?

MR. GOODRICH — The horns are of no use that I know of.

MR. MCKERROW — Do you keep up your herd of cows by selecting the heifer calves from the best cows?

MR. GOODRICH — Yes, every time. I feed them new milk for about a week. Then it is partly skimmed, and in about three weeks they are on full skimmed milk. Then I give them a little oats, bran and clover hay. I keep feeding them milk until they are seven or eight months old.

MR. ABBOTT — What do you consider skim milk worth for feeding purposes?

MR. GOODRICH — For feeding pigs I have experimented and a hundred pounds of skim milk made as much growth as a half a bushel of corn. It is worth to me this year twenty cents a hundred. It is worth the most fed in connection with corn to hogs.

QUESTION — How much do you get out of your cows on an average?

MR. GOODRICH — Last year 1890, we milked 20 cows and the average was 320 pounds of butter.

QUESTION — How much in dollars and cents.

MR. GOODRICH — $76.00 for the butter, then I counted the skim milk $10.00 and the calves $3.00, that makes $89.00.

My butter netted me twenty-four cents for the year 1890. I estimate the food for a cow costs about $30.00. I figured about $20.00 for the labor laid out on each cow and the making of the butter. That is $50.00 per cow. That gives me a profit of $39.00 besides the manure.

QUESTION — Give us your figures on feed?

MR. GOODRICH — Forty pounds of ensilage a day for two-hundred and fifty days makes five tons for the year. That is worth $1.00 a ton, that is $5.00; a ton of clover hay worth $5.00 and one acre of pasture to run on — I will call that $5.00, though I think it is too much. Then one ton of bran at fifteen dollars.

MR. EVERETT — Does the quality of the food and water effect the quality of the butter?

MR. GOODRICH — It certainly does.

QUESTION — Isn't well water good enough without warming?

MR. GOODRICH — If I could have water at fifty degrees I would not be at the trouble of warming it, but where it is pumped by a wind-mill into a tank, and has ice on it all winter it won't do. It ought to be warmed up to fifty or sixty. I know they drink more.

QUESTION — Don't you think that some breeds of cows make a firmer butter than others?

MR. GOODRICH — It may be so. I know there are individual cows that make firmer butter than others.

MR. BURTON — How would you pick out a good cow from a strange herd?

MR. GOODRICH — I have failed in doing it so many times I don't think I could tell anybody else.

MR. CONVEY — Does a heifer from a good cow always prove to be a good cow?

MR. GOODRICH — Not always, if she has a long line of ancestors that were good milkers she will stand a pretty good chance.

MR. MCKERROW — What would you cross a Jersey with to make a good cow?

MR. GOODRICH — More Jersey.

AFTERNOON SESSION—MARCH 18th.

The Institute met at 1:30 P. M. Sup't Morrison in the chair.

SWINE HUSBANDRY.

BY A. SELLE, Mequon, Wis.

Pooling Experience

In presenting to you this paper on swine husbandry, it is not my intention to teach you anything new, neither do I claim that I am an expert, but simply to give you the benefit of my experience, in this branch, and I hope that it may be of some value to those who like myself, look for improvement by comparing their own experience with that of other farmers.

No branch of stock raising is subject to such fluctuations of prices from one year to another as hogs. The price often doubles itself inside of two years, and again declines 50 per cent. of itself in the same period; one reason for this is, that hogs can be increased and decreased quicker than any other stock.

When hog raising on account of fair prices and cheap corn, this year increases, then the next year's market will be flooded with hogs, and prices will certainly go down considerably. Now, the corn crop may be a failure or fall short of the expectation and its price advancing in consequence then most farmers will rush to get rid of their porkers, sell their corn in its natural state, or use it for other purposes more profitable than feeding it to the hogs, the consequence of this may be, that the prices of hogs again begin to rise next year.

The same price fluctuation we also observe with the little piggies. Sometimes they are almost unsalable, while at other times they readily sell at $3 a head and more.

Breeding Stock.

In the raising of hogs, the most important part is the proper selection of *breeding hogs.* The old long legged, long necked and shy animal that is known under the name, country hog, razor back, Missouri hazel splitter, and when scared at almost anything, laid its long ears well back, and went off in a grunting gallop, with a speed that puts a common race horse in the shade, is now a thing of the past, at least in our region.

No other branch of stock has, in a comparatively short time, experienced such general changes as the hog, and the success certainly depends on the proper selection of breeders, and care has to be exercised to breed animals that combine a quick development of body with capability of fattening.

The region and locality also has to be taken into consideration in selecting breeding animals, also whether pastur-

age or pen feeding will be their principal reliance.

It has further to be considered, whether the market calls for meat hogs, or for lard and bacon.

Clean, Healthful Pens.

From the description of suitable hog-pens, I may as well abstain, as farmers will not easily make any alteration in such existing institutions; and if they in general suit the purpose, often the simplest and cheapest are the best.

But the hog-pen ought to be in such a condition, that no one need be afraid to go into it himself. In dirty mud holes in which we can only get around with a lantern in broad day light, and where we get the liquid manure into the boot-tops, no hog can exist decently, much less can it thrive or grow fat.

During summer and fall, or whenever the weather is dry and pleasant, any building is good enough for hogs, and God's green earth, for a floor, and the clouds and blue sky for a roof, is just as good a pen as the best. Although the hog likes to wallow in the mud during hot weather, it will look for a dry place to sleep at night.

In selecting the brood sow it has to be well observed, to select one with well developed characteristics of the respective race or stock, in order that these will be transmitted to her progeny, and to select one that is born in spring and from a mother that has distinguished herself in raising numerous pigs in each litter. Only the soundest and strongest animals of a litter should be selected for breeding. Besides the general characteristics of a sow the following points are very desirable: A light head, a long deep body and at least twelve developed teats, the more the better, in order to be able to nurse a large number of pigs.

Wild and unruly sows, and such as have the bad habit of killing and eating their young, should be entirely discarded for breeding.

Breeding Sires.

Of more importance than the sow, is the selection of a breeding boar, as he may be mated with hundreds of sows during his life-time. A young boar should not be stinted in food, and should be kept growing till he is a year old, but at the same time, must not be allowed to get too fat. Now some persons who have never kept but common pigs, are very apt to think, that their full-blooded boar is getting too fat; as the roundness of the body with the small growth of bone and offal parts, leads him to believe that the pig is not growing as fast as he should.

When a boar is full-grown, he will not require rich food, but enough to fill his stomach and keep him in good strength. A boar should not commence to serve, until he is at least ten months old; one service is sufficient; allowing more is only wasting the strength. When heavily worked, I feed accordingly; a daily ration of oats is very good. In winter I feed corn ensilage, clover hay cut fine, scalded or steamed and mixed with some middlings and skim-milk. Some persons think when they buy a thoroughbred pig he could live on a smaller quantity of food than a mongrel, and the consequence is that the animal goes backward and the purchaser begins to growl against pedigreed stock.

Daily exercise with enough of plain food will keep the boar in good health and vigor.

Care of Sow and Pigs.

WHen well provided with food and stabling it is best to have the sow breed pigs twice a year, and to let her take the boar in November and April, so that she will bring the pigs in March and September. In spring the pigs may be allowed to go out into the pastures right away (after weaning), and are therefore the less expensive to raise.

If September pigs are raised, they will be well developed before severe frosts come, and any one who has a dairy and makes butter. can make good use of the skim milk, and next spring will be found a fine market for 6 or 7 months pigs.

Without milk, proper food and a dry pen, the young pigs easily get stunted, and anybody who does not have these things, had better leave hog breeding alone, at least in the fall.

The sow should not be let to the boar at the beginning of the heat, but when the sexual desire has reached its height, about 30 or 36 hours from the beginning, as its duration is generally three days.

The advice of many breeders, to have a sow only once a year with young, cannot always be followed, and it is best in my opinion, to be guided by nature. As a rule the sow will get into heat again about six or eight weeks after she has given birth to pigs, and when nature is not satisfied, then again in three weeks.

Many sows are very restless at this period, and it is not unusual that stable doors, fences, etc., have to be fixed every few days. It is best at such times to confine them in a pen by themselves until the paroxysm of heat has passed.

The day of coition of the sow should be carefully noted, to determine the time when pigs will be born. It is not advisable to feed the sow too heavily during pregnancy, for she will either grow too fat, or develop the young ones too much, and both cases will tend to render birth difficult. Exercise in the open air is very beneficial to pregnant sows.

Farrowing Time.

A few days previous to farrowing, the sow should be separated from the rest, and put in a separate pen. Long straw should not be used for bedding, as the young ones will easily hide in it, and are liable to get smothered; a few baskets full of finely cut straw is the best for bedding. The sow should not be fed with anything the first day after she has given birth to young ones, and for the following three or four days only sloppy or liquid feed should be given. Care has to be exercised, not to overfeed the sow, in the first three or four weeks, and the quantity of food should be increased gradually. Mouldy feed, damaged grain and sour swill should never be given to breeding sows or piggies. I have observed that the sow likes salt very much at this time, and I always keep on hand a mixture of good wood ashes, salt and some chalk, and give a few spoonfuls of it daily.

To prevent the accidental or careless smothering of the young ones by the sow, round poles should be fastened around the walls of the pen, about eight inches from the floor, and one foot from the wall, behind which the young can escape. But if the sow is a natural good breeder, all these precautions may not be necessary.

At the side of the pen of the sow, I have erected another small pen, and both connected by small openings, through which the young pigs can slip; in this I put shallow vessels, as old pie

plates, etc., with sweet milk, also soaked wheat or corn, to induce them to learn eating.

When the trough of the sow is long and shallow, so that the little ones can easily reach in, and the feed is prepared in a proper manner, lukewarm, and mixed with sweet skim milk, the young pigs at the age of three or four weeks will commence to eat, without having this little side pen.

Sunshine is very beneficial to the little pigs, and doors should open to the south. It is a good plan to have a mixture of clay, salt, ashes and charcoal, in a trough, so that they, the sow and piggies, can get it whenever they want it.

The most prevailing disease of little pigs is diarrhœa or scours, caused mostly by improper food of their mother, but another principal cause is a wet and dirty stable, and the foul effluvia rising from the liquid manure that has gathered below the floor.

To prevent this, the stable floor should be made solid, say cement, and have an inclination or fall to one side, to drain the liquid manure. Also admit plenty of air, and scrub the floor with fresh lime water, once a week. Sometimes it is sufficient to change the food of the mother, and so give a spoonful of powdered caroway, anise and fenugreek twice a day.

If the stable is as it ought to be and a little care is exercised in proper feeding, then all this is needless.

Fattening.

The hog fattens very quickly compared with other animals, but it requires a corresponding amount of food in quantity as well as quality. A cheap and quick fattening depends greatly upon the health and age of hogs, as well as upon the season, and the condition of the food. For the fattening of meat hogs, that will produce a nice, tender meat, streaked with fat, I select from early developing stock, at the age of four to seven months.

On account of the rapid digestion, hogs cannot assimilate all the nourishment from the dry food, and this should be prepared in such a manner as to make the loss as little as possible, either cooked or bruised. To feed the hogs until all parts have changed to fat I do not consider profitable, for the fatter they grow, the slower they increase in weight. To begin the fattening with rich food from the start, is a wasting. Corn or peas should be left for the latter part of that process. Some rules have to be observed in fattening, to insure success. The best rule is to have the provision food succeeded by one more nourishing, and when the appetite begins to diminish, to feed less in quantity, but more in quality.

The time for feeding should be kept as regular as possible, else the hogs grow restless. The pen also ought to be kept somewhat dark, and provided with dry bedding. As much as the breeding animals need exercise for their prosperity, the hogs for fattening, need rest and quietness. An old proverb correctly states it thus: "Rest and quietness is half of the fattening."

To encourage appetite and digestion, I give daily some salt-ashes and antimony.

Always try to raise the best and what the market calls for. Raise hogs when they are cheap so you will have some for sale when they are dear.

With a little care and when well provided with proper food, stabling and pasture, in order to give them exercise, hog-raising is no trick at all, and it is almost as easy to raise a litter of pigs as it is to raise a patch of Canada thistles.

HOG PENS.

BY GEO. WYLIE, Leeds, Wis

Comfortable Shelter.

In order to realize the best results in raising swine, something in the way of comfortable shelter is an absolute necessity. Occasionally we find a farmer with the idea that an expensive hog house is necessary to the profitable handling of swine. Where we find one such farmer however, we are liable to find a dozen strongly imbued with the idea that a straw stack or a wire fence conserves every purpose or perhaps, present circumstances forbidding the outlay considered necessary in that direction, they allow their swine just for the present or until something turns up, to shift for themselves on the old root hog or die principle. After an expreience with almost every method of sheltering and feeding swine, we have come to the conclusion, that an expensive hog house at least is not one of the requisites necessary to the profitable production of pork. Your blue-blooded aristocrat of the human family is satisfied with nothing short of a modernized Queen Ann with a cut stone foundation. But your blue-blooded aristocrat of the porcine species with a gilt-edged pedigree tracing nowadays through ponderous volumes of hog lore is satisfied with any shelter that keeps him warm and dry.

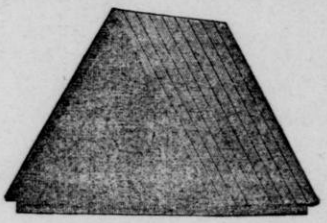
A Well Filled Trough,

in a "pigs eye," is more appreciated than the grandest design in architecture ever invented. In practice the objection we have found to the large expensive hog house where any considerable number of swine are kept under one roof is a difficulty in keeping it clean. In such a pen it is hard to arrange ventilation to keep the air pure and healthy. At farrowing time with ten or twelve or more sows, all in adjoining compartments, if one sow steps or lies on a pig, all the others spring to their feet and pandemonium ensues. If one sow that necessarily must be fed is given anything, others that should be kept quiet or fed very little, get up and expect the same treatment. The tendency of the whole establishment is toward irritating the tempers of the brood sows, which should be avoided at farrowing time. The larger the hog house the colder it becomes in winter and in summer it is difficult to arrange for sufficient access to pasture; Another strong objection is that the expensive hog house must be a permanent fixture, and where many hogs are kept, any one who has had experience knows that the ground surrounding it after a year or two becomes filthy and impregnated with the droppings of the animals. They are also liable to make unhealthy wallows in close proximity with the pen and these wallows are almost impossible to keep filled up when the ground is used permanently for swine. All this tends toward an unhealthy condition of the stock, and health above everything else in raising swine is of the first importance. In fact the only point I have

been able to discover in favor of the expensive hog house is that it is a little more pleasant for the feeder in a cold or stormy day.

Inexpensive Pens.

The pens that have given us the best satisfaction are small inexpensive insignificant affairs, costing from $5 to $10 each. The strongest point in their favor is health, fewer hogs being kept under one roof; this one point of health of itself should over-balance any objections that might be urged against them. When the ground around the pen becomes foul by continued occupation, these pens are easily moved to a fresh location, and the ground previously occupied by them plowed up and a crop or two raised from it, thereby purifying the soil. After two or three years it can be again seeded to grass and the pens returned to their original location. A rotation of hog-pens once in two or three years goes farther in the direction of maintaining fertility than anything I have ever tried. With this kind of pen, or as many pens of this kind as may be necessary for the number of hogs kept, the original outlay for pens is reduced to a mere nothing in comparison with the large hog house. They will pay for themselves every year they are used. With this system, less than half the labor will keep the pens clean; they are warmer, the air is purer, the young pigs are healthier, and large numbers at any season are prevented from piling up together. At farrowing time each brood sow is isolated from the others, thereby being removed from anything liable to make them irritable or restless. Bear in mind I have no wish to prevent any farmer with plenty of money from building as expensive a hog house as he desires. I am talking to farmers who may think as I used to, that an expensive hog house is necessary to raise fine pigs. And while recommending cheapness and economy in the way of hog-pens I do not wish to be understood as arguing that "anything is good enough for a hog." The essentials to be secured are health, comfort, warmth and cleanliness and any outlay of money that goes beyond this must be regarded in about the same light as a prominent breeder regarded his expensive 30x60 hog house. Said he: Its not much account for swine, but its awful nice to show to visitors:



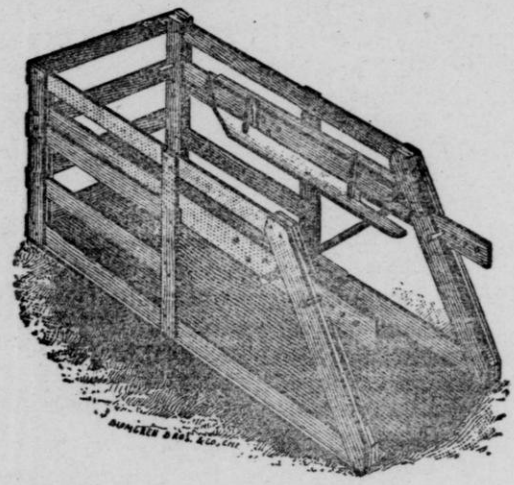
Bill of lumber for this pen is as follows: 256 ft. inch boards 1x12—16ft; 6-2x4—16 ft. 12 bats 16 ft. long 4 inch wide.

Bill of lumber for this pen 502 ft. 1x12—16; 8 2x4, 16; 20 bats 16 ft. long 4 inch wide.

A Breeding Box.

Nine-tenths of all farmers throughout the country make use of young boars and sows for breeding purposes. A boar six to ten months is used one season and then discarded and another young one put in his place; this is a mistake,

especially when the boar proves a good breeder. When a very prepotent sire is found it will pay to buy brood sows to be bred to him. The objection usually urged against keeping a boar is that he gets too large and heavy for service. With the breeding box illustrated



herewith any sized boar can be bred to any sow.

The difference between this breeding box and any box of the kind that I have ever seen is that this can be adjusted almost instantly to fit any sized sow after she is in the box, both as to width, height and length. The front end is better if boarded up tight. A four or six inch board nailed across the top four or five inches back from the front end would effectually prevent sows from getting out over the end. The "chin rest" for the boar so often seen on other boxes is not necessary with this as the adjustable steps for the boar's feet effectually prevent his feet from slipping down between the sow's body and the step, so that his weight is at all times on the steps and not on the sow. The adjustable step or shelf is six inches in width when closed, but when clear open is about double that in width. The steps on both sides can be made adjustable if desired, but I have found that an adjustable step on one side makes a fit for almost any sow from 200 to 500 lbs. or heavier.

We have used this box for nearly all our sows, old and young, this season, and we find that a young boar will serve a large sow much more easily in the box than out of it. For a young boar and an old sow a small platform for the boar is placed behind the sow. The sides at the rear end are made slanting because the height of the steps are more easily adjusted in that manner and there are no sharp corners in the way for the boar to fall against in getting off.

The iron rod to hold the sow in the box is a piece of gas pipe one and a quarter inches thick. The boards through which this rod passes must be good sound fencing six inches wide. On the inside of these boards and up tight against the shelves or foot rests, a piece of 2x4, about two feet in length should

be nailed to strengthen the shelves or foot rests, as a heavy boar will sometimes place nearly all his weight on them and they must be stout. The two straps of iron that make the steps adjustable are eight inches each in length between the screw holes, one quarter inch thick and one inch wide. Two small bolts through the shelf with the nuts up (or two one and a quarter inch wood screws will do) and two wood screws at the other end hold them. The pin and pin holes at the upper end allow the step to be adjusted to the width of the sow in the box. At the front end of the box are two pins, one on each side with different holes for the raising and lowering of the front ends of the boards supporting foot-rests; the method of raising and lowering the rear ends will be readily understood. The floor is put on crosswise; two laths on the bottom lengthwise make it slide easily in moving.

The adjustable step, the method of fastening in the steps or adjusting them as to height, the slanting ends of the box, and the application of the gas-pipe rod in connection with the same are what is new, and so far as I am aware have never been used before. A 600 or 700 lb. boar can serve any sow old enough to breed in this box. The diminsions are 2 ft. 4 in. wide; 2 ft. 6 in. high; 4 ft. long on top and 6 ft. long on bottom—all outside measurements

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DISCUSSION.

MR. MCKERROW—How would it do to have a movable yard that you could put in front of either one of these pens if you wanted to pen up a few brood hogs?

MR. WYLIE—That is all right for a short time. But I don't believe in penning up much. Hogs need plenty of range to keep healthy.

MR. ARNOLD—Tell us about training a hog.

MR. WYLIE—It depends on the man who handles it. You can train a hog to do almost anything if you use him kindly and don't try to force him. I don't approve of ringing hogs on general principles. If hogs are fed on the right kind of rations, they won't root much. If you are only going to keep them a few weeks and turn them to market it might pay to ring them. I raise hogs largely to sell as breeders, but I would not pen them up too closely if I were feeding them for pork.

MR. MONRAD — How much do you value 100 pounds of skim milk for feeding hogs?

MR. WYLIE — Under ordinary conditions skim milk is worth about 20 cts. a hundred pounds, that is, when fed alone; but it is worth more than that fed in connection with something else. It is worth more fed with corn than with most any other ration, skim milk and soaked corn for young pigs can hardly be improved on if cost of production is considered.

QUESTION — Are not whole oats and skim milk good for young pigs?

MR. WYLIE—The oats would be better ground for young pigs and even then you are not getting the right kind of a ration. You know skim milk is one of the best bone and muscle feeds there is, and so is oats. After a pig is past a certain age, if you will give him all the skim milk he can drink, and give him plenty of exercise, you can safely give him all the corn he will eat, and have the best ration of any. That is working on the principle that the profit is in the

first 200 or 250 pounds. It needs judgment to feed right. We have had some mighty good hired men at our place, but they never make a success as pig feeders because they lack that interest in the business that ownership gives.

MR. FLEMING—At what time would you advise the farmer to have his pigs farrow?

MR. WYLIE—Not much before the 15th of April, generally. There are very few men in this state that can raise two litters of pigs with profit. The first litter must be too early in the season and the second must be too late. There is nothing so detrimental to a young pig as cold weather. If any man can do it in Wisconsin, it is the dairyman who has lots of skim milk.

MR. HAYWARD—How is rye for your pigs?

MR. WYLIE—First rate.

MR. HAYWARD—How would you care for March pigs?

MR. WYLIE—I would rather take care of ten brood sows littering the first day of May than two the first day of March. The trouble is they don't get to the ground. The young pig needs fresh earth and grass and warm sunshine. You will have too keep March pigs shut up. You can only give them fresh dirt every day and see that they have exercise.

QUESTION—Do you feed vegetables to sows in winter?

MR. WYLIE—Yes, I feed a certain amount of mangelwurzels.

QUESTION—How many pounds of pork can you make from a bushel of corn?

MR. WYLIE—That is a great big question. Twelve is possible, fourteen may be made. The average Wisconsin farmer makes between six and eight.

QUESTION—How old do you have your pigs before you wean them?

MR. WYLIE—I never wean them. The whole success of swine raising is right there in the matter of weaning pigs. A farmer sees a brood sow getting kind of thin when the pigs are about four weeks old, and he says, "Those pigs have got to be weaned." He goes to work to construct a little 8 by 10 pen and catches the pigs and puts them in there, and the sow turned out, and in one or two weeks they are pretty effectually weaned; the profit has been all weaned out of them. A pig never should realize that there is such a thing as being weaned. It never should know when it ceases to depend on the dam and begins to depend on you. All the feed that you can get your pigs to eat after two or three weeks, when they should begin to eat, is just so much saved on the dam. They will wean themselves if you feed them right. Scarcely any of them will be suckling at ten weeks old.

QUESTION—Did you ever weigh your pigs when they were two or three weeks old and then in one week afterward, to see how much flesh they had taken on?

MR. WYLIE—My only experience with weighing was with a litter of eight. We weighed that litter the morning of the day they were eight weeks old. They weighed exactly 400 pounds, an average of 50 pounds each; these pigs, however, were better pigs and were better cared for than the average.

MR. MCKERROW—At what particular age or size can you make pork the cheapest on them?

MR. WYLIE—A well bred pig handled rightly, will give you as large returns for the food he has consumed along between fifty and one hundred pounds as he ever will.

MR. MCKERROW—Then at what size will it be most profitable to dispose of him?

MR. WYLIE—He is making gain right along and doing well, up to 200 or 250 pounds. On general principles, when a hog gets to be about 250 pounds, you had better let him go, and put the feed over into a younger pig. Of course, the market and other things have to be considered. He ought to weigh that when he is seven or eight months old. A pound a day is very good gain.

QUESTION—How would you care for brood sows prior to farrowing.

MR. WYLIE — I would have mature brood sows in the fall in rather thin condition. I would begin feeding gradually, start them to gaining and keep them gaining through the entire winter clear up to farrowing time in the spring, when I would have them in good strong flesh and heart. Now if that flesh that you put on during the winter is put on with corn, the pigs won't amount to much, so we don't put it on with corn, we put it on with a combination of oats, shorts and corn in about equal parts. We feed the oats the first thing in the morning, spreading them out thin on a dry floor so they cannot bolt their food. They can only pick up a few grains at a time and masticate their food. At noon we feed them the shorts made into slop, and we feed it warm. I have found out by experience that a pig's stomach is a very expensive place to warm ice water. You can better afford to warm that water with cord wood. Two bucketfuls of hot water will warm nearly half a barrel of slop and you might warm it on the kitchen stove, but that will depend a good deal on the disposition of your wife. We used to warm the water for the pigs on the kitchen stove, but we don't any more. The atmosphere in our kitchen used to get hotter than the water, and we had to quit. We warm the water with a tank heater in a water tank. We start the fire in the morning and by noon it is up to 70°.

QUESTION—If pigs have black teeth, does it hurt their health?

MR. WYLIE—No, that is on a par with hollow horns in cattle.

MR. BEMIS—I butchered pigs this fall at seventeen months old, that weighed 350 pounds.

MR. HYHTT—With a well balanced ration in the winter do you feed ashes?

MR. WYLIE—My hogs always have free access to salt and charcoal and wood ashes. Our sows are fed roots about this way, one meal a week during December, two meals in January, three in February and four in March, and clear up to farrowing time they get four meals. Clover hay might do as well to a certain extent, but I would rather have the roots.

QUESTION — Does it pay to winter hogs for profit?

MR. WYLIE — As a general thing, no, A Wisconsin farmer cannot afford to winter anything but his breeding hogs.

MR. OLSEN — What is the cause of a brood sow eating her offspring?

MR. WYLIE — A diseased condition of the system. If she is fed plenty of roots previous to farrowing time and gets plenty of exercise, she won't do it. Then again at farrowing time they should be fed something laxative, and very light at first.

QUESTION — Do you breed from mature dams?

MR. WYLIE — Yes, mainly.

QUESTION — How long do you keep them?

MR. WYLIE — Usually not longer than

four or five years. When you have something as good or better to take her place let the old sow go.

QUESTION — Is it possible to keep the dam from losing flesh rapidly while suckling her litter?

MR. WYLIE — I don't like to say that it can't be done, as most farmers don't feed their brood sows enough; and take it for granted that she will lose flesh anyway. With a mature sow and not too large a litter it can be done. Young sows and old ones, too, with good sized litters will be apt to lose some flesh even if fed all they will eat of the best kinds of food, good brood sows always get a little thin while suckling. In fact a fleshy sow is never a good suckler. The feeder however should do his level best trying to make them hold their own.

QUESTION — Do you feed dry or soaked?

MR. WYLIE — We soak corn for spring pigs until the new corn is ready to feed. What little corn we feed brood sows while suckling is usually fed in the ear dry. Shorts we always soak between feeds except in the winter.

QUESTION — What is the best pasture for hogs?

MR. WYLIE — I think white clover a little the best, but red clover is good enough and easier to get.

QUESTION — When should hogs be turned on clover, at what stage of growth?

MR. WYLIE — When about 4 inches high.

QUESTION — Should grain be fed to hogs while on clover pasture?

MR. WYLIE — Spring pigs and brood sows should be fed about all they can eat in addition to the clover. But if you have some shoats or old hogs that have been wintered a run of a month or six weeks on grass alone will put their system in the best possible shape for utilizing the corn to the best advantage when you begin to feed it.

QUESTION — What is a good daily gain for hogs on pasture?

MR. WYLIE — On grass alone a hog will make little or no gain whatever; grass as an exclusive food for hogs has been greatly over estimated; as far as gain made is concerned about all there is to grass for swine is that it keeps the system in shape to utilize the grain fed to the best advantage. If you feed grain to swine on grass the amount of gain will depend entirely on the amount of grain fed, the more grain you feed the less grass they will eat, this is why I favor a run of a month or six weeks on grass alone for hogs that have been wintered, and then putting them on a full ration of corn to finish them up quickly.

QUESTION — In what manner should corn be fed to hogs?

MR. WYLIE — I usually feed mature hogs corn in the ear; for pigs shell and soak. I don't think it pays to grind corn if it can be soaked?

QUESTION — Does it pay to grind oats for hogs?

MR. WYLIE — In feeding oats to young pigs if I had plenty of shorts to make slop I would soak the oats. In the absence of shorts I would grind the oats and make slop with them for mature hogs such as brood sows during gestation I would feed the oats dry without grinding.

QUESTION — Is it advisable to cook food for swine?

MR. WYLIE — An occasional meal of cooked food is good by way of supplying a variety. But the conditions under

which it will pay to feed cooked food exclusively are very rare. A large crop of pumpkins or potatoes that there is no market for would justify the feeding of considerable of them cooked and mixed with meal.

QUESTION—Which is considered the cheaper wheat or barley at the same price per pound?

MR. WYLIE—I would take the wheat and grind it as it makes the best kind of slop.

QUESTION—Can you make hog raising a success without dairying?

MR. WYLIE—Yes, but dairying makes it easier, that is if you are making butter.

QUESTION—Can you tell us anything about the feeding value of whey?

MR. WYLIE—As whey is usually fed it has no value in fact. I think it an injury to feed sour, acid whey to young pigs, and even fed sweet I don't think it much value, unless a certain amount of shorts or meal is mixed with it; fed in this way it has a feeding value, but not half as much as skim milk.

QUESTION—Have you had any experience in raising fall pigs for fattening the next summer.

MR. WYLIE—Yes, pigs farrowed after the middle of September as a rule seldom pay for raising in this latitude, young pigs are very difficult to make thrive in cold weather, and we should aim to raise them under as favorable conditions as possible when weather is warm.

QUESTION—What is your treatment in case of scouring in young pigs.

MR. WYLIE—There are several remedies- first hold up on the feed of the dam or change it to something else. If this does not stop it take a lump of alum the size of a walnut, dissolve it in a pint of water, give each pig a teaspoonful three times a day. Another good remedy is to parch wheat flour until brown, and mix with skim milk and feed in the same way, or if the pigs are old enough to eat feed in a trough. This last is an excellent remedy for scours in calves or young colts.

QUESTION—What is the comparative value of a bushel of corn fed in June or July when the hogs have the run of a good clover pasture or fed in January or Februarry with the thermometer 20° below zero?

MR. WYLIE — Over 100 per cent. in favor of summer feeding.

QUESTION — Under what conditions may corn be fed exclusively to hogs?

MR. WYLIE—When they are being finished up for market.

QUESTION—How many breeding sows should run together during gestation?

MR. WYLIE—With plenty of room we allow 15 or 20 during the first half of gestation, but later we divide them up, putting those of the same size and disposition together as near as possible. The last month four or five old sows is as many as we allow together.

QUESTION — Is it essential that pigs should have any corn until 60 days before marketing?

MR. WYLIE—Under certain conditions it may not be necessary, but you should remember that corn is cheap feed usually, and I always feed some corn from the time a pig is old enough to eat it.

QUESTION—How many pounds of pork can you make from a bushel of ensilage?

MR. WYLIE—That will depend entirely on the amount of corn in the ensilage. If there is no grain in the ensilage I don't think your hog will get very fat on it, and if there is grain in the ensilage, the hog will eat the grain and leave the stalks and leaves.

QUESTION — Does barley make good food?

MR. WYLIE—I don't like barley to feed by itself, pigs get tired of it very quick unless you are very careful in feeding it, it is best mixed with something else, such as bran or shorts. If I had only bran to feed it with I would grind the barley and mix the bran with it, if I had shorts, I would make slop of the shorts and soak the barley without grinding.

QUESTION — In the absence of skim milk what is the best food for young pigs?

MR. WYLIE—Good shorts, middlings or ground rye made into slop and fed in connection with soaked corn.

QUESTION—How about rye for brood sows during gestation?

MR. WYLIE—I don't think it a safe feed for brood sows at that time.

QUESTION—In increasing size which is preferable, a coarse boar or sow?

MR. WYLIE—I think there is not much difference, the progeny will as a rule be a compromise between the two as regards size.

QUESTION—How do you kill lice on swine?

MR. WYLIE—Take kerosene and lard, equal parts, melt the lard and pour the kerosene into it, make a swab by tying rags on a stick and apply at once. Two applications, allowing a week to intervene will unusually be sufficient. Crude petroleum oil will answer the same purpose of the lard and kerosene, but is not always so easily obtained.

QUESTION—What is the size of the small pens, that you gave the bills of lumber for?

MR. WYLIE—The A shaped is 8 ft. by 8 ft. on the ground and the roof is the same. The other is 16 ft. long and 8 ft. wide, 7 feet high in front and 3½ in the back.

SHEEP HUSBANDRY.

BY MR. GEO. MCKERROW. Sussex, Wis.

Mr. President, Ladies and Gentlemen: Knowing that I cannot do this subject justice in the short time allowed me, I will strive to bring out what I consider a few of the important points in the business.

First, I will speak of the advantages of sheep husbandry. Sheep, for the food consumed, the money invested, and the care expended upon them, will give as good results as any line of live stock.

There is no animal that can be kept upon the farm that will assist in cleaning it up, freeing it from weeds and brush as well as the sheep. Yet don't understand me as advising you to keep sheep on brush and weeds, for if you do, you will not have success.

There is no animal on the farm that will do more in keeping up the fertility of the farm.

I am not here to raise a question of breeds. We have many good breeds of sheep. The American Merino cannot be beaten in the world for wool production, and yet its breeders are changing their tactics. They must breed larger, stronger sheep with more mutton qualities, sheep with more constitution, so that their progeny will be

stronger and need less care, and the dams will be better fitted for providing for their progeny. Located as we are in Wisconsin, near some of the largest cities of the west, and upon high priced lands, to make this business succe-sful, we must turn our attention more to the mutton side of this question. There is no class of meat produced that is cleaner or healthier than mutton; the people of our cities are growing in their appreciation of it.

Gilt-Edge Mutton.

High quality lamb mutton, brings today from three to four cents a pound more than poorly fed old mutton put upon our markets. I believe mutton can be produced as cheaply as beef. This has been proved by experiments at our experiment station and at the Ontario station.

We have many good mutton breeds of sheep introduced into this country. We have what is termed the "Middle Wools" as found in the Southdowns, Shropshires, Oxforddowns, Hampshires and Horned Dorsets. We have the long wools, as found in the Cotswolds, Leicestershires and Lincolns. These breeds all have their good qualities. If you wish to start in sheep husbandry, study these breeds make up your mind which suits your soil, climate, and conditions, and follow that breed as long as you can get any satisfaction out of it. If you are going into mutton production you must make up your mind to be good feeders. You cannot handle these mutton sheep that have been developed by high breeding and high feeding and think that you can feed them as lightly as a grade Merino that you are only seeking to get wool from. If your go in with you mind made up to give them a good chance they will give you good returns.

Now as to the money to be made in this business.

Good Prices.

A friend of mine last year realized over $7 a piece out of his common sheep and gave them only ordinary care. His lambs brought him, last November, $5.10 per head and his wool something over $2.00 per head. About six weeks ago I sent a few fat wethers, two years old to Milwaukee, and they were sold, one in a place, to leading butchers of that city to hang up before their meat markets. One of the best, dressed one hundred and seventy-five pounds; he was sold at nine cents a pound, and his pelt was sold for two dollars giving a total on that one sheep of $17.75. That sheep cost me to keep him the two years and ten months that I had kept him, about $13. Yet I made a mistake in keeping them as long as I did. If I had sold them at eleven months old, when they averaged 140 pounds each, I would have gotten six cents a pound for them and they would have brought me $8.40 each, and would at that time only have cost me about $5.00, giving me a net profit of $3.20. These that I kept two years and eleven months brought on the average $13.20, and so I only made about 20 cts. on each sheep on the average.

Profit in Early Maturiey.

We get the most profit if we sell our sheep before they are a year old. If I were starting to breed with the object of mutton production in view, I would not go to some breeder and pay him $30 and $40 per head for pure bred registered ewes. I would start with the best common sheep I could buy in the country at a reasonable price and with a good pure bred sire would raise up a flock in a few years which would be just as good for practical purposes as pure breds, but

you must start in with a clear idea of the line you intend to follow.

In caring for our sheep we must use judgment coupled with liberal feeding. In the summer they must have plenty of pasture which will be best not to be over one and a half or two inches high and the flock should be changed often from one pasture to another. They should have access to water and salt at all times. Late in the summer or early in the fall is the critical time in the sheep business, because it is the weaning time, when our lambs must receive no set-back. To wean the lambs put them in a good pasture with one or two old sheep as leaders. Put in some grain troughs, but don't feed too much grain; a quarter of a pound of oats is plenty to commence with. When the cold rains of the fall come be careful to house your sheep. Don't allow them to depend on the frozen grasses of the fall; if you do the wool will stop its growth, and the next season you will find a week place in that wool, and your fleeces will run from two to four pounds less than if you keep them in good shape and they will not be as well and strong as if properly fed. In the winter be sure that you have a variety of feed of the proper kinds. Clover hay is excellent.

Well cured corn fodder or oat straw are good. Ensilage in many places is taking the place of roots, and giving good satisfaction when properly fed.

In feeding don't spread out your hay or fodder; too much is wasted that way. Have a rack to feed in, and don't give them any more than they will eat up pretty clean. Feed regularly, the same amount at the same time every day Give your flock plenty of exercise, especially the breeding ewes. Without exercise the lamb crop will not be satisfactory.

In housing our sheep we don't want warm quarters for them. In building sheep houses or barns there are two points to keep in view. One is to have them well ventilated, and another is to have them free from draughts, so the wind don't blow in directly on the flock. It is all right to have it open on one side. Have it so plenty of sunshine can get into it, facing the south if possible. I believe ticks are costing sheep breeders in Wisconsin thousands of dollars every year. It don't pay to keep ticks and we don't need to. If we will dip our lambs from seven to ten days after the sheep are shorn in some of the patent dips or strong tobacco water, we will have no more trouble with ticks for a year.

I believe the great majority of our sheep have grub in the head during the winter and then blow it out in the spring, and if they don't have the strength to do that they will be very likely to die.

A neighbor of mine sent for a Scotchman to look at his sheep, and the Scotchman said, "What is the matter with them." "Oh, they have grub in the head." He said, "You think they have grub in the head, and I think the matter with the flock is they lack grub in the stomach."

DISCUSSION.

MR. RICE—Can you rid your lambs of ticks by once dipping?

MR. MCKERROW—Yes, so that I have no trouble unless I buy in lambs that have ticks on them. I have been using a chemical dip. We think that it gives a better lustre to the wool than tobacco water which will kill the ticks and the nits.

HR. HYATT — After you wean your

lambs is it necessary to look after the breeding ewes?

MR. MCKERROW—Yes, they should be gotten up every forty-eight hours and milked until dried off.

QUESTION — Will sheep do well pasturing with other stock?

MR. MCKERROW — Yes, they will do better than the other stock.

MR. HEMMINVAY — Would you recommend raising lambs early in the spring to keep over or sell?

MR. MCKERROW — I would not advise anybody to breed early lambs unless they had good buildings and a good supply of succulent food, (roots and ensilage), plenty of clover hay, bran and oil-meal, everything to make them grow, and put them on the March or April market. Then there is lots of money in it. For lambs to put upon the market during the summer I would not advise the average flock-master to have lambs dropped before the middle of April. The early lamb makes the best sheep in most cases, but costs a good deal to raise him.

MR. TOWN — Have you ever used common rock salt for your sheep?

MR. MCKERROW — I never have. I believe it is a good thing. We have a trough in the edge of the field where they can always get salt. I feed sulphur during the summer along with the salt. I believe it is good to keep parasites out of the lambs' stomachs and lungs.

PROFIT IN SHEEP HUSBANDRY.

BY W. L. AMES, Oregon, Wis

The Advantages.

Fortunate conclusive wording! Had it been profit in beef making. Profit in pork making at the present time. Ah me! I should have had to admit as in schoolboy days. "I can't spell it," and thus have been delinquent in my duties here or else have had to remain at home, and to remain away from a farmers' gathering of any kind within ten miles of my home would surely be a cross to me.

But, I am called on for a practical discussion of our favorite line, in which the idea of *profit* is to figure, or placing it in a little different wording, "Why have we in the past, and why do we continue, so persistently, in the sheep lines." In the hastily prepared thoughts that follow I will endeavor to answer. It is needless to mention to this audience that we are agriculturalists the same as they. Striving first, to obtain an honest living as agreeably to ourselves as possible, and secondly to make *some* provision though but scant, for a wet day ahead.

In pursuance of this idea we have had considerable experience with dairying, beef and pork making, grain raising and sheep husbandry, and from the pioneer days of this country, the *latter* line has seemed to have become wedded to us as a factor in the most of our farm undertakings, that have approached *to* or

merited in *any* degree, the tittle of *success.*

It seems to me that we have tested them in nearly all practical ways, and in this far exceeding any kindred line, first in clearing *new* land of sprouts and under-brush, and later in keeping the same and other lands clear of foul weeds, in exterminating Canada thistles, in renovating exhausted lands, in shirking for themselves to advantage, on forage, that nothing else in the animals line would live on, and in feeding them with a generous hand, and in every case proving our *most* economic factor in successful farming. In fact, I do not hesitate to say that they are the *one* line, in which profit may be considered, regardless of a direct market value. It is said of them, that they never die in debt, and if such can be truthfully said of anything, I believe it can be said of them.

Cost of Keep.

In the first place, the real cost of keeping them is comparatively much less than that of any other farm stock, for, to make pork a great proportion of the food consumed must be cash grain, and to make beef, butter and cheese, a goodly proportion, while to grow the sheep and place it on the market requires least grain of all, and exclusive of preparing him briefly for market, his living consists very greatly of nibbles here and there, which the bovine and porcine race would never find, much less make use of and which would otherwise go entirely to waste.

I am often asked the question, "What is the cost of keeping a sheep a year?" the cost varies with each year, for while on the "about 100 acres," that we generally use for pasturing 450 to 500 sheep, previous to the recent dry seasons, the same acres would have pastured nearly double that number, thus reducing the cost of their summer keeping nearly half what it has cost the last two or three dry seasons. "Do we have to buy bran or other grain to feed our sheep in order to keep up the fertility of the land our sheep occupy?" We never have had to neither do we expect to. Our richest returns thus far in the hee p line have come from our indirect income. And what is that? In most of our operations on the farm we think we do well if we get a little direct income. If through the agency of our sheep, on grain impoverished lands, we can so recuperate those lands within the space of a few years, that their producing capacity is nearly or quite doubled, and in the meantime harvest from those lands a remunerative crop of mutton and wool, we look upon the renovating effects of the sheep on these lands as an indirect income, and with us the most satisfactory. What other line can the same be said of?

Renovators and Recuperators.

In comparing sheep with clover as a renovator of exhausted lands, I would incidentally suggest, that the man who sows and raises clover, carries on a sort of legitimate robbery on his neighbor who neglects or fails to utilize this more useful plant, it being one that draws much from the air, assimilates and materializes much of its drafts from the elements, and then leaves them as permanent deposits in the soil through its roots.

Perhaps my theory is not well grounded, but after several years of observation in which the workings of the two agents, clover and sheep, on exhausted lands, have been so similarly beneficial, I am inclined to think that the principles

that underlie those agencies, are in some respects similar; at least to the extent that the sheep too, perhaps, inhale and retain elements from the air, and often completing their use for them, leave them as permanent acquisitions to the soil. The fluctuations in the price of pork, beef and mutton of from 2 to 6 cents per pound, and almost as great extremes in the dairy business from time to time, indicates that all agricultural lines have their ups and downs, and under the exhilarating influence of their ups, are well able to take care of themselves and those engaged in them. But it is when the other extreme occurs and the bottom seems to have dropped out of them as far as remunerating us in any way for the time, labor and attention given them and the food consumed in their production is concerned, it is then that we begin to wonder what is to be done next, and even to conclude that the promise of a living is not very flattering from these lines of business.

We take our books and look the pork account over and we find that the most of that 2½ to 3 cent pork has been made from cash corn, to produce which, called for a big outlay of labor on each acre engaged. The honest steer looks us in the face and meekly acknowledges that for similar reasons, *he* too has cost us every cent that there is in him. The cow in the seasons of depression in the dairy business, as we sit down to milk her at regular intervals of twelve hours each, (except the Sunday morning lay off of half an hour,) for ten or eleven months in the year, affectionately switches her soiled tail tassel in our face and occasionally sets her foot in our lap, to express *her* gratitude to us for continuing in her line of business when the remuneration is so unsatisfactory.

The average grain producer truthfully declares that, one season with another, besides the fertility drawn from his farm, his crop has little if any more than paid the costs of producing it.

These items though remote from my subject are presented merely by which to contrast, for as the poet has said: "We learn by *contrast* to admire," etc.

A Constant Source of Profit.

Then we confer briefly with the sheep, and seeing by our looks that we are in a discouraged and fault finding state of mind, they with a unanimous bleat remind us that even though our direct income from them may not have been satisfactory, yet we must remember that we pastured them most of the summer on that hill land that we did not want to plow, and in that wood lot that was so full of wild plants and second growth sprouts that nothing else would eat, and on that lot we bought and seeded, that grain wouldn't grow on any more, and finally turned them into that pasture that the cattle couldn't live on any longer, and yet that they attained to and continued in prime mutton market condition on this style of living. That early in the spring at least half of them presented us with a lamb that did not have to be taught to drink skimmed milk nor be dehorned. That after we turned them out to pasture in the spring, we did not have to again bring them in till about shearing time, when they each gave us their old coats that sold for a trifle over $2 each, and that at a time when there was very little else coming in, and that from this time to the close of the season they require very little of our attention. And then they went right on and reminded us that it was just in those years of the most serious depression in their direct product that we were keeping them

mostly on that grain impoverished land that our predecessor in ownership had partly abandoned, because he could not raise grain on it any longer, but that utilizing it for their pasture for four or five years so completely renovated it that it nearly doubled in value and was again ready for profitable cropping, thus most emphatically demonstrating that *indirect* income that we mentioned before.

Thus having fairly carried conviction with their argument they again quieted down, and we were left to but one honest conclusion, and that was that if our sheep business had been *unprofitable* what line of agriculture had not been even more so? But we were again reminded that to secure its *best* results we must be continuous in it, as it is *the* line that though its market and commercial value be depressed, still as a factor in successful and independent farming it is still as valuable as though on the markets it were enjoying a boom.

Hired Help.

The question of "hired help" on the farm is one worthy of careful consideration and one in which our "new country" differs widely from the "Old." That man who would seek to *develop* labor on his farm for the unemployed, more than what seemed absolutely necessary for the handling of his crops would surely be a novelty, and this perhaps, is justifiable under the present apportionment in which the employed, if paid as per agreement, are thought to get fully their share with the employer. Then as this question relates to my subject, the dairyman must have as help, good milkers, with which, however, this country does not abound.

To plow, sow, cultivate, raise and handle the grain from which the most of our pork and beef is produced calls for a *host* of common laborers, while to attend, provide and care for the sheep requires the least, and thus seems to fit the prevailing economic ideas of the present time, of employing as little farm help as consistency will admit of.

Care and Attention.

To the sheep, there are times when we expect to give our untiring attentions, preeminently during the lamb harvest and at shearing time. But to us those are of such importance that we plan for them in the season as much as we do for sowing cultivating or harvesting our grain. But those once over we are again relieved from conferring daily attentions for the green feed season. In the winter we feed in the morning, shortly after sunrise, again at about ten o'clock. Water at noon, and feed last about one or two o'clock.

In general, the expert workman should not be detained at common labor. It is not economy. The farmer also, who finds himself in possession of an inexhaustably rich soil, may put it to a better use than producing wool and mutton. But we all know that this last mentioned condition of soil does not prevail in one farm in a hundred throughout our state. And we also know that there are thousands of acres being plowed and sowed or cultivated, for a few expensive bushels of grain, that would yield the owners an income fully as good or better, without the labor of annually tilling, if it were seeded and pastured with its capacity of sheep.

Surely it was not old sheep pasture that gave rise to the "New England" story concerning a settlement in the

territory, of Scotch Presbyterians among whom it was the custom of the elders, deacons and stewards to make the rounds of their circuit and offer prayer for its successful maturity over each seeded field.

Coming to one, that, although seeded, looked very barren and hungry, the elder stopped, took in the situation at one sweeping look, and then started on again with the remark: "'Tis useless to stop and pray over that field until more manure has been applied."

That elder had almost enough of the practica about him to make him a good farmer.

Verily sheep husbandry is essential to the prosperity of the nation. If any other nation would give us our wool and woolens, it would be the poorest bargain we could make.

My faith is such in sheep, that I believe that nothing short of 100,000,000 will maintain a healthful condition of our agriculture, and we have but about 45,000,000.

Sheep—Prosperity.

I have in mind an instance in our locality that I wish briefly to note. A. and B. join farms. The portions that join are similar, being hill but not rough land, the line fence simply dividing them. A. has for years pastured his hill land with sheep, at least six years out of eight, and thereby without manual labor, secured an income from those lands more than equal to B's., who having no help of his own, has to hire all done except what his own two hands can do, and who has during this same term of years, plowed and cropped his hill land each year, and if the crop has amounted to sufficient to pay the expense of itself, it has done well. If men will thus continue, with observation as unobstructed as in this case, whom shall I hope to convert from the follies of some of their ways by standing and talking here to-day. But I am at least satisying the conviction of the lady who I recently heard asked this question: "If people will not learn that fire is hot by being burned with it, how shall we convince them?" "Why, by continuing to tell them that it is hot," she replied.

In the instance above mentioned, I know that A. often, as he folds his arms and contemplates the two cases, while his sheep are doing his field work, concludes that if B's. management is satisfactory to himself it ought to be to him. While I suppose that B. as often looks over the fence at "sheep farming," while he turns his hill over and over again year after year and concludes: "Well, that kind of business of letting sheep farm your hills may suit you, but I prefer to plow mine, even though my income from the same is not equal to yours." These certainly are the indicative conclusions to a looker on.

Utilize the Hay Crop.

Another point to be considered is our "hay crop," which by the way is one of our surest, cheapest and most easily and hastily secured crops on the farm. In this we have not known a failure within the scope of my memory. And there is no animal on the farm that will utilize a good hay crop to better advantage (nor I believe as good), as the sheep. In fact, good clover hay is almost a perfect food for sheep. Although for best results they should have more than one kind of food, but the cheap, bulky clover hay, *may* constitute their principal winter ration.

Gratifying feeling of relief! in these days of 50 cent corn and 35 cent oats.

Wonder how the swine herd would thrive on it as a principal diet.

Again consider for a moment the vast amounts of meats that this country is producing, not only enough for our own consumption but seemingly enough for all the countries of the world besides, that cannot produce for themselves. How about wool? We produce but about *half* what we *consume*, the other half having to be imported — of course from countries that can produce it cheaper than we can — nevertheless wool at present prices, I consider it fully as profitable, as our meat production, besides the many advantageous conditions connected with its production over that of meats.

One Hundred Per Cent. Profit.

Our sheep business dates back farther than I can remember. Its origin on the mother's side was three superlatively native ewes, that sheared about 2½ pounds of wool each. We have never bought a ewe since, but have sold probably upwards of 2,000 sheep, all of our own production, and our stock in trade to-day numbers 475 all told. A year ago last May we sheared 360 sheep, last May 430, so our flock for the year averaged about 400, from which our books show a direct income of $1,700, besides the surplus numbers we have on hand over our average numbered flock, and an improvement over the original stock with an average of 2½ pounds of wool per head, to an average for the 430 last May of 10½ pounds per head.*

The dairy business of this country is assuming too vast proportions to be ignored, and it is growing day by day in profit, *just in proportion* as system, thought and polish becomes mixed with it as ingredients.

Exactly so with sheep, but with only the *average* amount of those ingredients that generally get mixed with either. I believe the chances are best with the sheep.

The purchaser of our last clip of wool amounting to some over 4,500 pounds, pronounced it the choicest lot of wool that he had ever seen in producer's hands, and was willing to emphatically wager that we would never again produce its equal. *But*, when the time comes that we loose faith in our ability to not only *equal*, but to *improve* on our past efforts, then will "Fairview Farm" take down her shingle and her business will have lost its first prime and most exhilarating principle.

Conclusion.

Then in conclusion. Why do we keep sheep? Certainly not because we have no experience with other lines of stock, as we are continuous producers of sheep, hogs, cattle and grain. And they prove most remunerative to us, all things considered, in the order named.

The dairy business, though disagreeably confining seems to be overdone, especially in the production of bitter, solid, rubbery and indigestible cheese. While for the near future of the beef question, we are with everybody else, hopeful. Still the discouragements of the present and near past need no mention. Of the grain fed to the hog, the fewest fertilizing elements ever get back to the land from whence they came; while the living of our sheep costs us the least, they do the *most* toward keeping the farm clear of foul weeds, tax the soil least that feeds them

*NOTE—For the past year facts will bear out the statement that for every dollar we have put into our sheep they have returned us *two*.

and strengthens it most; are the least confining to attend; cause us the least trouble are the most quiet, contented and easily handled. Keep the farm in the best producing condition, and the dollars that come to us through them, come the easiest of any that find their way into our languishing purse.

DISCUSSION.

QUESTION—How will sheep kill Canada thistles?

ANSWER—Always salt them on the thistles and the effect of the salt and continual gnawing of the sheep, kills the thistle.

QUESTION—Why do you think the sheep can be more economically handled than other stock?

ANSWER—Because he needs less grain than either hog or dairy cow and can be fenced in or out cheaper than horses or cattle, and needs less of the farmer's time in caring for him than any other stock, and he renovates worn out lands quicker than any other class of stock.

MR. SNYDER — How many sheep can you keep on an acre?

ANSWER—A difficult question to answer, as capacities of acres vary so with seasons. Can better give the cost of keeping our sheep (500 in number), a year, or the past year, and let each apply it to acres. For the pasturing season, allowing $3 per acre for the land thus used, which, however, is doubly a just allowance compared with land let for cultivating purposes, and computing value of food consumed during the close season, our flock has cost us practically $900, while our income from them has been doubled that amount, while the flock in numbers and quality is unimpaired.

QUESTION—Is corn a detrimental food for breeding ewes?

ANSWER—Not with plenty of exercise. But a certain amount of feed with exercise might be seriously detrimental if fed and the exercise omitted.

QUESTION—You speak of exercise being necessary with ewes to insure success with lambs. My ewes had the run of a 20 acre field adjoining their yard, and yet the lambs were inclined to be sluggish and dish-raggy, and showed considerable lack of vitality. Can you assign a cause?

ANSWER—I can assign a cause, whether absolutely the cause or not I cannot say. In our own case, breeding upward of 200 ewes, were our ewes to have only access to exercise, during the winter months, I should look forward to the lambing season with considerable suspicion and dread, expecting many representatives of the above mentioned class of lambs, but a goodly portion of our ewes' rations, or an important portion, during the winter months, is a certain amount of exercise daily, except when it storms, given or forced upon them, by drawing a shock of corn the first thing in the morning, about half a mile away from the buildings. They will go there after it. They soon learn it and need no driving. Thus, with quiet handling at the buildings, average treatment otherwise, vigorous sires and this extra exercise business, our lambs almost without exception, come to us vigorous, and needing but little extra care.

QUESTION — What about washing sheep?

ANSWER—It is a thing of the past. It is heathenish to both man and beast, and at best furnishes but an imaginary and unjust standard by which to measure the values of other wools by. The sooner it is abolished the sooner will a

basis just be established for marketing wools.

QUESTION — Have you fed silage to sheep?

MR. CRAIG — Yes, I have fed corn and clover silage to breeding ewes and fattening wethers. Corn silage gave good results in each instance. When fed with cut corn fodder and whole corn a pound of gain with fattening wethers cost only 3.7 cents. At odd times the wethers seemed to care little for the silage but that may have been due to the lack of variety in the ration. It is doubtful if silage can wholly take the place of turnips for wether feeding. Both these foods should if possible be available to the shepherd. For breeding ewes I found silage a capital food being fully better, all things considered, than turnips. While feeding it the ewes were thrifty. The clover silage was relished by both the breeding ewes and fattening wethers. When put into the silo uncut and fed so, the sheep will leave considerable refuse; more of it than when fed clover hay.

QUESTION — Does it pay to feed grain to the breeding ewes?

MR. CRAIG — I believe it does. Let me tell you of the experience of two breeders in this matter. One had a flock of 150 ewes. He stinted them, giving them no grain whatever. A carload of oats was shipped from his farm because he considered them too good for sheep. From these 150 ewes only fifteen lambs were raised last year. That is an extreme case but it shows in a strong light the relation of grain feeding to profitable lamb raising. Another breeder in the neighborhood had 47 breeding ewes and from these he succeeded in rearing 57 lusty lambs. His ewes were well fed and received grain. You will find that ewes fed a little grain will give you a heavy clip of sound wool and lusty lambs. If the ewes go into winter quarters in good condition in the fall do not give them any grain until a few months before lambing; I would rather feed good oat straw and some grain than any other fodder I know of and no grain.

QUESTION — Would you advise using ram or ewe lambs for breeding purposes?

MR. CRAIG — A robust ram lamb may serve twenty or thirty ewes. More than that number will check the growth of an ordinary ram lamb. I have used a ram lamb to serve as many as sixty ewes and had an excellent crop of lambs the next year. The lamb was not injured in any way. He was fed during service 2 or 3 pounds good hay 3 pounds of roots and ½ pound of heavy oats. By using a ram lamb on a limited number of ewes you do him no harm and you are able to criticise his stock getting qualities the next spring before using him on all your flocks. I do not think it good practice to breed ewe lambs unless they are very early and forward in growth.

QUESTION — How long may a ewe be kept in a breeding flock?

MR. CRAIG — As long as she continues to raise a good lamb each year. There is a greater range of variation in ewes than in any other of the domestic animals and hence the possibilities of selection are exceedingly great. Some ewes will continue to be profitable until they are ten years old; others become unprofitable at four years of age. I know a grade ewe eight years old that has yielded her owner $100 in lambs and wool and when in her eighth year she had triplets and they were all fairly well nourished. By keeping a record

each ewe of the flock it is an easy matter to cull out the the unprofitable ewes each fall and fatten them for the butcher.

QUESTION — What is your system of keeping a record?

MR. CRAIG — We number all our sheep with small metal ear tabs. The ewes are all entered in a book — opposite the name of each ewe we have a column for the time of service; then another for the time when due to lamb and another for the actual date of lambing. We number and weigh each lamb as soon as dropped and these are entered with the sex in three columns following the others. The weight of the wool clipped by each ewe is also noted. In the place left for remarks we note the conditions of the udders of the ewes at the time of lambing and determine their milking qualities by two examinations at different periods, and the growth of the lambs. When fall comes we cull closely with the facts we have gathered as a guide. Age alone cannot be relied upon.

QUESTION — When is it best to have the lambs dropped?

MR. CRAIG — If you have good dry quarters for your sheep you can hardly have the lambs come too early for profit. If the lambs come strong they do not require warm quarters. They must be kept dry above and under foot. As a general rule I like to have them dropped a week or so before the grass is ready for them. You can rear a larger percentage by having them dropped in the shed as you can attend to the wants of the weaker ones easier.

QUESTION — What treatment do you give the ewe about to lamb?

MR. CRAIG—As soon as due to lamb put the ewe in a small pen by herself in a quiet place. Do not attempt to assist her until you are convinced that she cannot deliver the lamb without your aid. When dropped dry the lamb and above all things see that it gets a good drink of its mother's milk. If it is the first lamb the ewe has had it may be necessary to hold her to give the lamb a drink. Sprinkling a little salt over the lamb is a good idea to get the ewe to lick the lamb thoroughly dry.

QUESTION — What points would guide you in selecting a ewe for breeding mutton sheep?

MR. CRAIG—Just let me tell you the kind of lamb I like to have to feed and then you will understand why I want certain points in the ewe. I have noticed that the broad faced thick necked lambs with long even bodies make the most rapid progress. Some admire the short bodied lamb but I would rather have one that is considered long between the legs. It is desirable also to have them plump behind and well filled out in the inner thigh. You can fill out a fairly long bodied lamb better than you can a short bodied one. The butchers like such length between the legs as this is the most valuable part of the carcass to them. Now the ewe that will produce such a lamb, when served by a good type of mutton ram, is long and low, straight and broad backed with all the indications of good milking qualities. A ewe can, during the time the lamb is with her, do more to determine the profitableness of the lamb than you can afterwards. A good milking ewe with the sympathy of the mother strong within her will always raise a profitable lamb.

QUESTION — What course of treatment do you consider the best for destroying ticks on sheep?

MR. CRAIG — After the ewes have lambed I would shear them as soon as the weather would permit. In addition to aiding you in getting rid of the ticks early shearing is a good practice for the reasons that the ewes will nourish their lambs better and moreover the wool will be of a better quality — and you prevent it from dropping out. You are safe in concluding that two weeks after the time of shearing the ewes, the lambs that run with them have become the hosts of the ticks that were before shearing on the ewes. Thoroughly dipping the lambs in tobacco solution, under this system of management will completely destroy the ticks. Do not delay the lamb dipping as the ticks may seriously check the growth of the lamb?

QUESTION — How do you make this tobacco solution for dipping?

MR. CRAIG — As a dipping fluid I use tobacco and sulphur. Some of the manufactured dips are good, others vary in strength, a few are more or less dangerous to use and all are expensive. As I said shear your ewes, as early as the latter part of May if possible. Then if you have about 50 lambs to dip take ten pounds of tobacco stems and boil them thoroughly for a day. From these you will get about six pints of very strong tobacco juice. In a pail of warm water stir three pounds of sulphur until it becomes of the thickness of cream. A tin lined tub or box will do for the dipping. To this tobacco juice as it is being used add during the progress of the work four or five parts of very hot water and also add small quantities of the sulphur. This hot water besides diluting the juice enables you to keep the temperature of the dip at 102° to 104° Fahr. at which temperature it is most effective. You could dip more lambs with this quantity of fluid but it is better to change it often and keep it clean. It is claimed for the tobacco that it will kill the nits as well as the lice and my experience appears to justify the claim. For scab, tobacco and sulphur are also strongly recommended used in the proportions of 1 pound of tobacco and 1 pound of sulphur to 5 gallons of hot water.

QUESTION — If sheep are fed sulphur will it kill the ticks?

MR. CRAIG — No, I think not. I used to feed our flock sulphur with salt but do not do so now. It seemed to me to bring on an openness of the system that gave rise to frequent colds.

QUESTION — At what age would you wean lambs?

MR. CRAIG — When from 12 to 15 weeks old. Often when a ewe has twins and she cannot supply them with the milk they need for growth it is advisable to wean one of them as early as possible. The milking qualities of the ewe will have most influence on the time of weaning. When you wish to wean the lamb early they should be taught to eat grain as soon as they can be induced to eat it. A nice piece of aftermath clover with some oil meal and cornmeal (1 of oil meal and 2 of cornmeal) will give a good unchecked gain.

QUESTION — Would you feed grain to lambs before weaning?

MR. CRAIG — Yes sir. In an experiment we carried on at the experiment station I found that it paid to feed grain to the lambs as early as they would eat it. I put two lots of lambs (three in a lot) on good blue grass pasture with their dams. To one lot of lambs we fed grain consisting of 1 part bran, 1 part cornmeal and ¼ of a part

of oil meal night and morning. The other lot did not get any grain. The grain fed lot made a gain during ten weeks of 27 pounds more than the other lot at an extra cost of 57 cents. The figures gathered from the experiment showed that the lambs made the greatest gain on the least food during the first half of the period so that it pays to feed the grain just as soon as they can be made to eat it.

QUESTION — How do you teach the lambs to eat grain?

MR. CRAIG — When the lambs are about two weeks old if they have been dropped early and are yet in the shed we divide off a corner with a lattice division made so that the lambs may pass through but the ewes cannot. In the corner so partitioned off from the rest of the pen we place a small trough in which a little grain is sprinkled. If the lambs do not begin to eat a little themselves we take one of them and force a little of the meal into its mouth. If the grain mixture consists of oil meal and cornmeal it will relish it and soon this one will be leading the others to the trough. In the field we make a small latticed pen to keep the ewes from the grain trough which is placed in it and this we put where the sheep are in the habit of gathering to get in the shade or for other reasons.

QUESTION — For feeding a flock of breeding ewes during winter what foods would you recommend?

MR. CRAIG — My system of management, where the conditions are suitable for following it, is as follows: As soon as the ewes are put in the sheds in the fall I would feed them ¼ pound whole oats per head. When the season is half over and lambing time approaches I would feed to each ewe daily ½ pound of bran instead of the oats. As coarse fodder I would advise feeding oat straw, corn fodder and hay. Three pounds a head per day will be about the quantity of these that a ewe will eat. More corn fodder will fatten them too highly. Along with these it would be well to feed three pounds of roots or ensilage. In any event never feed much roots before lambing time. With a ration of oat straw roots and the fore mentioned grain I have been keeping part of our flock of grade Shropshires in good condition at a cost of less than one cent per head per day.

QUESTION — Is it not so that sheep will do well only on high rolling pasture land?

MR. CRAIG — Some breeds will thrive only on high land but just the opposite conditions are most suitable for others. It is commonly thought that a farm must be of a certain aspect and soil texture to become a successful breeding ground for any sheep. There are about ten breeds of sheep in America and each one of these will thrive best under special conditions of environment so that it may be said that there is not any district in America but could furnish a home to some one of these breeds. For instance such breeds as the large Lincoln and Leicester do best on heavy low soils. Others such as the Cotswolds and Downs thrive best on lands of medium altitude while following these come the Merinos and for the highest table lands and mountain sides the Cheviot and Highland breeds are most suitable. To the best of my knowledge of our conditions and the characteristics of breeds every section of our continent may hope to become a profitable breeding ground for sheep.

QUESTION — Have you any experience

with the English rape at the experiment farm?

PROF. HENRY — Yes, we had a small field that Prof. Thomas Shaw of the Ontario agricultural college pronounced a fine crop and equal to that usually produced in Canada. While further experience may show that this crop will not generally succeed with us it certainly promises most favorably in this first trial and a thousand Wisconsin farmers should experiment with rape in a small way next season. It is par excellence the feed for fattening sheep and lambs in the fall. Just now most fortunately a deep interest is being awakened in English breeds of mutton sheep. If we are to keep these animals to the high standard at which we find them and produce mutton equal to that of the English markets we must improve our present methods of caring for sheep, and add to our very limited list of feed stuff suitable for them. Our limited experience shows that rape may possibly become a valuable crop for sheep-feeding in this state.

POULTRY FOR THE FARM.

BY MRS. IDA E. TILSON, WEST SALEM, WIS.

A Host of Questions.

It is said a child can ask questions that a philosopher cannot answer. Reverse positions, and how will the tyro succeed when an expert is inquirer? There were sent me, by our superintendent of institutes, several pages of poultry questions, and an essay requested that I should classify and answer them. Satisfactory replies to inquiries virtually ranging from grave to gay, from scientific to practical, and from "banty" to shanghai, might require "Wood's Natural History," "American Standard of Excellence," and "Encyc. Britannica" combined. My department of the poultry business is egg production for food, and my affairs are conducted not as a professional fancier, but as any farmer's daughter may do. Incubators, capons and packing will, therefore, be relegated to dealers and shippers.

Warm Quarters.

Nothwithstanding our amiable and progressive weather prophets, there are usually long winters, at this latitude, hence the hen-house, whatever its style, should be warm. My houses are double boarded, one filled between with sawdust, the other having tarred paper intermediate. The former building, with its thick absorbent walls, is both warm and dry. Paper arrests all breaths, and their accumulated moisture frequently freezes in hoar festoons, which weep themselves away on 'thawy' days. A hen, merely beholding such frost and dampness, will shiver. But that kind sawdust, which, instead of biddy, takes the moisture into itself, is slowly affected by dry rot, while tarred paper

certainly repels insects, and "as snug as a bug in a rug," is no greater bugbear to housekeeper, than as snug as an insect in a crevice, is to poulterer. With sawdust and paper linings it is evidently a case of paying your money and taking your choice. Satan surely finds some mischief still for idle hens to do. A floorless house, well sanded, permits biddy to 'kill time,' and to secure exercise by scratching, and may keep her in practice for the spring flower-bed. A floor affords rats and insects another refuge. Good stone foundations secure safety, and outside feeding, under a shed, attracts rats away from the house proper. Simple interior arrangements, movable nests and roosts, and a judicious use of coal oil, and pyrethum will free house-cleaning of its terrors. Sawdust has been my only nest filling for some years. To pack hay or straw so it will not become 'humpy,' is more than packing a Saratoga trunk. Round perches resemble tree branches, Nature's roosts, and present no sharp angles to biddy's feet. Flat perches, wide enough to support her whole body, are comfortable for a heavy fowl. Summer nights, the ideal hen house will, by arrangement of doors and removal of windows, approach a draughtless shed. In midwinter, little outside air is needed. For intermediate seasons, I have apertures at the base, because top ventilation is more apt to call down roup than blessings on chickens' heads. A building 12x10, with open shed same size attached, will accommodate forty and even fifty fowls, perhaps as many as can agree and thrive in one place. Houses are for roosting and laying, for repose and thought. Sheds are invaluable for sunshine and sociability.

Good Layers.

To get layers healthy and early, matured hens need rather be sought than perfectly marked ones, since, happily, dress does not govern ability in either brute or human form. All varieties of Leghorns are unexcelled layers. Evidently Mr. Grimes' legendary hen was a Dominique Leghorn.

"For ten long years she lay.
At morn and eve, old Grimes an egg,
But none the Sabbath day.
Her back was brown and speckled o'er
With spots inclined to gray.

As general-purpose fowls, none stand higher than Plymouth Rocks, closely followed by Wyandotes, less hardy and intelligent, but more stylish, gentler, and very delicate eating. Both these and Cochins are excellent sitters and mothers, when not too heavy A Plymoth Rock may be rather independent, but let her have her own way, and it will generally prove the right way. Instead of removing sitters to a separate room, I now allow each to retain her chosen nest, protected from intruders by a temporary door, consisting of a shingle, held in place by a brick, resting on the little platform which extends in front of all the nests. (Patent not applied for.) A dozen hens can be set at once, and every morning be taken off together for food and water. Two or three substitutes are kept in training on glass eggs, and if not needed to replace ugly or restless sitters, are duly discharged. After a few days firm discipline, all learn regular habits, and no further watching is necessary. Something like Tennyson's brook.

Men may come and men may go,
But *they sit* on forever.

Intelligent Selection.

Since "like produces like," neither the largest nor the smallest eggs are best for setting, because neither giants nor dwarfs are desirable. Medium sized

eggs should be cultivated, as they best fill shipping boxes and cooking rules. A flat or ill shaped egg will break easier than the perfect oval, Nature's arch. If a sitter accidently breaks an egg, her nest must be repaired, and smeared eggs washed in warm water and wiped, as closed pores will suffocate the embryo chick. I am as expeditious as possible and otherwise never disturb a nest, not even to test the fertility of eggs. To sprinkle eggs may be necessary when a sitter is so confined that she can never bathe her feet and trail her wings in dew. One enterprising hen made a stolen nest of a disused horse collar, lying on a bare board shelf, and presented me 18 chicks; another proud mother marshaled 16 from the hay mow. Both locations were certainly high and dry. Even if that skin lining the shell, dries, in incubation, the shell itself grows brittle, and it would seem that any chick worth raising might make his own way out, and we have "the survival of the fittest." The eggs of a mature hen, two years old, are more satisfactory for hatching than those of a pullet, and I prefer the layers not to have been unusually stimulated. Though fresh eggs are always preferable, they will retain fertility for six weeks, if packed in bran and set in a cool place. Our grandmothers said points down, philosophers say heads down, and biddy leaves her egg side down. My own experience reveals no great difference in results. Some recommend that the infertile eggs left after hatching, be boiled and given to the chicks. Other poulterers pronounce them very unwholesome. They always seemed to me a dangerous subject for investigation. Until every hen-house has an almanac, and biddy is educated, she will sometimes sit unseasonably. A humane cure is confinement in a comfortable jail; without vestige of a nest, but with just enough egg-producing food to make her scratch and long for more.

Not Always Successful.

Once I raised all but one of 200 chicks hatched, and generally being successful, was inclined to think others careless when they complained of weasels and rats. After a long procession, however, of right-minded, rat-hunting cats, which slept in the hennery if they chose, my dear kitten proved an aristocrat, fond of spring chicken. Later three hawks selected my downy darlings for family supplies. Grown thin and almost demented, from long watching for them, I called in my neighbors and acquaintances, and sold 150 fine chicks "How are the mighty fallen!" Had I owned a harp, might have hung it on our willow tree, but instead, girded on my big apron, that was at hand, and raised 25 more chicks, which survived, protected by the higher grass.

The Best Feed.

There are no safer foods for little chicks than milk curd and bread and milk. Hard boiled egg perhaps once every other day is good, but the cheaper corn meal must gradually replace these. Soon, one-third of bran, ground oats, rye or beans, and two-thirds corn meal will be relished. To neither chickens nor hens do I ever give any sort of meal without scalding it. Salt, pepper and other spices, when used, are mixed dry through the dry meal before wetting. Wheat is a safe food, to be fed as soon as it can be swallowed, and meat may be given with care that it does not prove laxative. Corn is preeminently the fattening food. Wheat, buckwheat, rye, vegetables and

meat, are bone-forming and egg-producing. Barley is a favorite in England, because standing midway between wheat and corn, contributing somewhat both to eggs and flesh. I feed little chicks five times a day, larger ones three times, and grown fowls twice. A quart of grain per day for every ten hens, has been found a satisfactory winter ration. To this I add, each once in three days, chopped vegetables and fine charcoal, next cooked meat and gravel, followed by meal pudding and bone meal, forming a circular, rotating program. Picking the kernels from a few ears of corn daily, will furnish amusement, and variety not only spices a hen's life, but is indispensable for building her frame and fame. Oat hulls are so dry and harsh, they are rather indigestible. Whole oats, though an excellent summer food, cannot, therefore, be recommended during winter's trying confinement. Raw bone *is* bone, with its phosphates. Burned bone is practically a good but expensive form of lime and charcoal. A half ration of grain will suffice for summer with its insects and grass, but particular attention must be given food in moulting time, when I feed more pudding than usual, as it is easily digested, and add sunflower seed and corn for their oil.

A Nourishing Drink.

Milk, if sweet, is a perfect food and model drink. A fermented sour is not identical with a natural acid, like fruit juice, hence sour milk freely used, needs a little soda added or a slight scalding, else it may prove too laxative. Lime water can be given in excess, but tried for a day or so at a time, is an excellent regulator of the bowels. I would allow poultry warm water in winter, just as I would folks the same privilege, because digestion is helped and comfort imparted thereby. Why a hen will drink filthy, stagnant water, I do not know, unless because she lacks a scientific education, and has never heard about germs and microbes. Prevention meets this case better than philosophy does. When hen houses are opened mornings, their thirsty, hungry inmates rush in all directions, eating and drinking where they can, unless water dishes and feed troughs are previously filled and conveniently placed. Early and habitually satisfied with pure water and proper food, hens certainly are less ravenous for impure water and rubbish. The Douglas mixture, ½ lb. sulphate of iron and 1 oz. sulphuric acid, dissolved in 2 gals. of water, one teaspoon of this mixture to every pint of drinking water, was formerly very popular as a tonic. Decapitating rather than doctoring sick fowls, seems to be the modern tendency, since $2 worth of time and medicine are generally required for curing each 25c. bird. Decapitation applies also to scaly-legged, egg-eating, roaming fowls, and all morbid conditions. If eggs are gathered often, they are not only fresher, but if in addition, glass nest eggs are used, the egg-eating habit probably will never be learned. The Japanese egg gourd, when grown only to a proper size, on ground not too rich, is a cheap and good nest-egg. It is thought that a wet location develops scaly legs, and no doubt poor fences tempt roamers. But Polands and Hamburgs,

> Like Mistress Mary
> Seems quite contrary,

and wander for the sake of wandering, unlike Leghorns and Plymouth Rocks, which are merely good foragers. Cochins and Wyandottes, comparatively light

feeders and easy keepers, can be recommended for confinement.

Which Shall it Be?

In both France and China, where cooking has been brought to great perfection, black-legged and white-legged fowls take precedence of yellow-legged. Although yellow meat looks tempting, nothing can be more delicate than the white skinned Houdan, or jucier than the dark skinned Lan Shan. Perhaps methods of fattening and cooking are as important as tints of flesh. Poetry and music have entwined themselves about the delightful subject of fresh eggs. Shakspeare knew a poor from a good egg, while Mozart in one of his minuets, and Hayden in his Twentieth Quartet incorporated the joyous notes that announce a new-laid egg. But there are eggs and eggs, and each variety can, like a colt, best be valued after broken. The white-shelled are attractive for boiling, but the dark shelled have more substance, and two dark eggs will generally do the work of three white ones in cakes and custards. My Leghorn and Wyandotte pullets usually lay well when five or six months old, while Plymouth Rocks are about a month later; when a pullet has reached this period, she is in her prime, and for two years thereafter should lay over a hundred eggs per year. If active, red-combed and bright-eyed, it may be best to retain her another year. Could we put our hens asleep through the winters, like bears and coons, no doubt summer eggs would be most profitable and popular. Since our hens do, however, wake early and eat often through cold weather, we may as well, by judicious feeding, produce some eggs to pay for our trouble. A frozen comb must be painful and debilitating, and hinder egg-production, though I never dared to try any remedy, except sometimes a very little glycerine.

Keep an Account.

By all means keep an account with the hens. It will prove that all the way from nothing to $1 a hen per annum, can be made. For the first time, the balance on my books is against me. My pullets, purchased instead of raised by myself, are fine looking birds, but evidently, were not early impressed that their mission should be to lay. Or, perhaps, the Guinea fowls kindly given me, and the peacock loaned me, for hawk extinguishers, have scared the hens themselves.

Like an old-fashioned minister who usually preached twice a day from the same text, informing his hearers in the morning that he could not exhaust his subject then, but would try to do so in the evening, I must leave some topics untouched, though without any promise as to where and when I shall exhaust them.

EVENING SESSION—MARCH 18th.

The Institute met at 7:30 p. m.

Prof. W. D. Parker in the chair.

Music. Mixed quartette.

PROF. PARKER—The Farmers' Institutes of Wisconsin, have now been in progress five years. These institutes are free for all, no one is restricted from participating. They have become a great educational factor in our state. Educating the farmers, popularizing our state university and advertising the bountiful resources of Wisconsin.

Any organization that will bring farmers together to discuss better ways and methods upon the farm, will be fraught with good. We see all other vocations assembling together in convention, using their brain as well as their brawn in eager efforts to keep abreast of the sharp competition of the times. The farmer who laughs and sneers at the farm institute, refuses to study, read and think will have a chance to act as "rear guard."

The institute is the farmer's opportunity, and will do more to educate and encourage him than anything heretofore offered. If every farmer and his wife in Waupaca county could attend an institute and give their lessons of experience, if successful, all would receive the benefit; if a failure, some one would perhaps point out a remedy. We must banish the isolation of the farm, it is fatal to advancement and progress. Every school district should have a co-operative institute, which should meet once a month and maintain the interest and prepare the way for the annual county institute. An organized educated force of the best thinking, progressive men and women scattered throughout your many townships, would uplift and elevate agriculture to its proper position.

It gives me pleasure to introduce as the first speaker of the evening, Prof. Henry, Director of our experiment station.

WISCONSIN SYSTEM OF AGRICULTRUAL INSTRUCTION.

BY PROF. W. A. HENRY.

The system of agricultural education adopted by the University of Wisconsin posseses features worthy of consideration by all citizens of our commonwealth. It has attracted the attention of educators and others interested in progress from near and far, and I sometimes think has been more studied by non-residents than by those who give it their support and enjoy its benefits.

Perhaps the reason that it is not better understood and appreciated at home,

is in some measure chargeable to the University authorities. We have not always used every opportunity possible to present the advantages of our system and make it understood by those who are in position to receive its advantages. The institute platform and the institute Bulletin offer a grand opportunity for informing our farming population of just what we are doing for the advancement of agricultural investigation and agricultural instruction.

Our system as now developed, is triune, the three factors being:

I. To develope agricultural science.

II. To educate youth in agricultural science.

III. The spread of agricultural knowledge throughout the whole farming community.

The first division of the system comes under the title of the Experiment Station. Through the publication of its annual reports, our station has already become quite well known to all reading farmers of the state. Its origin dates back to 1866, when Dane county secured a grant of lands made by the general government to the State University, by giving $40,000 which was used for the purchase of land for a farm and the erection of farm buildings. Upon the farm purchased through Dane county's generosity, experiments were started at an early date, Prof. W. W. Daniells having direct charge of the work. The first aid to investigation was by the legislature of 1881, when $4,000 were appropriated for experiments with amber cane and the ensilage of fodders. In 1883, the legislature increased the income of the university, and provided for the establishment of an experiment station. At that time there were not half a dozen experiment stations in the United States, and though we did not establish the first one, we certainly may be classed among the pioneers. Recognizing the great need for a better study of our agriculture, the general government in 1887, very generously donated $15,000 annually to each state in the union for investigations in agriculture. This sum, and the appropriation from our own state form the fund which maintains our experiment station. With unrivalled generosity our state prints annually 15,000 copies of the station report, and 10,000 copies each of the quarterly bulletins. These reports and bulletins are free upon application, so long as they last, to every farmer in the state. We now have the names of over 8,000 farmers on our mailing list, to whom the reports and bulletins are regularly sent as soon as issued.

What the Station Workers Are Doing.

The station force consists of a director with four professors, two assistants, a farm superintendent, and more than a half dozen other employes. The leading features of our work may be described as follows:

Besides general oversight of the station work, the director has chosen pig feeding for his special line of study. Experiments have been conducted to note effects of feed upon the flesh and bones of pigs, the quantities of different feed required to make a pound of pork, the value of cooked and uncooked feed, etc. More than a year ago a long investigation was begun to ascertain, if possible the amount of food required to maintain a pig at different ages and weights, and the additional amounts required to produce a pound of gain in weight. Although we have enough figures on hand to fill a large book if all were printed, some years must yet elapse be-

fore we dare strike averages which will give the conclusions permanence and value.

Dr. Babcock, besides having charge of the chemical laboratory, has thus far given most of his time to milk investigations. His discovery of fibrin in milk attracted the attention of scientists, and helps explain some of the peculiarities of this most complex fluid. The doctor is best known through his invention, the Babcock Milk Test, which I believe to be the most valuable invention ever brought out by an experiment station, and one which will be worth millions to our dairy interests. Every farmer who keeps a half a dozen cows, cannot afford to be without the Babcock Milk Test.

Prof. F. H. King is working faithfully studying the movements of water in the soil, how much water is required by growing crops, and how it can be best conserved to them, He has a most difficult problem, and we must be patient in looking for results. His investigations on the construction of barns has received favorable attention, while Bulletin No. 28, upon the construction of silos, has received praise on all sides as most timely and well written.

Prof. Goff has planted an orchard of hardy fruits, the trees coming from Siberia and other parts of Asia, as well as Russia. To these he is adding all of the more promising hardy varieties originating in this country.

Mr. Craig has just come to us, and will take up the very important subject of sheep husbandry. When we learn that in 1880, Wisconsin had 1,300,000 sheep, and in 1885 less than 900,000, I think you will agree with me that it is time something was done to place the sheep interests of our state upon a firm footing. The motto of our station is 3,000,000 sheep for Wisconsin, without driving out a single horse, cow or pig.

Mr. Woll has given his time largely to a study of the silo and its effects upon milk and butter production. He is also studying the sugar beet. This spring a thousand pounds of sugar beet seed were distributed to as many different farmers in the state, and when the samples come in this fall we shall know pretty well which portions are best adapted to the production of sugar beets. I do not believe there is a better state in the whole Union, for producing beet sugar than Wisconsin, and if we only proceed judiciously, I am sure capital will seek to locate sugar factories within our borders in due time.

Mr. J. W. Decker, the latest addition to our station force, gives his time largely to cheese investigations.

Though the range of subjects under investigation by us is small compared with the whole list, I think it will be conceded by every thoughtful person that each line we have in hand is an important one, and that it is wisdom to study a few subjects carefully, rather than lose ourselves among a multitude.

The Instructional Work.

The second division of our system calls for the education of youth in agricultural science, and to accomplish this, we have laid out several courses. Our long course is the equal of the other university courses, and prepares a young man in agriculture by broad, liberal training. It is especially helpful to young men who may wish to take up the teaching of agriculture or the work of experiment stations. There are scores of young men who intend to become farmers, but first desire a good college education, and can find the

means as well as the time for securing it. All such should carefully investigate the merits of this course.

The Short Course in Agriculture.

Our short course calls for the special attention of all farmers' sons who desire the largest amount of agricultural training in the shortest possible time. It is especially designed to help those young men who can spare a couple of winters from home, but who cannot leave the farm during the busy season. If you can imagine a farmers' institute lasting sixty days for two winters, held at the state university, with its books, apparatus, and equipments for the purposes of illustration and helping those in attendance, you can get some idea of what is possible for a bright young man to obtain who may come to us. This course is attracting attention from far and near, and educators have come long distances to study more carefully its peculiar features. Its merit attracted the attention of the Hon. John L. Mitchell, of our state, who in his love for agriculture, and his desire to benefit his fellow men, has generously provided twenty scholarships of $50 each in the short course. These scholarships go to the graduates of our country district schools. It is impossible to calculate at this time, the far-reaching good of Mr. Mitchell's splendid gift.

The Dairy Course.

The dairy course has become exceedingly popular. Though established but two winters ago. January, 1891, brought to us 72 young men from as far west as Kansas, and as far east as Canada and New York, the majority, of course, being from within our own borders. This course lasts twelve weeks, and promises to be of the highest value in helping young men to perfect themselves in the care and management of cheese factories and creameries. When the dairy school building, almost a college in itself, now under construction on the University grounds, shall have been completed, we will have the finest dairy building in the world. I need not tell you that this is the Wisconsin way of doing things. She takes second place to none whenever a movement is made to advance her agricultural interests.

The instructors for the educational department are drawn from the experiment station force for the most part. I believe that a good investigator is usually a good teacher, provided he instructs on those subjects in which he is deeply interested, and is not called upon to do too much work as a teacher. The young men who come to us for instruction are brought into close contact with men who spend the greater part of their time working on agricultural problems. Some of our instructional work, especially the practical side of dairying, is given by persons employed especially for that work.

The Farmer's Institutes.

The third feature of our unique system is the spread of agricultural knowledge throughout the whole community, through the medium of the farmers' institutes. The institute is just as much a part of the University and the agricultural department as the experiment station, or the teaching of agricultural studies within the college walls. Every person who attends an institute is a student of the University as much as though he had registered with us at Madison. The institute system is based upon the idea that knowledge should be as free as air and water, and that our farmers are anxious and willing to avail themselves of everything that is useful

and will help them to better follow their vocation. Many years ago the farmers began coming together each winter for the purpose of discussing agricultural questions, and making themselves better farmers and better citizens. These gatherings were under the name of grange meetings, farmers' clubs, meetings of various state organizations such as the State Agricultural society, the State Dairymen's association, etc. Each of these filled its mission and has done a great work, but the institute managed as it is from the University as a central point, gathers together all the great agricultural forces of the state into harmony, and carries more information and distributes it better than was ever before possible.

The Institutes Have Come to Stay.

When first started there were those who expressed the opinion that, though popular for a time, the farmers' institutes would soon die out, and there are those within our borders to-day who still believe it short lived. From the first I have affirmed the contrary, basing my reasons upon my knowledge of Wisconsin farmers and human nature in general, and I have seen no cause to change my opinion. When the horticulturist ceases to care for horticulture, when the horseman ceases to care for the horse, when the stockman's eyes grow dull as he listens to some practical paper on the care and management of our domestic animals; when men are so well posted in the growing of farm crops that no better methods can be employed and no larger yields obtained; when the owner of 160 acres of good Wisconsin soil is content to doze over the winter fire and care for nothing outside his boundary fences, then there will be no demand for the farmers' institutes in Wisconsin, but until such a time comes the institute has its place among our educational factors. My only fear is that interference may come from those who would rather farmers should not gather in meetings of this kind, and grow intelligent in the discussion of all things that work for and against them; or, perhaps trouble may come through the jealousy and enmity of a few who would ruin where they cannot rule.

And now in closing let me review briefly the salient points in Wisconsin educational system.

The System Summarized.

At the State University there is situated the experiment station with its corps of investigators busy upon some of those problems of great importance to our agricultural advancement. Associated with these are other teachers, and the whole make up the instructional faculty to help such young men as may go up to Madison for the study of the art and science of agriculture. From this same source, reaching out all over the state is a system of instruction in agriculture carried right to the very homes of the farmers themselves. Through this system every farmer in the state becomes a member of the University, receiving help and encouragement from it year by year. Through the institute bulletin and the reports of the experiment station, the latest scientific facts and the best practices in agriculture are at once brought to the attention of the farmers, instead of waiting the slow process of sifting down to them as was the case in earlier years. Our system in its whole and in its parts stands without an equal in any state in the Union. Wisconsin farmers are already proud of it, and when they come to understand it better and learn more fully its beneficence, will appreciate it more highly than they have in the past.

ADDRESS.

BY DR. T. C. CHAMBERLIN, PRES. OF THE STATE UNIVERSITY.

The District School.

Ladies and Gentlemen: I regret very much that Mr. W. H. Chandler is not present to discuss the relationship of the common school to the farmer, for I think there is no more important question before this country to-day. I know of no subject within the range of educational problems that more strongly commends itself to the careful consideration of educators and citizens alike than the proper development of the common district school. We have in our cities fairly well developed systems of education. We have a complete gradation from the primary to the intermediate school, from the intermediate to the high school, from the high school to the university, but until the present year there has been no such definite succession of courses before the boys and the girls of the country.

Any system of education, to be entirely satisfactory, must have consideration of the relationship of the child to his future occupation. Education must be adjusted to the environment of the child if it is to have the highest degree of vitality.

There should be a vitalizing relationship between the work of the shop, the field and the school-house. This is being partially brought about in our cities by the introduction of manual training, but in the country this has been neglected.

Knowledge Leads to Better Work.

The boy studies his grammar and geography, but he does not study the plants with which, as a farmer, he must deal; he does not study the animals he must care for, he does not study the earth beneath, or the sky above; his school work is entirely apart from the work of the home, and of the field, and they do not vitalize each other. The study of the life and purpose of the plants should be followed in the rural schools, the same of animals, of the soil, and of the air—all those things that the country boy comes in contact with every day. In these things are resources that will vitalize and enliven his intellectual processes and give him a new view of life. When I hoed potatoes upon the farm, I thought myself merely dealing with homely plants. In my maturer judgment of to-day, the potato plant is a more wonderful production than Niagara Falls. Those tubers on exhibition there are developed in a peculiar way, they are neither root nor fruit. They are things in which children are inherently interested, if explained, and a study of such things will vitalize the otherwise dull work of cultivation.

When I was a boy I used to go through the cornfield and pull out the beautiful silks and carry them away by the armful. In the fall I noticed there were many cobs partially filled with kernels but I never put the two together. Fortunately for me my father did not either. But if I had known the functions of that silk, I would have seen in it a beauty that I never saw. The peculiar economy that it performs would have been of great interest to a boy of

my bent — far beyond the spectacular interest that I felt. And so in all plant life. We bewail the going of our boys to the cities, but that does not stop them. One of the remedies, in my judgment, lies in making farm life interesting. They must have somehow this development of the inner thinking life, and if they do not get it upon the farm they will go elsewhere. We have left our boys and girls lives upon the farm barren, because we have not put into them the interest that is really there. We do not associate our children with us in the management of the farm, we do not take them into our counsels, and we forget that the interest that we take in carrying out our plans, is entirely absent from them.

It is the function of our schools to put a vital interest into the lives of our children.

The University and the Farm.

This leads me to the subject upon which I am to speak, the relationship of the university to the farm. We must find a remedy for this state of things. Wherein shall we find that remedy? Frst, we must find the knowledge of these things to impart to the young to vitalize their lives and put interest into their work. That knowledge must be produced, and it is the function of the University to produce it.

Secondly: It must put that knowledge into a form that is adapted to the young. Scientific knowledge must be simplified, and formulated and this must be done by the higher institutions of learning.

Then comes the third requisite, and therein lies the great difficulty. We must develop and equip teachers that can go into our country schools and carry this lesson, this vitality, this interest. It may even be in the books but the personality of the teacher is necessary to give it shape and force. Now, to put that teaching force into the minds of six or eight thousand teachers, is an enormous work.

Beyond that, the community must be developed to an appreciation of this work which will lead it to encourage and demand it. Necessarily the preparation will be more expensive. The improved talent will command higher prices in the market, and it must be paid for at its worth.

The Country School and the Universtay.

Now, the University has been endeavoring during the past few years to develop a system of courses of study which should connect the country school with the highest reaches of the University, and this last year, there has been announced an intermediate course which is to make the final connection. This course admits to its classes those who have completed the full curiculum of the county school as laid down by the state superintendent so that a graduate from a country school may be admitted without examination to this middle course, then two years after, he may be admitted to a college course in agriculture of indefinite length.

But the University has other relationships to the farmer than those which I have indicated. It has too long been the impression that a college is a place where a few young men—and lately, young women — may gather and go through a prescribed curiculum. The better idea is gaining ground that a university is an institution that will promote education among all the people. In three different ways is that idea carried out. First in the admission of adults to the classes of the University.

During the past year there have been some sixty in attendance at the University who are 21 years old and upwards, several who are past 40. Such adult students can study in the special lines in which they desire to inform themselves. But the most important benefit to the farmer lies in the line that has been so well represented from this platform to-night by Prof. Henry, the discovery and formulation of agricultural knowledge through study and experiment, and the giving it out to the community, thereby making it possible for those who can never go to the University to receive the benefits of the work done in that institution.

Again, through these institutes the University is endeavoring to do a class of educational work with which you are familiar. It is our hope to extend these educational endeavors, to put more work into the discovery and formulation of knowledge, and to more and more freely communicate that knowledge to the people, so as to make the University more and more an institution of the people, devoted to helping them in all practicable ways, and to lifting them up into those higher spheres of mental activity which are most wholesome and profitable, practically, intellectually, morally; which are advantageous financially; and serviceable to our whole civilation.

PROF. PARKER—Our present secretary of agriculture, Hon. J. M. Rusk, who we remember as a farmer, a soldier and governor of our state for seven years, who is always a success and never forgets his vast army of friends in Wisconsin has kindly sent Col. F. E. Parsons, as a representative of the department of agriculture.

DEPARTMENT OF AGRICULTURE.

BY COL. F. E. PARSONS.

I come here as a representative of the Department of Agriculture, and I came because I was wanted, I suppose, at both ends of the line. I heard what Gov. Hoard said this morning. He said he had been abroad in different parts of the country and Canada, and he returned home with a feeling of shame when he learned what attempts had been made to weaken this great work of the farmers' institute. My friends, if you will do as Gov. Hoard has done, and as I have done, go out and realize the position of this great state, you will have more pride for Wisconsin, than you ever had before. It is not long since the time when we could not have gotten together such an audience as this to listen to agricultural subjects, but the farmers are wide awake, they are trying to learn the very best methods, and everywhere I have been, from Nebraska to New York, from Mason and Dixon's line to the lakes, whenever they found out I was a citizen of Wisconsin they have praised the methods, and the doings and the laws of Wisconsin, until I felt proud indeed. I did not

blush, because I knew all their praise was true. Wisconsin has the lead and when other states plan their farmers' institutes they send their representatives to this state to your superintendent to get their lessons from him. In all the states where they have not farmers' institutes they are passing resolutions in every farmers meeting to call upon the legislature to establish institutes. In Iowa some of the best men have passed resolutions to go down to their next legislature, and demand that farmers' institutes should be established, and they all say, "When we get them we want them just like Wisconsin."

Farmers' Institutes.

If anything has ever happened in the state of Wisconsin that has given it a name far and wide it is these farmers' institutes. I have been around and I have heard the verdict, and I say if the farmers of Wisconsin permit this instution of learning which belongs to them to be weakened by any party or any politicians you ought to be ashamed of yourselves, and you never ought to have a good thing in the future. There ought to be no politics about it and there never has been, either, in its workings.

Dairy and Food Commissioner.

Then again, I have been told in these other states, "One of the best things you have ever done in Wisconsin was establishing that office of Dairy and Food Commissioner. That was the cleanest cut thing you ever did there." Do you know, my friends, your cheese is disgraced in Europe by the stuff that is being sent out from this state, just the fellows that your food commissioner is after, and if you farmers of Wisconsin let that office be abolished for the sake of $3,000 or $4,000 you will have to put your good cheese and butter up against old stuff that is not fit for food. We have a right to be protected. There is no one who can give protection to us who consume your food, but you producers.

You Feed the Nation.

The voice of the farmer has become potent in the land; you must unite for the purpose of protecting your own interests and not suffer other people to walk over you. Let me tell you something, the farmers of the country number, I suppose, in actual workers about eight million people. Well, that is a good many. You should get your minds made up as to what is right, and you should ask for it gently but firmly. You have to figure out with intelligence one of the greatest undertakings on earth, and that is to feed sixty-five millions of people with good wholesome food. That is the job you have on your hands, and the nearer you can come to doing this, the more independent you are. Look in every direction, and see what will be for your interests in making a market and then see to it that what you have is fit to eat.

The splendid show of potatoes over here shows that the farmers in this part of the country have put intelligence into their work, and learned what they can raise to advantage.

I have heard many things in this room to-day that would be of great value to me if I were farming. We get a great deal of instruction, my friends, in one way and another, but the trouble is we don't apply it. The questions and subjects that come up here are of much consequence to you. I know you come here to hear, and I believe that you are going to learn, and I believe we shall all go home with the determination to do all in our power to promote

the welfare of the farmers' institute, and the name of this state will still stand proudly in the foremost rank, and your children will rejoice that they carry the banner, leading all other states in agricultural knowledge, and in agricultural advancement.

WAUPACA.

By Mrs. Lizzie Stetson.

The Potato is King.

Mr. President, Ladies and Gentlemen: It was with reluctance I consented to take part in the exercises this evening. I consider it a great compliment to be invited to address so intelligent an audience as I find assembled here this evening. Although I may not do my subject justice, will try to paint Waupaca in its true colors. Beautiful are the footsteps of those who bring glad tidings, for hath not potatoes been crowned king? and is not Waupaca the capital? and do not the princes of commerce come from all ends of the earth, to do him reverence and pour down at his feet the silver drawn from the inner recesses of the western mountains? Hath he not made his subjects happy, and made hayseeds' pockets resemble the "horn of plenty"? "He hath clothed his sons in broadcloth and his daughters in fine linen."

This evening we hold high carnival in the tribe of Agriculture. To the many wise sachems, who honor us with their presence, we give kindly greeting. We have heard of your fame, of your great wisdom. Waupaca asks you to command, and we are proud to do your bidding. The little Gem City of Wisconsin, nestling in this beautiful valley, surrounded by its coronet of hills, would do you honor. Your advice, thoughts and words will fall on mellow ground—seed sown will spring up and bear rich reward.

Perhaps it would not be amiss to make you gentlemen, who have and will address us during the series of meetings, better acquainted with your surroundings. It is scarce two score years since the barrier was thrown down by our government, and civilization seized upon the belt of country known as the Indian land, lying west of the Fox and Wolf rivers. It was in the fall of 1852 that old King Oshkosh led away from this country what was left of the once powerful band of Menomonees — the very tribe who, under the command of Monsigneur De Langlade, met and defeated Gen. Braddock and Washington at Fort Du Quesne.

The Pioneers.

Westward the star of empire takes its way. It is the men who meet here this evening, that have swept back the wilderness, and built beautiful homes, extensive farms, and added another county to those which already formed proud Wisconsin. You have developed its resources and demonstrated that the light soils of central Wisconsin can be worked at a profit — that even here the queen of horticulture looks with favor. It was with emotions of pride that an old citi-

zen of Waupaca stood beside the fruit collected from all parts of the state, spread out for exhibition in the horticultural rooms at the capital, and heard the answer to the inquiry: "Where did those beautiful apples come from?" They formed the center plate, the nicest ornament of the display. The attendant replied: "Waupaca." Yes, Waupaca can and does raise the finest fruit of any county in the state. Millions of timber swept by the woodsman's axe from its bosom, have been the source of wealth for the many Crœsuses of the state, and have furnished the material for many a city.

Waupaca, noted for its beautiful scenery, is as well noted for its high rank in all business enterprises. In regard to educational interests we are second to none. A short time ago a prominent citizen, being asked why he didn't send his son to school, said: "Well, my opinion is, the fellow without the education is the one that 'gets there.'" Of course there are exceptions to all rules. Waupaca is willing to come under the exception, for we have a well graded school, under the supervision and control of an able instructor and disciplinarian.

I must not forget to mention the nursery, located south of the city. Although yet in its infancy, it is quite an advancement in the way of horticulture. The proprietor, though not well posted on the names of house plants—having been heard to call a beefsteak begonia a "beefsteak bologna"—however, is well versed in the culture and names of trees, small fruits, etc.

Old Indian Mounds.

If time would permit, I might indulge in some thoughts of the race of people who once held possession of our valley, and whose boats must have skimmed over our many clear and crystal lakes. On yon range of hills are many of their quaint-shaped mounds. Although I am not able to solve their history, of one thing I am certain: Those hills with rugged front, dotted with majestic boulders, have been there a very long time; and some antiquarians have been heard to say, that it was on Mount Tom that Noah's Ark rested after the flood. Wise men have held weighty and protracted discussions on this subject, but it still remains unsettled. No wonder we are proud of our history, proud of what has been accomplished in so short a time. It was but as yesterday, our young men rallied to the call of Abraham Lincoln, and the tramp of armed companies going to the front was heard along our streets. Are not their brilliant acts, their heroic achievements, written in history? On most every field of battle in the wide area of strife, were found the sons of Waupaca; their bones lay bleaching on many a battle field.

Waupaca again comes to the front in the triumphs of peace. Just over that range of hills may be found a memorial of a grateful people to the defenders of their country. There is home and a place to rest for those to whom fortune has been unkind. There they will be provided for until they have fought their last battle. That such an institution exists, was due to the generosity and patriotism of the prominent citizens of Waupaca. It was in this county originated the plan for better care of the insane—the honor of which was fraudulently claimed by the board of charities and reform. The plan was successfully carried out, without state aid, and insane were being cared for from other counties, long before the measure was passed giving state aid to counties.

I have read that the question of doing away with farmers' institutes is being agitated by our legislature. I think I can illustrate our position with a little story. In earlier days, when rapid speed upon railways was being discussed, a member of the British parliament asked Stephensen, the famous engineer: "What if a cow should get on the track?" Stephenson replied after thinking awhile: "That would be bad for the cow." If there are any politicians who try to stop the car of progress, in which the farmers are pushing to the front, I must say I think it will be bad for the mules.

Thanking the managers of the institute for the honor they have done me, by giving me a place on their program—probably for the reason my father was once a farmer, whose boast was that he had cleared more land and improved more acres than any man in the county. But I shrewdly suspect, he did it as some patriots served their country—by a substitute.

I have worried your patience too long. If I have not done justice to my theme, I would advise you to do as a legislator did the other day—my informant was down to Madison on a free pass—you can move to amend the title to suit the bill.

Music—Male quartette.

The institute then adjourned to 9:30 A. M. next day.

MORNING SESSION—MARCH 19th.

The Institute met at 9:30 P. M. Geo. McKerrow in the chair.

INSECTS AND DISEASES OF THE POTATO.

BY PROF. E. S. GOFF.

Mr. Chairman, Ladies and Gentlemen: It has been the history of nearly all cultivated plants that for a considerable time after their introduction to culture, they have been comparatively free from destructive parasites. But as the area devoted to their culture becomes greatly extended, and vast numbers of the plants are crowded together in close proximity, insects and diseases appear among them, which often prove very destructive, and sometimes threaten to exterminate their culture.

The history of the cultivated potato offers an excellent illustration of this truth. About the year 1845, the potato disease for the first time assumed a very alarming character in Europe, and in this country, and for one or two seasons the crop was almost annihilated, in consequence of which a literal famine occurred in Ireland. Up to about 1864, the potato plant was almost free from injurious insects. At that time the culture of potatoes was extended to the mountains of Colorado, and the native

Colorado Beetle

becoming introduced into our potato fields, swept like a prairie fire across the continent, and but for the fact that we have learned how to successfully combat it, would long ago have exterminated the potato from culture in this country.

The Colorado beetle is an insect that is familiar to us all. The insect passes the winter in its perfect state, the last brood of beetles entering the ground after the potato tops die. With the first warm days of spring, the beetles emerge from the ground and the female lays her eggs upon the leaves of the young potatoes. In about a month after the eggs are laid the first brood of larvæ are matured and enter the ground again, then in ten or twelve days another brood appears and this in turn in about a month attains the perfect form and again enters the ground to appear in due time as a third brood. Thus there are three broods of the potato beetle in the northern United States.

It is probable that you are all familiar with the methods of dealing with this insect. You all know that certain compounds of arsenic, as Paris green and London purple are specifics for it, and you are all probably familiar with the machines that are being used for distributing these poisons. It is not, however necessary to provide ourselves with expensive machinery to handle the potabeetle, as the object may be accomplished in a satisfactory manner in the average

potato field, with an apparatus that costs but a dollar or two, and which is described below.

How to Apply Poisons.

We can apply the poisons dry, diluted with some cheap powder, as common land plaster or air-slacked lime, or we can apply them with water. I have found the dry method more satisfactory. Of course water costs less than lime or plaster, but the trouble of using it is greater. While connected with the experiment station in New York, I made a careful series of tests to find out the smallest amount of Paris green or London purple that would answer. I tried 1 pound of Paris green to 100 pounds of plaster, and found that was quite efficient. I next tried 1 part to 150 and I found where the mixture was perfect this was also efficient. I next tried 1 pound to 200, but found that with so great a dilution some of the beetles would escape, and I settled on the conclusion that 1 part to 150 is about as small an amount of poison as it is wise to use. An old barrel churn is a good thing in which to mix the materials.

For applying the powder I find nothing so good as a hand sifter, a sort of pail made of galvanized iron or tin with a perforated bottom, a rigid handle and a tight fitting cover. We simply have to give the pail a shake over the plant to cover the foliage with the mixture. A man can use two of these pails at once, if he chooses, and thus take two rows. Of course this applies only to those who have not a large area of potatoes. Where a man raises ten or twenty acres, he would require some horse machinery for distributing poisons. When applied in water, I have found that one ounce of the poison to ten gallons is a good proportion.

A few other insects are injurious to the potato at times, but hardly enough so to merit discussion here. The flea beetle has been reported as doing damage in different parts of the country. It is similar to the cabbage flea beetle, and like the latter, does not appear to be susceptible to arsenites. It does not eat the foliage much, but subsists upon the juices of the plant. Strong tobacco water is perhaps the best preventive, but does not form a complete remedy. The white grub sometimes injures potatoes to some extent, and the cut worm is also troublesome at times. For these insects I can at present suggest no practicable preventive.

The Potato Rot.

The most common disease of potatoes is what is known as the potato rot. This disease always appears first upon the foliage of the plant. Its life history has been the subject of much study and some dispute. Doctors, however, agree that it lives from one year to another from what are called resting spores. Two kinds of spores are produced, one maintains the life of the fungus during the summer, the other during the winter. These resting spores are formed in leaves that have been destroyed by the fungus, and also in the decayed tubers. In wet weather and on wet soils these spores are in a condition to germinate. Some are deposited by the wind or other means on the foliage of the plants, and being in contact with a moist surface, these very minute spores germinate and send a little mycelium through the epidermis of the leaf into the interior. The disease, when once it has obtained a foot-hold, spreads under favorable conditions with great rapidity, and one day is sometimes sufficient to blast a whole potato field as if fire had passed through

t. The spores being formed on the leaves are set free and fall to the ground and the rains wash them down into the soil, where they come in contact with the tuber, and thus it is that the potato rot begins. Unfortunately, no positive remedy has been discovered for this disease.

How to Prevent Potato Rot.

Perhaps our best preventive measure is to plant early; this brings early maturity. The disease always prevails worse in the latter part of the season. We can do something by thoroughly draining our soils, as the fungus is always worse in wet soils and seasons. In order to lessen the chances of the disease the following year we should burn the tops of the diseased tubers.

Prof. Weed, of the Ohio experiment station, made a test during the summer of 1889, which promises to be of some value. He sprayed the tops of potatoes with a mixture of sulphate of copper and lime, what we call the Bordeaux mixture, and found that the rot was considerably less on the area sprayed than on that not sprayed.

Another Disease of the Potato.

There is another disease of the potato which appears in July or August as a black blight on the foliage, causing the tops to die as if a fire had passed through the field. It was very prevalent the past season in the southern part of Wisconsin and in Illinois and Ohio. This disease has not even been named. It is being investigated, and we shall probably soon know more about it. Experiments have shown that the Bordeaux mixture is a preventive of this blight.

How to Make the Bordeaux Mixture.

I will now tell you how this Bordeaux mixture is made. I dissolve six pounds of sulphate of copper (blue vitriol) in four gallons of hot water, and in another vessel slack four pounds of fresh lime in four gallons of cold or warm water; then when the two solutions have dissolved, add them together and dilute with water until the whole makes 22 gallons, when it is ready for use. We apply it with a force pump or any other apparatus for applying liquid mixtures.

The Potato Scab.

The potato scab is a disease with which we are all familiar. There appear to be several different causes for this trouble. It seems that almost anything that corrodes the surface of the tuber in the soil will cause the potato scab. It appears that the planting of scabby seed tends to increase the disease.

Some years we find that after harvesting our potatoes and storing them in the cellar they are destroyed by rotting. There are several different fungi that may cause the rotting of the potato in the cellar. I know of no positive remedy for this trouble. While connected with the New York station we found by careful test that slacked lime did not prevent the trouble.

DISCUSSION.

MR. FISHER—If you can bend the tops over and hill them up pretty well, is not that a partial preventive of potato rot?

PROF. GOFF — That has been tried pretty thoroughly in England and found to be beneficial, but it is not generally practiced, whether because it is too expensive, or for some other reason, I do not know.

QUESTION — Can you tell from the looks of the plant whether the tubers are going to be affected with rot?

PROF. GOFF—We can. The fungus

appears first as blackish spots on both sides of the leaf, and on the under side we find a silky or wooly appearance surrounding the spot. The spot increases around the borders.

QUESTION—When would you apply the Bordeaux mixture?

PROF. GOFF—I should begin to apply it as early as the middle of June for early planted potatoes.

PROF. HENRY — Do you put in the whole of the lime, or do you just let the lime settle and take the lime-water?

PROF. GOFF—We let the lime settle and pour off the water, and afterwards we can add more water if we choose. We use enough lime so that the water is colored like milk.

MR. FROST—Do you find it advisable to use hot water in preparing Paris green water?

PROF. GOFF—I have never used it, and know of no advantage in it. Paris green is insoluble, and we do not wish to render it soluble even if we could, because this would endanger the foliage.

MR. HARTMAN—What is the result of too much Paris green?

PROF. GOFF—It will blight the foliage. It will not injure the tubers except through the foliage.

MR. ROBINSON—Is there any advantage in plaster as a fertilizer for potatoes?

PROF. GOFF—On some soils plaster is found quite beneficial. On others it has no effect.

MR. BRAGG—Is there any advantage in mixing plaster and Paris green some time before using them?

PROF. GOFF—No, sir.

QUESTION—Would ashes be a sustitute for plaster?

PROF. GOFF—Any light cheap powder will answer. It doesn't make much difference what it is if it only dilutes the Paris green.

QUESTION—On what does the flavor of potatoes depend? Is it upon the starch content, or is the flavor affected by the soil?

PROF. GOFF—Mr. F. A. Heubner, a very intelligent potato spec ialistof Manitowoc, tells me that the flavor of potatoes is not necessarily dependent upon their starch content, and that tubers grown from seed are always inferior in flavor for the first generation or two, though their content of starch is as high the first year from seed as it ever is. I believe it is perfectly well established that the quality of potatoes of the same variety grown on different soils is often very different, and until recently, I had ascribed this difference to a variation ir the water supply of the soil, which produced a corresponding variation in the starch content. But I have since met samples of potatoes that cooked dry and mealy, which no potato poor in starch can do, and yet the flavor was very inferior. I may add that Prof. Voorhees, of the New Jersey experiment station has been investigating the influence of different manures upon the quality of potoes. He found that those raised with sulphate of potash were finest in flavor, those from farm manure next, those from muriate of potash next, and those grown with kainit were poorest.

QUESTION—How can we prevent potatoes kept for summer use from sprouting?

PROF. GOFF — A French method has recently been highly recommended, though I do not know that it has been tried in this country. It consists in soaking the tubers for ten hours in a very dilute sulphuric acid, formed by adding two parts of commercial sulphuric acid to 100 parts of water. The

acid is said to penetrate the eyes sufficiently to destroy their vitality, while it has no effect upon the skin of the potato. The tubers must be throughly dried before storing. The same liquid may be used any number of times with equally good results, and a barrel or tank of any kind will do for the treatment. This method is worth trying, but I would advise a test on a small scale first.

ONE YEAR'S EXPERIENCE IN GROWING POTATOES.

BY E. D. FROST, Almond, Wis.

Our Way.

Last season I planted thirteen acres of potatoes on the home farm, on ground that had been pastured the year before. I had spread over this piece a light dressing of barn-yard litter. It was plowed about seven inches deep, dragged once, marked both ways, and planted with spades. The spade is handled with one hand, pressed deeply into the ground, tipped forward, seed dropped down behind the spade, which is then withdrawn and the earth falls on the potato. In this way the seed can be put in deep, and we have fewer missing hills than by most methods. I dragged once before sprouts showed above ground, and partly dragged a second time, but stopped because I thought I was doing more injury than good. I gave this piece nearly level cultivation, but the ground must be kept very mellow or the tubers will push above the ground and get sun-burned. They got injured in this way. Hilling with the cultivator would have been a great benefit this season. The more cultivation the better, and most fields suffer for lack of it, but injury may be done with the cultivator late in the season if the hills are disturbed.

Bugs were killed with Paris green, put on with water. Two applications were required. Hand sprinklers were used, with spraying nozzle and plunger.

For some reason, perhaps excessive hot and wet weather, potatoes planted the first week in June showed many missing hills, and later in the season, blight injured the fields more or less. Parts of this field suffered by rotting of the seed, and also from blight. We dig with six-tined forks and haul direct to the cellars. The yield was 2,000 bushels from the thirteen acres.

Expenses.

Figuring expenses for plowing, planting and caring for the crop, I find the crop cost $150 in the cellar. The 2,000 bushels then cost less than 10 cents per bushel, or $11.50 per acre. The cost put into market was about fifteen (15) cents per bushel.

I planted another field. It was late in the season and I plowed the potatoes in, dropping in every third furrow. The land was light and did not yield so well

but there was very little trouble from bugs. The potatoes were very smooth and fine. It cost 7 cents per bushel to raise these potatoes and 10 cents to dig and put into market. Yield, sixty bushels per acre. I did not figure in the rent of the ground in either case.

DISCUSSION.

MR. ROBINSON—What time in the year did you plow that land?

MR. FROST—The home crop I planted the first week in June, plowing just before planting. The second field, from the 13th to 17th of June.

QUESTION — What was your loss on those 2,000 bushels when you came to take them out to market?

MR. FROST—It was 10 per cent. from black rot this season. If potatoes are well ripened the shrinkage will be very little.

MR. ARNOLD—Won't they shrink more kept above ground than in the cellar?

MR. FROST—The potato warehouses that are being built have no cellars, as a rule, and the heaviest buyer and shipper I know of said to me this winter that he would rather pay three or four cents more storage to have the potatoes kept above ground. But I think the trouble with him was a lack of ventilation in his cellar.

QUESTION—How deep did you plow in those potatoes when you planted them?

MR. FROST—About five inches, though I would have preferred more shallow plowing on account of digging.

QUESTION — How did you cut your seed?

MR. FROST—Down to about two eyes to the piece. Sometimes we split a potato, and sometimes cut it in four pieces. I like to cut it immediately before planting.

QUESTION—Do you advocate early or late planting to get a good crop?

MR. FROST—This depends upon the season. I shall plant some early and part late this spring.

POTATO RAISING.

BY GEO. W. MARTIN, Hudson, Wis.

Potato culture, like all branches of agriculture, has to be learned. I have been growing potatoes for several years, from ten to eighty acres per year, and it is what I do not know about growing them that troubles me.

Necessary to the production of a good yield of potatoes is good soil, good seed, good cultivation, and having them well protected from bugs.

Nearly all soil in this state can be made to produce a good paying crop of good potatoes.

Our much exhausted soil must be regenerated before a good crop can be grown. I have tried different methods and find barnyard manure the quickest, best and surest way of preparing land for a potato crop.

Clover sod is good, clover sod and barnyard manure are better. "Timothy sod is not good." Do not plant the

same piece of land twice, my experience having been more trouble with bugs and more liable to scab.

I prefer to plant in drills thirty inches apart, five to six inches deep, and ten to twelve inches apart in the drill.

Seed to be cut to one or two eyes, and not too small. Potatoes for seed should not be allowed to heat or sprout. Move them or turn them, which will prevent sprouting.

Temperature for all vegetables should be thirty-two to thirty-five degrees. Keep a thermometer in your root house. Cut seed one or two days only before planting, as much seed fails by being cut and then piled or sacked.

I plant with a planter, which makes its own drill and does its own marking. Plant or make rows perectly straight on acco unt of ease in cultivation and sprinkling or bug killing. To me it is a pleasure to see a neat, clean, straight planted field of potatoes or any other crop. I use three 1,200 pound horses and a good man. The machine does perfect work.

Roll the ground immediately after planting, to pack or firm the dirt, that the soil may be kept moist. Never open drills ahead of planting. Kill all weeds by repeated harrowing until the plant is visible, then cultivate, turning the soil to the plant. Harrow and cross barrow. Keep weeds down by repeated cultivation until the plants begin to blossom.

Cultivate, level and hand pull all weeds left, which costs me about $1.25 per acre. Potato and all hoed crops should be clean and free from weeds, as it pays at harvest time and for future crops that are to be grown on the land.

Bugs must be kept off, as the full foliage is necessary to the plant.

Two pounds of Paris green to six barrels of water applied to plants when dry, will destroy bugs; one to three applications as the case may require. It is much easier to destroy them when first hatched. I use a six barrel tank, the teamster sprinkling two rows at a time and a boy to stir to keep the Paris green from settling.

Most of the bug killing can be avoided by heavy fertilizing and late planting, and much labor can be saved in destroying weeds by late planting.

Do not plant until the ground is warm, that the plant may come up vigorous and strong. It is the small and slow growth plant that is destroyed by bugs.

Some years since I asked Mr. J. M. Smith what he used to kill the cabbage worm. He replied, "Nothing," and said: "I force my cabbage so that the worms cannot harm them." This led me to try the same method on my potatoes. Last season I did not use ten pounds of Paris green on 50 acres. The year before not any on the same amount of land. On land adjoining they used 100 pounds on 15 acres.

I plant for winter use from June 10th to 20th. My best crop last year was planted the 20th of June, on clover land, well manured. I harvested on this piece 225 bushels per acre, early varieties being used of course in all late planting.

Dig when ripe, and not until ripe. Potatoes are not ripe or fit for market when the skin will rough in handling. Green potatoes are not profitable to the grower, the buyer, nor the consumer. Our prices are badly demoralized every season by the green stuff sent to market.

As a rule sell from the field when dug. Avoid the commission man as you would a pestilence.

I dig with a machine, drawn by six good sized horses, which leaves the potatoes clean in the row and the land in perfect condition for the next crop. Assort from the ground, picking nothing but good size table potatoes. There cannot be too much said about the assortment of potatoes for market. On most farms anything bearing the name of potato must be sold. This is a great mistake. The second picking "about one-fifth with me," will make, when assorted, good feed and seed.

The above first assortment will bring more money in any market than the whole crop. In short, offer for sale such as you yourself would buy.

Farmers near any one market should plant one variety. Select some kind that is well quoted on the market and that is well adapted to your particular locality; by so doing you can get a much better price. Keep plenty of help; there is no economy in trying to see how little help you can get along with—put your brains to work and see how much help you can work to a profit. Keep stock enough to work up your coarse feed so that you will have enough barnyard manure to go over your farm once in four or five years—thereby your farm will grow a good crop of potatoes or any other crop.

Agriculture, like all other branches of business, has by necessity become a science.

The time for hap-hazard, go-as-you-please farming has passed. Close, careful attention, with much study and good figuring, are necessary to success.

No more guess work, no more wheat growing because you have been growing wheat for thirty years, nor because the signs are that the season will be cold and wet, not favorable for chinch bugs, which, by the way, I consider a blessing instead of a curse to the general farmer, thereby forcing him to abandon unprofitable crops. Diversified farming must be taken up at once, now, this coming season.

Do not wait till we are driven from our farms and homes. Form new plans for 1891. Tell your family, tell your neighbor, that you are going to produce a little of everything. Keep a few cows, hogs, sheep, chickens and turkeys. Raise a few choice colts, grow a few acres of onions, cabbages, beans and potatoes, which I from experience can assure you will materially change the general appearance of your farm and your bank account.

DISCUSSION.

QUESTION—How did you apply that manure?

MR. MARTIN—I have been plowing it under. I have used both well rotted and green manure.

QUESTION—Did you get the best results from manure applied some time previous to plowing, or immediately before plowing and planting?

MR. MARTIN—I have got my best results from rotted manure applied some months before planting.

MR. COLE—Tell us something about potatoes rotting in store.

MR. MARTIN—Last year I had considerable trouble with my potatoes rotting. I had a foreman working for me that knew more about potato culture than I did, and when we dug our potatoes it was pretty late, and he thought it was

all nonsense in pitting those potatoes. I allowed him to put them into the cellar as we took them from the field. In February I had to sort them. They were rotted a good deal. This year the price didn't suit me exactly. I took the time and sorted them and pitted the good potatoes by themselves and the others by themselves. Of course the potatoes were thoroughly cured. I put into the cellar nothing but very dry, smooth stock. About the middle of February I went in and turned about half of them, and they were still dry and dusty as they were when they went in. I sprinkled a very little lime on them as I put them in.

QUESTION—When potatoes are worth a dollar a bushel would you plant scab by or small potatoes for seed, if you could get them for nothing?

MR. MARTIN—I would not plant a scab by potato. I would plant a reasonably small potato for seed when they are high or any other time. I would cut it.

QUESTION—Is it better to plow your ground in the fall or in the spring?

MR. MARTIN—If I should plow my manure in I would plow it in the spring, just before planting.

MR. PARKS—What variety do you consider the best?

MR. MARTIN—I am running on Early Rose and Hebron.

QUESTION—Do you recommend level culture on clay soil as well as on sandy soil?

MR. MARTIN—I have had no experience on clay soil. I think if you should cultivate level in a wet season on clay soil you would meet with trouble.

MR. HYATT — Have you any certain knowledge that the little potatoes are just as good as the big to plant?

MR. MARTIN — I have been growing from the same kind of potatoes all my potato life, as you might say. I do not take a small potato, I take a reasonable potato, the size of a hen's egg. I have looked up the experiments at the experiment farms, and they show just as good results from one as the other.

PROF. HENRY—Do you find any difference between seed potatoes where they have sprouted before planting, and those that have given out no sprouts?

MR. MARTIN — I find that a potato which has not sprouted grows a much stronger and thriftier vine than one that has sprouted.

QUESTION — Are potatoes more likely to be scabby which are grown near the top of the ground than those grown deeper?

PROF. GOFF—I don't know why they should be.

MR. BURTON—Can you prevent, and if so, how, the seed from sprouting before the time of planting?

MR. MARTIN—Not entirely. And yet, on second thought, I might say yes. If you keep a thermometer in your root house and keep the temperature as close to 32°, the freezing point, as you can if your potatoes are dry when they go into store they will sprout very little. I will say this. As soon as I see that my seed potatoes are going to sprout in my cellar, I take them to the stone basement in my warehouse, where it is reasonably dark, stir them, and occasionally turn them.

QUESTION — Do we understand Prof. Goff to say that he got at the experimental station as good results from small potatoes as from large ones?

PROF. GOFF—At the New York experimental station, our results were very perceptibly in favor of large seed.

MR. HYATT—I said several years ago

that I would select my seed potatoes as I would my cow. In digging, I would take a basket along, and if I found an unusually prolific hill, and could see no cause for it, I would put them in a basket by themselves, and if potatoes were not more than a dollar a bushel, and I had a choice kind that I didn't want to run out, I would plant those potatoes whole, and I wouldn't expect them to run out, any more than my cows do. Prof. Henry's results and my own were alike.

MR. FISHER—I think it stands to reason that large potatoes will produce a large crop. If you look in a bin of sprouted potatoes, you will see where the big strong sprouts come from, and they don't come from the little bits of potatoes. Five years ago, I did the same as this gentleman speaks of. There were five diggers. I had one boy that was not big enough to dig, and I gave instructions to the diggers, whenever they found a perfect hill, to throw them together, and the boy picked them up. I got 50 bushels that way. I calculate to do it every year, because I think it would pay. The next year I planted those, and I also planted some of those that Mr. Martin claims are just as good. I had three plants of the big ones and two plants of the little ones, and when I came to dig those potatoes, I went down to do the same thing again, and looked for the perfect hills, but it was that year the weather was so exceedingly dry, and then wet afterward, and I couldn't find a perfect hill on any of them.

MR. MCKERROW—I would like to ask Prof. Goff if it is not his opinion that the large selected seed will keep up the vigor of potatoes better than the small ones?

PROF. GOFF—While connected with the New York experiment station, we carried on various experiments, through five years, based on a selection of seed. We selected seed from the most productive hills, also from the least productive hills, and planted them separately. We found that throughout the five years, the yield from the most productive hills was decidedly better than that from the least. We found that the smallest potatoes from the most productive hills yielded better than the largest ones from the least productive hills. I think we can increase the vigor of the plant by selecting from the most productive hills. The question of the size of the potatoes I think depends very much upon circumstances. If our soil is rich and we have a favorable season, I think the small seed planted closely will yield just as well as larger seed planted farther apart.

MR. MARTIN—If I were fixing the awards on potatoes, I would not select a large potato to give the premium to. And I did not, in fixing the premiums this morning. I picked out the potato which I considered would sell best on the Chicago market.. It is not the largest potato that brings the most money. It is not the largest potato that gets the biggest yield. If you select large seed, you will grow a large overgrown potato, a large knotty potato, and irregular in shape. I will venture to say that the potatoes that received the premium were grown from medium sized potatoes.

SUPT. MORRISON—Now, I know a great many of your people will go away from here and will say that Mr. Martin has advocated planting small seed. As I understand "small potatoes," they are generally picked out about this way. We put our potatoes into the cellar in

the fall, and the good housewife picks that bin all over during the winter, and when spring comes you have got a whole lot of small potatoes, which you plant every year, and every season your crop is degenerating and running out. As I understand, that is not the kind Mr. Martin means.

MR. MARTIN—I would say about the size of a hen's egg. I sort in the field, and pick up nothing but what I consider good marketable potatoes. I throw out about one-fifth of my whole crop, then I re-sort those left, so that I have an average smooth potato the size of hens' eggs and upwards, for seed.

QUESTION—Are we not justified in raising those large potatoes for starch?

MR. MARTIN—Any good table potato will make good starch.

QUESTION — What do you consider those small potatoes worth for feed?

MR. MARTIN—Twenty cents, if they are cooked, not raw.

QUESTION—What is the relative expense of digging by fork and by machine?

MR. MARTIN—I don't believe I can dig potatoes any cheaper with my digger, and put them into a car or store room, than I can with a fork, charging the expense of my teams.

QUESTION—In storing potatoes must they be entirely dry, and must they be spread out thinly on slatted floors?

GEO. MARTIN—A slatted floor is good and sensible, any way to let the cold air under and around them so they will not sprout so early in the spring, but for temporary storing, for fall or early winter market, they are all nonsense.

QUESTION—When you winter potatoes in a pile outdoors, which do you find the soundest and best in the spring—the dry potatoes on the top of the pile or the bottom ones that lay right on the damp earth all winter?

MR. MARTIN—All who bury potatoes must have noticed that the damp ones are the best.

QUESTION—What is the use of excessive, or in fact, of any drying then, when the soil is in seasonable condition for digging?

MR. MARTIN—I wouldn't handle potatoes at all when they are wet and muddy, but when the soil is in fair condition for digging I would like some brother to prove to me that there is anything gained by drying the potatoes. If they can lie damp and fresh in the soil without injury, why not put them into the cellar or heaps in just the same condition? Spreading out in thin layers also is nonsense, practically. We do not want to dry them, and a circulation of air through them is worse than useless. Of course, it goes without saying that all light should be excluded from cellars or buildings where potatoes are stored. Light will soon ruin the best potatoes. We store them right on the cool cellar bottom or on the basement floor of the barn, three feet deep in August, and four or more feet by the middle of September. We are careful to avoid bruising in handling in hot weather. They will heat up a little sometimes for a few days where large quantities are stored, two or three hundred bushels per day, but they soon cool off and have the temperature of the cellar bottom. We open up at night and let the cool air through where they are stored and shut up early in the morning, thus keeping the temperature quite even. I prefer to make early contracts and draw from field to cars and ship at once, thus avoiding so much handling.

PROF. GOFF—I was recently told by a

merchant who has had many years' experience in handling potatoes, that potatoes dug before they are fully ripe and put up immediately in close barrels will be very short lived. I have observed that the barrels of new crop potatoes, that the merchants receive early in the season, are always provided with ventilation. I agree with the former speaker that it is not necessary, if it is desirable, to have the outside of potatoes thoroughly dry in the cellar, but I think some cautions should be given against storing potatoes in bulk during warm weather, and especially, before they are fully ripe. Of course the need for this seldom occurs.

AFTERNOON SESSION—MARCH 19th.

The Institute met at 1:30 P. M. Supt. Morrison in the chair.

STEPS IN THE PROGRESS OF EXTRACTING THE BUTTER-FAT FROM MILK.

By J. A. SMITH, Ft. Atkinson, Wis.

The Past and Present.

It is related of a lawyer whose beard was yet limber, that in pleading his first case before a circuit judge, that he began way back to the period "when time was young," and that during the first hour he had covered the history of the world from creation's dawn, to the time of the reputed flood; when the bored judge called a halt, and told the lawyer he might skip the next 2,000 years—as there were a few things that a circuit judge might be presumed to know.

I will try to profit by the sarcastic admonition of the judge—assume that you know a good deal about butter making, and not go too far back, or dwell too long, upon the earlier methods employed to extract the fat from the milk of bovines, for the use of man. The things of now, and here, are those that chiefly concern us, to-day.

However butter fat was extracted from the milk of bovines by the ancients, and by all modern peoples, it was not until after our present nineteenth century had passed its "high noon mark," that it was obtained by methods other than raising cream by the gravity processes, and through concussion of it, or churning the whole milk, the fat was extracted from it. From time immemorial, of course, the lighter butter globule has sought to rise through its own levity, and disengage itself from the heavier watery serum. It is this characteristic that makes the extraction of fat from the milk possible by any process whatever. This characteristic has made the foundation for all the claims that have been made for merit, in all the crocks, pans, pails, creamers, and centrifuges that have successively appeared and have heroically fought for success

and pre-emience, from the first to date. It is that very meagre difference in the specific gravity of the butter globule and the rest of the milk emulsion as it comes from the cow, that makes a theatre for all these systems to get in their claims and work.

New Methods.

It is true, too, that the simple discovory of methods as to how a principle acts, does not always work out the latent revolution there really is in it, in the order of its discovery; for some are seemingly so vast, so far-reaching in their scope, that it takes the world some time to comprehend their usefulness so as to utilize them. We see this verified in the fact that the truths involved in centrifuging milk with a rude machine were actually known, and demonstrated, several years—but not many—before the revolution came in extracting butter fat from milk through the ice-cold, deep-setting, and submerged systems. Perhaps these, just named, ought not to be distinguished as separate systems; for, in a sense, they are only "parts of one stupendous whole," and really are only successive steps leading to the Cooley, which embraces them all. It is recorded of Prof. Fox of Germany, that in 1859 he suggested testing the richness of milk by swinging test tubes holding samples of it. In 1864 a Munich brewer, Antonin Prandtl, tried, but not with much success, to get cream from milk by putting it in vessels in an ordinary centrifuge used to abstract the water from syrup, so as to obtain dry sugar. It is even recorded that through the virtue of long swinging of the vessels, he obtained, not only cream, but actual butter. Is it possible that right then and there the extractor was born, and there were no "wise men," either in the east, or elsewhere, to know it as a dairy savior? It seems nobody followed out the suggestions of the revelation, and so the incipient revolution slept.

Yankee Ingenuity.

The first of these was only a suggestion; and the second, after a partial trial, was voted into the limbo of "innoccuous desuetude," as a dream. It remained for a live Yankee to do something that led to something, even if he did not do much of the leading that really solved the problem. The Rev. H. F. Bond of Massachusetts, did it with a rude, crude hand machine, that was simply a wooden bar, balanced on a pivot, to the ends of which two glass jars containing milk were bound, when the bar was made to revolve at the astonishing speed of 200 revolutions per minute! Compare that with the speed of the periphery of the centrifuge drum, or bowl, that revolves at the rate of from three to five miles per minute, and makes from 4,000 to 7,000 revolutions per sixty seconds!

But it took out the cream, or rather separated it from the skim milk, in one hour, even at that slow motion; and thus confirmed the faith of those who were intent upon solving the question of the centrifuge skimming of milk. This was in 1870.

Cold Setting.

But the revolution, though born, and nurtured more or less through the succeeding six or seven years, did not prevent the coming of another revolution in extracting fat in the form of cream, from milk, through the aid of ice. Though deemed rank dairy heresy, and an absurdity, when compared with all the gravity methods up to that time —about 1874-5—it had a rapid march to the front, and holds its own to this day as the acme of all that has been attained

on the line of the gravity process, for raising cream, through the watery part of the milk, through its own levity. The reason it succeeds so well, is, that the intense coldness of the ice water more quickly condenses the water in the milk than it does the oily part; and thus suddenly widens the difference there is in the specific gravity of oil and water as they exist in the emulsion. Add to this, the coldnsss keeps the milk liquid longer—especially in warm weather,—and so keeps open longer the passage-way for the smaller globules to travel to the top. Chemical analysis of the skim milk shows the ice-cold process, on the average, is more exhaustive, as a skimmer, than any other gravity process; and for the milk of some peculiar cows, it has taken next to all the fat, leaving no glory to be won, even by the centrifuge, in separating such pecauliar milk. With average milk, however, the power involved in the natural levity of cream is no match for the overwhelming force of the centrifuge that brings to bear upon the milk at the periphery of the rapidly revolving bowl, a power equivalent to the weight of more than a score of tons to the square inch. It makes all the difference between may and shall, about the cream starting from the skim milk; all the difference between doubt and certainty; between conditions that may not be entirely overcome, and "getting there" with both feet.

In saying this, I am drawing no essential distinction in creamers that use the ice-cold deep-setting process, submerged or unsubmerged, but paying my respects to the naked principle, itself, that takes milk warm from the cow, and cools it rapidly. We have had dreams and visions of substitutes for this vital principle, some of which were aids, part of the year, and sometimes when there was no ice to be had, and some of which were problematical, if not snares and delusions—but the vital principle stands, I think, after some of the phantasies are gone; and it only takes second place, when in competition with absolute, forceful, mechanical power, exerted upon a centrifuge.

Centrifugal Creamer.

I return now to a consideration of the steps in the progress of developing the centrifuge creamers of milk, that were being taken while the newer innovator—ice-cold, deep-setting, submerging processes—were revolutionizing the business of raising cream, and greatly improving the general character and quality of the butter of the world. What became of Dr. Bond's invention, more than to lead others on, I have no data that tells. Prior to that D. M. Weston, of Boston, that is, in 1868, had the skeleton of a separator in his brain enough to get a patent on something, and have his name immortalized in the hyphenated name — Danish-Weston — that now is known as one of the standard separators of the world. Something he had was utilized on the other side of the ocean, by those who made it a success, and gave it its compound name. At that time, however, not one of them all had solved the problem of making a centrifuge a continuous skimmer; to evolve that, was what the savants and ingenious engineers in Europe and America were working at, and trying to mature, while the ice-cold method was going ahead to possess the dairy world. Until continuous skimming was made a success, it was one almost futile struggle to get something practial and valuable, by changing the method of construction to use machines that had to be filled at starting, and stopped to be emptied of

the milk and cream separated, fill up anew, and get up speed again. Such machines were used until 1874. They had detachable vessels on revolving arms.

Another Step.

In 1874, the idea of a centrifugal drum into which the milk was run and whirled, was conceived, and a rude machine was made by Mr. Winstrup, that was successful enough to inspire a hope; and Prof. Segelcke, of Denmark, encouraged Mr. Winstrup, and others, to go on with what light and facts they had, and see if they could not solve the problem. But not till after the middle of 1876, did a machine that was almost a living entity come from the struggling brain and deft hands of the men chosen to mature and embody the idea. When it was tried it marked a new era in the progress of extracting butter fat from milk. It was far from perfect, and the croakers gloated and fattened themselves on the same east wind they have been breathing and blowing about the butter extractor for the last two years; but it had in it the living germ, and it grew. They had got down to something solid, at last; something that could be run at a great speed, and not be a death-dealing engine, by going to pieces.

Another party of inventors, Messrs. Lefeldt & Lentsch, adopted the centrifugal drum, and modified it; bringing out a machine in 1877. But they still had to fill, start and stop, and fill anew. This party have the honor of establishing, at Keil, the first public butter factory that separated cream from the milk with a centrifuge; and run a regular factory to make separator butter, which they did the same year, 1877. They soon thereafter constructed a device to remove the skim milk and cream, while the machine was in motion, and were justified in shouting "Eureka!"

It was afterwards learned that a continuous centrifugal skimmer was invented in 1875, in Frankfort-on-the-Main, by Prof. A. Prandt; but it was never matured enough to get a foothold in the dairy world, and I suppose was abandoned as a toy, or because it found it was superseded.

The Cream Separator.

But no matter about the early struggles of the inventors. The separator was perfected at last, and marched like a conquering army to take possession of the dairy world, to a great extent, and so far as to making the factory butter that is made from gathered milk. It did this because, after great tribulations, it proved it could make more butter to the hundred pounds of milk than any gravity process known to man. It will do so, if the separator, and best creamer, are put side by side, near the cows, and both using divided milk immediately manipulated at the proper temperature for each system; and the separator will do much more, comparatively, with transported milk. I have tried to do my best with getting the fat out of transported milk with the best of iced creamers, and never succeeded in getting more than 3½ pounds of butter from 100 pounds milk, except when I heated the milk to blood heat, before setting, when I did get a little more than 4 pounds. But the heating of somewhat aged milk damaged the product of partially skimmed cheese, made therefrom, because the heating promoted rapid acidification in the cheese vat. As to how the centrifuge affects the yield, as compared with average gravity setting in our best iced creamers, I will give you Dr. S. M. Babcock's facts and conclusions, to fortify those made in

our own factory. I take the data from a communication of the Doctor's, to *Hoard's Dairyman*, printed May 2d, 1890.

A Milk Test.

The test was made with what the chemists call "split milk," which is simply well-mixed milk, divided; one part being subjected to one process, and the other to another. Of course, nothing could be more fair. In such trials the skim milk from the separator had in it .31 of one per cent. fat; and the iced creamer .72 of one per cent. The difference is .41 of one per cent., which means, if it was all recovered in the churn — with the customary foreign matter added to it, to make commercial butter of it — a loss of 4.71 pounds of butter in each 1,000 pounds of milk; or, in a factory receiving 10,000 pounds per day, means 47.1 pounds of creamery butter per day otherwise consigned to the pigs and calves. Rather expensive food of which to make from 3 to 5 cent meat! And the worst of it is, this loss attaches to all the milk of the average common cow on the farm, that is not put through a centrifuge, of some kind; and even worse than that comes to those who use the gravity creamers that are not equipped to use ice, or very copious floods of very cold water. I have the authority of the *Iowa Creamery Journal* for the statement that the average gravity creaming that produces the gathered cream of that state, does not extract more than 3 per cent. fat from the milk, during the usual creamery season when three-fourths of the milk is made; and that winter milk, there, does not yield by the gravity process more than 4 per cent; when it is quite probable there is a little more than 4 per cent. in it—yearly average—that the centrifuge would get out.

A Loss of 25 Per Cent.

Can dairymen, worthy the grand avocation, afford to feed and milk cows and only get about three-fourths of the most valuable element in their milk? Not unless they have the Almighty to fiat gold for them! Now if these statements are true, and the conclusion warranted, it would follow that there is scarcely a creameryman in the country, in a location where a good creamery can live at all, on, say, 20 to 25 sections of land, who could not afford to gather the milk, and return the skim milk to the farmers, and take as his compensation, the excess of butter he can make with a separator, over what any gravity process can get out of either the farm churn, or the churn of the gathered cream factory. I believe he could do it with any good separator. I have not a doubt he could do it with an extractor, that saves the losses of fat in churning.

Some of the readers of *Hoard's Dairyman* may remember that last May, I had quite a spirited discussion with Messrs. Wm. Beard & Son, of Iowa, upon the merits of the centrifuge versus the gathered cream system, in which they stoutly defended what they were doing in the latter line. I tried to be a "Father in Israel" to them, and to their patrons, in showing them the errors of their system; but confess I had no hopes of their changing their immense business, quite so soon. It is not likely that I converted them, but the cold facts did; and it was announced about the 1st of March, that this large and able firm had put centrifuges into ten or twelve of their factories, for the work of 1891. I do not mention this to gloat over their action, because they act as I then wrote; far from that. But to show again, that the truths of the arithmetic are mighty

in the dairy business, and must prevail; and that instead of gloating, there is joy in my household over any poor sinner who repenteth and puts his feet in the paths of righteousness, and dairy good sense.

The Goal Ahead, Eureka!

But solid as the business has become, when conducted in accordance with the principles involved in the use of the thousands of cream separators, there was a goal ahead to reach; another height to scale; another step to take "in the progress of extracting butter fat from milk," as the title of my paper sets forth. That step involves the introduction of the butter extractor, that goes a step further than the separator in denuding the fat in milk of substantially all the other elements that form an emulsion with it. However mighty was the revolution achieved by the separator, in instantaneously and continuously transforming 75 or 80 per cent. of the volume of the whole milk, into almost completely skimmed milk, the machine did not so far complete the work but that it had to have the cream-vat and the churn, to aid it, or rather finish the work of extracting the fat from the resulting 20 or 25 per cent. of the milk in the form of cream. The use of these dairy implements — the churn and the cream vat—prolong the time of getting the butter package from the milk—involve the perils of cream-holding, if it is not churned sweet, and the churning of either sweet or sour cream, for all of which nobody pays a cent. It involves the cost of, and the care of, the cream vat, and its equipment of steam and cold water pipes to warm and cool the cream; involves the cost of, and care of, a churn, the filling and emptying of it, for which nobody pays; the special machinery to turn it, the room it takes on the factory floor, that is occupied by one or more, of each of these dairy implements; thus necessitating the building of larger, more expensive buildings to manipulate them, the same pounds of milk that can be run through the extractor, which machine makes directly and continuously, only two products—to-wit: Butter ready to be washed and worked, and sweet skim milk containing 95 per cent of the volume of the whole milk, ready to be fed to animals, or mixed with whole milk for cheese making, as may be determined by the operator or patrons.

The Final Test.

The crucial test for the use of the ice-cold, deep-setting, or submerged system, was whether they decreased the cost of production; whether they increased the quantity, and improved the quality of the butter made over that of the old methods. The trial was made, and the creamers won. The crucial test for the separator was whether it cheapened production, whether it could make more butter from the same milk than either the farm or factory churn, and make that of equal or better quality. The trial was made, and the arithmetic and the chemist said "yes," on the points of cheapness of production and quantity; and private opinions differed, and yet differ, on the point of quality; but the world's "market judgment," and price, said, and yet say, it won on quality, too.

Both these systems have the weak point that they have to commit the cream to the tender mercies of the churn; and it is conclusively proved, already, that concussion to abstract the butter fat is not physically equal to the task of making churning so exhaustive but that it leaves in as much, and

usually more, fat in the buttermilk, than there is in an equal volume of skim milk that comes from gravity creaming, and from separator cream. How to save that loss, as well as the losses involved in cost and use of the cream vat and churn, is the feat the butter extractor addresses itself to; and, as far as heard from its limited use, it wins easily on that line, as the separator won on the creaming line, when compared with gravity processes.

No Loss.

We have then, at last, all the butter fat there is in milk, without waste of any through the weakness involved in all concussion churning. The butter comes from one spout of the extractor, and from the other comes all the sweet skim milk there is in it; thus putting the valuable part of milk by itself, and the cheaper elements by themselves, and no damage done to, or waste of either.

The far-reaching scope of this later revolution, to be even partially comprehended, has to be illustrated by applying the figures and facts to the manipulation of large bodies of milk, such as our factories are daily handling, and which are computed by the million pounds.

The Extractor Ahead.

Bear in mind that the most potent fact of the separator is that it can abstract some more fat from any normal milk than any gravity process can—both using the well-mixed milk on the farm, as it is milked; and it can abstract quite a good deal more per cent. from gathered milk, at the factory. Bear in mind, also, that one of the potent facts of the extractor is, if desired, it can be used as a separator to make cream for family use, or to peddle in cities, or to make cream in the factory to be soured before churning, for those who yet think they must make sour cream butter—and when so used it will separate 50 per cent. more milk in an hour than the medium Danish-Weston — the one of that kind in common use — and as compared with the largest size De Laval, or common Sharpless separator, it will separate 60 per cent. more, in the same time.

Its Advantages.

The gain at this point, the dairy farmer can see at a glance, augments the per cent. of sweet skim milk he may take home each morning, that is rescued from the sour milk tank, and a stay of 24 hours in such a tank. Bear in mind, too, that the extractor does its work, when making butter direct—which it soon will do for all the milk that comes to it—at a temperature of 60 degrees F., or customary churning temperature; while machines that are separators, and nothing else, have to do their work at 75 or 80 degrees, and thus nearly every day in the year require the milk to be treated with artificial heat, while in warm weather the milk to be run through the extractor, must be cooled instead of being heated, and only requires to be warmed when the weather is so cool that warming the milk to 60 does no damage. There is an immense saving in the feeding value of skim milk involved in these practical facts. Bear in mind, further, that another potent fact of the extractor, when used as such, to make butter direct, is, that it has no use for either cream-vat or churn, and that it saves from souring about 20 pounds of milk in the cream that comes from each 100 pounds of milk, and at the same time rescues from the buttermilk in sour cream 2 hundredths lbs. 25-cent butter from 4 hundredths lbs. the churn leaves in it. Apply these two savings t

one and a half million pounds of milk, that comes to the year-round-operated factory, that has 10,000 pounds its best day in early summer, and computing that 20 pounds of sweet skim milk is worth double the same weight of sour buttermilk, and that the milk is worth 4 cents, and the buttermilk 2 cents, then in the 300,000 pounds of buttermilk there would be in 1,500,000 pounds of whole milk skimmed, there is a loss of $300.00 in the feeding value to the farmer, and of 600 pounds of 25-cent butter, worth $150.00—the two losses combined being $450.00—just the price of the wonderful machine that may be used to save both losses, and thus pay for itself, every time it ran through so much milk.

Sweet Skim Milk.

I go to Prof. X. A. Willard, to get the relative feeding value of sweet skim milk, the solids of which are about half and half caseine and sugar of milk; while in sour buttermilk the sugar of milk has dropped out, or, in other words, turned to acid — the stuff that makes animals grow poor.

But perhaps some bewildered farmer who has worshipped all his life at the shrine of a sour swill barrel, and thinks there is virtue in the sour fumes that come from it, may ask, "Has not sour buttermilk some feeding value in it?" Why, yes—just about half as much as same volume of same article, sweet. Don't understand me to say it is worthless.

I aim to be, and will be fair; and therefore will say that this loss in feeding value on the sour buttermilk would not occur, if the cream from the separator was churned when it was sweet. But the loss of fat in the buttermilk in churning sour cream, would occur, and I know of no way to recover it. Then again, if cream is churned at all, the expense of the cream vats and churns comes in, and also a more expensive factor still, comes in, if the cream is churned sweet—that of losing still more fat in the buttermilk, unless it is centrifuged over again, as the plan of Prof. Meyers, of the West Virginia experiment station, involves.

In any event, the use of a separator involves the handling of the cream through the cream vat and churn; and if the cream is churned sweet, the additional expense of handling and centrifuging the buttermilk by itself, has to be incurred, or the yield of butter runs down. I will not say that plan involves the re-churning, by itself, of the cream obtained from centrifuging the sweet buttermilk, for I suppose that can be safely mixed with the cream of the next churning.

A Revolution in Butter Making.

Now compare all these frantic, laborious, and disagreeable efforts to save the feeding value of the by-product, and save the waste and costs of churning either sour or sweet cream, with the steady pegging away of the extractor, that draws from 1,200 to 1,300 pounds of milk per hour—according to the richness of the milk—from the receiving and storing vats, and finishes the job of getting partly washed granules of butter, as it goes smoothly along, and you will then see and know the far-reaching sweep of the impending revolution in butter-making, that is surely coming, and is nigh. It will require less power to propel the lesser amount of machinery, less square feet of floor room in the factory building, and so less cost to build, and less high-priced skill in the butter-maker; for the most intricate duties of butter-making with a churn, those requiring the most skill, experi-

ence and judgment, as well as the hardest, most disagreeable part of the work, lie between the time of obtaining the cream, and the "coming" of the butter in the churn; and all that the extractor does automatically, while the operator looks at it, does some other part of the work, or reads his newspaper.

Some of this, you may say, is theory—opinion, merely, or a computation of what may be. Give us facts—results—yields from milk of a tested or substantially known quality. Fortunately, though the running of an extractor by our firm, is comparatively a new business, set up Dec. 22d last, and we have run it to do practical business with and earn money, rather than to make reports about, still I have a few facts I will give you for what they may be worth, and say that now that we have a milk tester in operation, we can make, in the future, more valuable reports than we can now.

Winter Dairying.

The patrons of our factory did not "catch on" long enough ago to the great advantages of winter dairying, so as to have many of their cows come in, in the fall, as more than half of them should. But they have got fairly started, and will do better in the future. The result is, yet, that we get our best and richest milk, in November and December, from the "stripper" cows that have been milked all summer. A few have their cows come in, in the fall, but quite a number have cows that are fresh, soon after the 1st of January, having moved so far towards winter dairying. The result was that many of the stripper cows dried off about the first of January, and the fresh cows came on, in few numbers, to take their place. But the sum total of milk for that month was only 50,014 pounds.

Babcock Milk Tester.

We had not then a Babcock milk tester, so as to make analyses often; but we had the milk of a day's run, of substantially the same kind of milk, tested, and found it had in it 3.7 per cent. pure fat, and the butter had in it 81.67 per cent. fat, and 18.33 per cent water, salt, caseine, and ash. From said 50,014 pounds of milk there were made of cured cheese and packed butter, as sold, 852 pounds of butter, and 4,416 pounds of cheese. The yield, therefore, was 1.70 pounds of butter, and 8.83 pounds of cheese, or a total yield of 10.53 pounds from each 100 pounds of milk, of the quality stated. Milk of that quality would have made 4.36 pounds of commercial butter to the hundred, and given the patrons back 95 pounds of sweet skim milk. The same milk would have made not more than 10 pounds of full cream cured cheese, and some better whey than it did make. You may ask, how I account for more yield of butter and cheese, than for full creams? I reply, in two ways: First, by using an extractor to get out part of the fat, the milk was left so that the rennet could impart a holding power to the caseine, so that all, substantially, of the fat left in the milk was saved; and second, had the rennet not been applied to cold milk, there would have been a loss in the whey of part of the fat that was saved.

Per Cent. of Cream in Cheese.

I know I am confronted at this point by the claim of some who have been to school long enough to have learned better—that all the fat, even in 5 per cent. milk, can be incorporated in a cheese without using so much rennet as to damage the flavor; but with me a Fairbanks scale says it cannot be done, and

so I don't believe it can be, unless more skill than I have, is brought to bear upon it. But even if it can be done, by ever so learned and wise a professor of cheesemaking, I say distinctly, it is financial stupidity to do it; for 4 per cent. milk is rich enough in butter fat to make the finest, highest selling cheese of the world; and the other pound of butter is worth more, as butter, than to be half wasted in an extra buttered cheese; for it is neither so palatable or healthful to eat, nor will it keep the kind of flavor that brings cash, so long.

Comparatively No Loss.

Further: At the time the said test of milk, was made, we were running the extractor at the speed of 5,800 revolutions per minute, and the analysis showed there was .3 of one per cent. fat left in the skim milk. That is pretty close skimming for any centrifuge, doing regular, practical work. But we have since speeded it to 6,200, and found that the skim milk contained only .1 of 1 per cent. of fat. Such saving, if it can be regularly effected, means 2 pounds of fat saved from each 1,000 pounds of milk, and escapes all the perils of churning besides, as well as saves losses in buttermilk.

Summary.

Having given you a review of the facts involved in the successive "steps that have been taken in the progress of extracting fat from milk," I submit these views and facts, to your candid consideration; and if they shall lead you to employ means to get more of the valuable elements that are really in your milk, out of it, and the avails into your pockets, and so enable you to make of yourselves abler, and broader, and better men and women, because you have more of this world's goods with which to fight the battles of life, and enjoy more of the blessings that an honest prosperity will put within your reach, then I shall be amply rewarded for coming, and looking into your "speaking eyes" while I have endeavored to tell you wholesome truths. I have, during the long years, now gone to the returnless past, sought to know the basic truths of the dairy business, with a heart inclined to take a step up and on, wherever the head and judgment led the brightened way; and in that spirit I have given you to-day, of the very best I know.

There being no time for discussion, Mr. J. H. Monrad of Winnetka sent in the following remarks:

I listened with great interest to Mr. Smith's paper (read at Waupaca Round Up Institute), and as I was present, I cannot let it go on record without a protest on a few vital points which may mislead those not posted.

First, Mr. Smith claimed as an advantage that the milk for the extractor need not be heated up as high as for the separator, but forgot to mention that in summer, when we receive the bulk of the milk, it must be cooled down to 58 or 60. And allow me to say that is quite a job, and practical creamery men will rather heat milk 15 than cool 5 degrees.

Next, Mr. Smith forgot to mention the extractor buttermilk at all. As this forms from 8 to 10 per cent. of the milk, and contains from 1 to 4 per cent. fat, it must be run through again, thus leaving 1,000 pounds extra to manipulate in a creamery with 10,000 pounds of milk, leaving again another 100 pounds of buttermilk to be reworked, and so on.

Thirdly, Mr. S. claimed advantage of saving room for and cost of churn; yet

it seems to me something like a churn is needed to wash the butter in.

Fourthly, Mr. S. left the impression that there was a present demand for extractor butter. This is not so as far as our western market is concerned. While perhaps a private trade might be worked up for such butter to the tune of a few hundred tubs a week, the bulk of our creamery men and dairymen cannot afford to "educate the consumers," as friend Goodrich rightly remarked. But even if the market would take sweet cream butter, practical creamery men will find it better to run the machine as a separator (and a good one it is).

The very fact that the extractor can manipulate 2,300 pounds as a separator, but only 1,200 pounds as an extractor, proves the fallacy of combining in one two machines (which require different temperatures to do their best work), and as to saving in the cost, Mr. S. seems to forget that one machine run as separator will do the work of nearly two run as extractors, and thus leave at least $400 to pay for vats and churn, etc.

Cheese makers who, like Mr. Smith, insist upon educating consumers to use cheese made from 3 per cent. milk only. may use it without re-extracting the buttermilk, as they can use it in their cheese, but I deem it a sorry day indeed when Wisconsin cheese makers first commenced that kind of "education," and trust to see the day when they will not be afraid of making cheese from 3.7, or even 4 per cent milk. As yet few factories will average more than that.

I also challenge the attractive but delusive picture of the operator of an extractor "reading his newspaper" while he is running it.

As the loss in buttermilk from properly ripened cream is not more than 0.4 (at least I would dismiss a butter-maker who left more), I fail to see how Mr. S. can lose 8 cents' worth of butter, as 0.4 per cent fat in 16 pounds of buttermilk (from 100 pounds milk) cannot make more than 0.073 pounds butter, which at 25 cents only makes 1.83 cents. If he does lose 8 cents' worth of butter in the churn from 100 pounds of milk, I pity the man indeed.

CHEESE MAKING.

By W. H. Phillips, Waupun, Wis.

The first thing to be considered in any undertaking is the foundation we lay, and in nothing is this more important than in making cheese. We may give volumes of instruction on the way to handle milk after it is delivered at the factory, but the beginning is not there. Some trifling neglect on the part of those who care for the milk before delivery will set at naught the most skillful maker and the most approved methods.

Great care is necessary on the part of the farmer in order that the milk may be of the best quality and in the best possible condition when the cheese

maker takes it in hand. Let us notice some of the steps by which this result is obtained.

Proper Food.

First, then, let us see that our cows have proper food, avoiding anything which will give a taint to the milk. Especially in the spring is this caution necessary, for if cows are turned out on low bottom lands they are liable to find leeks, which ruin the flavor of the milk. Stagnant water is another most fruitful cause of torment to the cheese-maker. If you have pools of stagnant water in your pastures, by all means fence them in, and do not on any account allow your cows to have access to them. Pure water is as essential for your cows as for yourself.

Salt Regularly!

Another point which we must by no means lose sight of, is the regular salting of the cows. Salt seems to be a physical necessity of some animals, and for none of them more than the cow. It has been proven by experiment that the salt given to cows has an important effect upon both the quantity and quality of the milk produced. An English dairy authority gives these figures as the result of experiments in feeding cows salt: "Cows without salt for the period of a week shrank from 14½ to 17½ per cent. in the quantity, and the milk was of an inferior quality, which on an average turned sour twenty-four hours sooner than milk drawn from the same cows receiving salt every day." Then by all means let your cows have salt every day. I would recommend keeping rock salt where the cows can have access to it at all times. They will be sure to taste it, and the effect on the milk will be to improve both quantity and quality.

I have touched on but a few points regarding the care of the cow, but I wish to emphasize this: It is of the utmost importance that the cows be in a healthy condition in every respect. To this there are no exceptions.

Clean Stables.

I wish to say further, that the stable in which your cows are kept and milked should be clean and neat. We want milk which will not remind us, by its flavor, of the barnyard, and public opinion is slowly arriving at the point where perfect cleanliness will be required, not only of the stable and its surroundings, but of the milker himself. If you enter a cheese factory, you desire, and rightly, to see the maker clean as to his person and his hands. The man who handles the milk on the farm should also be clean and have clean, dry hands. A stable, even if kept reasonably clean, will still have some bad odors, and therefore, as soon as you have finished one cow, take the milk to the can and empty it. The milk-stand should be at some distance from the barnyard, in a place where there are no bad odors. All utensils should be carefully cleansed each day. Too much care cannot be exercised in this, as a great measure of the poor cheese can be traced to this very source.

Filthy Cans.

I have this summer examined cans where I could scrape quantities of dried milk from the seams, and this when the housewife supposed she was washing them carefully. I run some risk in the statement I am going to make—for I have incurred the wrath of more than one farmer's wife by saying it—but the fact is, that a great many do not know how to wash cans properly. If the good housewives will bear with me I will give them my way of washing cans. First

then: Wash them at once, as soon as they come from the factory—do not allow the milk or whey to dry on, as it will then be almost impossible to remove it. First rinse the can with cold or lukewarm water—never hot at first, as that would cook the whey on. After rinsing, wash thoroughly with hot water—I do not think it necessary to use soap, certainly not soft soap, as that leaves an odor difficult to get rid of. Especial attention should be paid to the seams, as there is the hiding place of the imp that spoils the cheese. A small brush for the seams would be a good idea. Finally, scald with clear hot water and turn in the sun to dry.

You may object to my spending so much time on these points, but it is of the utmost importance that these things be attended to. For some years past we have heard much of bad luck in cheese factories. Cheese has been sold at 5, 4, and 3 cents a pound, or has been taken out and buried, until if we lived in olden times, we certainly should have said that the milk was bewitched. And it is. Little elves lurk in the milk-can, in the pan, in the strainer, waiting to catch the unwary and ruin the best milk ever produced.

Cooling and Aeration.

A very important point in the care of the milk is its proper cooling and aeration, especially the latter. Milk should be aerated until all the animal heat is out of it before cooling with water, as is the custom of most farmers.

The best means to this end is the aerator, which can be obtained at a reasonable price. If you have not an aerator then the next best thing is a gallon dipper, with which you may bale the milk for 15 or 20 minutes, then let it stand for half an hour or an hour, after which place water around it and stir it again. Then leave the cover off from the can, so that the air may have free access to it all night.

The Ordinary Factory.

Supposing the milk now to be ready for delivery at the factory, let us look at the building which is to receive it. The ordinary Wisconsin factory is a wooden structure, guiltless of paint, or else painted a dingy red. The surroundings are uninviting, and your nose gives you notice of the presence of the factory by the odor which comes from the neglected whey tank and drain. I have in my mind's eye factories which, for dirtiness and uninviting exterior, would suffer by comparison with a well-kept pig-pen. Let us enter and see if the prospect brightens. We meet the maker at the door, with clothing smeared with grease and whey, and if he is without a pipe, which shall shed its ashes over the curd, we will thank our lucky stars for this grace.

The interior of the vat-room corresponds to points already mentioned—floor covered with whey and dirt, flies festooning the ceiling and the various utensils, and meeting untimely fates in the vat itself.

We are tempted to "drop into poetry" and exclaim:

> "Vice is a monster of such frightful mien
> That to be dreaded, needs but to be seen;
> But seen too oft, familiar with her face,
> We first endure, then pity, then embrace."

Imagine one unused to such sights, brought face to face with some of these "awful realities," and you see horror on his countenance. A slight acquaintance causes him to pity those who must endure, but if the acquaintance is followed up, we find him "embracing the flies," or in other words becoming like the average cheese-maker, who at best looks upon

the flies as a necessary (?) evil. A word about this cheese-maker. He is probably one of those who learned to make cheese about twenty-five years ago, or else had one of the veterans for his teacher. He is wedded to old methods, and if he is here to-day will sniff at the idea that there can be anything about cheese-making that he does not know.

The Future Cheese Factory.

But let us turn from this picture to look on another. Behold, then, the model cheese factory as the future shall see it, and as indeed there are a few bright examples to-day. This is a neatly painted building, and its surroundings are neat and tidy. I should not be surprised, nor at all displeased, to find a flower-bed near it. No foul smell from the whey-tank greets us, for that is so arranged that it can be scalded out each day after the last patron leaves. The whey also is scalded and kept sweet for patrons' use.

We find screens at every window and door of this model factory, thus promising cleanliness within, for many factories are kept reasonably clean but for those pests, the flies. Within, we find the best apparatus, for the owner has learned by experience that a poor article is dear at any price.. This factory has a sink well supplied with hot water for cleansing the various utensils. I take pleasure in introducing you to the cheese-maker, for I know he will win your approbation. The successful cheese-maker is an intelligent man. He has some brains and knows how to use them, some ideas and a desire for more. He is not afraid of work. He is anxious to learn and willing to help others. It is more than possible that he has seen the inside of our excellent dairy school. In short, he is a live young man, who is able and willing to keep abreast of the times. When this maker labors with the farmer in regard to the proper care of his milk he sends him home resolved to improve, for the cheese-maker's speech is oily, and he backs up his sermons on cleanliness and care with such steady practice on his own part that his arguments are unanswerable.

Intelligent Cheese Making.

I will give you now the method by which I believe this model cheese-maker will make his cheese. We do not claim that the method is perfect. We hope and believe that many improvements will yet be made, but this is the result of our experience so far. Before putting in the rennet, ripen the milk by the application of heat to such a degree, that not more than three hours will be required between the addition of the rennet and the development of acid sufficient for the removal of the whey. The ripening may be hastened by using a "starter" of milk which is slightly sour. However, loppered or thick milk should never be used for this purpose. Enough rennet should be added to coagulate the milk ready for cutting, in from thirty to thirty-five minutes, at 86° Fahr. The rennet should be diluted by using one gallon of water to one vat. After curd is firm enough to break clear over the finger, cut as fine as kernels of corn. The application of heat should be delayed for at least 15 minutes after the stirring has commenced. The temperature should be raised to 98° and kept there till the whey is drawn. Care should be taken to so apply the heat and perform the stirring that the curd particles will be so dry before the development of acid is perceptible, that after being pressed in the hand, they will fall

apart easily. After the whey is drawn off, the curd should be kept at a temperature of 98°. Colder than 94°, the development of acid will be hindered, and moisture will be retained in it during the souring process. The presence of such extra moisture in the curd at this stage will leave the cheese with a weak or pasty, or tallowy body, according to the degree of acid development permitted. After drawing nearly all the whey, tilt the vat and shove the curd to the lower end. Place the racks in the upper end and throw the curd upon them to mat. After the curd has matted, cut it lengthwise of the vat and in strips 8 inches wide, then turn it over to mat on the other side. After five minutes, turn again and pile it two layers high. Watch closely, and as soon as the whey begins to collect in pools on the surface, turn again and pile one layer higher, and so continue until it is all piled in layers. Constantly turn and re-turn until the curd is ready to grind. After grinding, air the curd well before salting. After salting, let the curd lie in the vat until the harshness caused by the salting gives way to mellowness. Then put in press with a temperature of 84° F.

It would be impossible, in the time I have, to enter upon the details of curing the cheese. I have briefly sketched our method of making, and if there are any questions upon it I will answer to the best of my ability.

Conclusion.

A few words now concerning the present prospects of our business, and I am done. By referring to the annual report of Food Commissioner Thom, you see that 60,000,000 pounds of cheese are made annually in Wisconsin. I believe I am safe from contradiction when I say that on two-thirds of this there is an average loss of from 1 to 1½ cents per pound. At 1½ cents this means an annual loss of $600,000, to the farmers of Wisconsin.

Various causes might be assigned for this. I will speak of but three. First, then, the reputation of Wisconsin cheese has been injured by unscrupulous men whose greed for gain has led them to put filled cheese on the market, and so injure the sale of honest goods. By wise laws, carried out by our excellent dairy and food commission, we hope to remedy this. It remains, then, for us, as farmers and cheese-makers, to see what we can do to help ourselves. Two other causes may be assigned for our loss of credit. First, the unskilled maker. Second, the careless farmer. I believe that the cheese-maker should use every possible means to make himself master of his business. No maker should be employed unless he is known to be thoroughly competent. He should, if possible, have had a course in our dairy school. But granting all this, it will still be impossible for him to make No. 1 cheese from poor milk. The farmer, then, should see to it that his part of the work is carefully and conscientiously attended to.

Finally, let not the farmer and the maker continually blame each other if things do not go right, but as partners having a common interest in the success of the business, let both pull together and be equally anxious to do anything and everything that will contribute to the desired end.

CHEESE MAKING.

By THOMAS J. FLEMING, Watertown, Wis.

Mr. Chairman, Ladies and Gentlemen:

I am very glad that my friend from Waupun, who has just preceded me, has most effectually covered the ground relative to success in cheese making. I simply want to say that I earnestly believe every word of what Mr. Phillips has so ably expressed on that subject.

Fourteen Hundred Cheese Factories.

Cheese manufacturing in Wisconsin is not receiving the attention that, in my opinion, it merits. There is no branch of agriculture that has developed such a rapid, permanent and profitable growth during the last decade, as that of cheese production. That being so, it behooves every one of us to give to it that thought and study that it deserves. This industry is represented in Wisconsin by fourteen hundred cheese factories. Or, expressing it another way, by sixty-five thousand of our farmers.

I believe that the future success of this industry will not depend so much upon the quantity of cheese we manufacture, as it will upon the quality of the same, because it is the quality that is going to affect the consumption.

Give to the cheese consumers of this country a cheese at the time and in the condition that they demand it, and consumption will inevitably keep place with production.

Wisconsin, a Dairy State.

I sometimes think that we, in Wisconsin, do not realize the natural adaption of our state to this line of work. I believe that it is one that will not meet with formidable competition from the broad and fertile west.

What is it that makes the real success of cheese production? It is something more than the two elements of its composition, namely casein and butter fat; to these must be added, skill. It is skill largely we sell when we sell our good cheese. You see before you two cheeses, they have the same percentage of butter fat, the same per cent. of casein. One of them sells for seven cents per pound, the other for ten. Why? Because the man who made that cheese for ten cents a pound has coupled with those two ingredients, skill, thought and study.

Flavor Important.

What are the points which determine the value of cheese next to the proper per cent. of butter fat? They are these: flavor, texture, color and salt. And of all these, flavor is the important one. It represents two-fifths of the entire value, and it is the difficult thing to get. What is necessary to get that good flavor? It is necessary to closely adhere to the suggestions that have been made by my fellow cheese instructor, Mr. Phillips.

In my opinion, the most important element in this matter is the water that the cows drink. The water enters immediately into the stomach, and it carries through her system the elements of food, which enter first into the stomach, undergoes the process of digestion, then into the blood, then into the mammary glands, and from thence into the pail. In 100 pounds of milk, there are 87 pounds of water. Now, do you think it possible that your animals can go to a stagnant pool or any other place

where the water is objectionable in color, smell and taste, and takes 87 pounds of that water into their stomachs and evolve from it 100 lbs. of good milk.

Another point is to see that the milk is done cleanly, and do not cool that milk so quickly as you have in the past. The general practice in Wisconsin is to take the milk as quickly as drawn from the cow and put it into cold water. That is an objectionable practice. The milk before being sent to the cheese factory should be well cooled and aired.

DISCUSSION.

QUESTION — Will that same process of cooling have the same bad effect upon butter?

MR. FLEMING — It is not objectionable for buttermaking because we utilize only the butter fat, the lightest solid of the milk, which rises to the top, away from the objectionable elements. Indeed, we would advise you to put the milk into cold water immediately, for butter making, because it seems to cream in that way better than in any other. But when we undertake to manufacture cheese, we have to go down into the bottom of the can, and utilize the serum of the milk, in which we find incorporated these objectionable odors.

MR. MCKERROW — If you have very rich milk, do you consider it a good plan to skim it down to the level of three per cent?

MR. FLEMING — I am decidedly opposed to the use of the skimmer. I believe that it is one of the curses which have fallen upon the cheese industry of Wisconsin. I believe that the question of economy in the erection of cheese factories is a very important one. There are many places in the state of Wisconsin where farmers have gone into the erection of factories that have cost at least one half more than they should, and in some localities that will never receive sufficient patronage to make them successful.

MR. HYATT — I am convinced that there is no practical way for farmers to control their milk until it goes directly to the consumer.

MR. PHILLIPS — I do not believe that it is a good idea for the farmers or any one else to listen to every gentleman who comes around to advertise these creameries and cheese factories.

QUESTION — How expensive a factory would you put up, if you were going to build for, say a capacity of 20,000 pounds of milk, a combined factory?

MR. FLEMING — It hadn't ought to cost over $3,800.

MR. J. A. SMITH — Make it $3,000.

MR. FLEMING — If that was my line of business, I think I could do it, and make fair wages, and it would be as it ought to be.

RESOLUTIONS.

Mr. Allen in the chair.

Mr. Row offered the following resolutions, which were unanimously adopted by the Institute:

WHEREAS, The State Board of Regents kindly selected Waupaca for the fifth annual round-up Institute, and

WHEREAS, Supt. Morrison and his corps of Institute workers have given the people of this section the best Institute ever given in this state; therefore, be it

Resolved, That the unanimous and heartfelt thanks of the people attending the Institute be and hereby are extended to the State Board of Regents and Supt. W. H. Morrison and his efficient corps of workers for their earnest

and successful efforts in making this Institute the success it is. Be it further

Resolved, That it is the sentiment of the people of Waupaca, Waushara and Portage counties that these Farmers' Institute courses should be continued so long as the sun shines and the government reigns at Madison.

Mr. Thom offered the following resolutions, which were adopted by the Institute:

WHEREAS, The several committees of Arrangements, Exhibits, Programme, Music and Finance, have put forth their best efforts to make the fifth annual round-up the signal success that it has been,

WHEREAS, The persons who have taken part in the musical programme have performed their duties in a manner most acceptable to all who have been present, special mention being made of Miss Belle Smith and her "reserve farmers,"

WHEREAS, The hospitality of the good people of the city of Waupaca has made the visit of the Institute force both pleasant and profitable; therefore be it now

Resolved, That the sincere and heartfelt thanks of the institute workers and of the farmers and their wives and children from abroad be extended to these several committees and to Waupaca for making this round-up one that has been one of the most interesting and instructive in the history of Wisconsin Institutes.

SUPT. MORRISON—I wish that I had time to thank you for the resolutions which you have passed, but I cannot find words to do so, and you know my heart. You know that I do thank you from the very bottom of my heart, and and as we have considerable more work, without any more thanks, we will proceed to the remaining business of the Institute.

ADVANTAGES OF THE CREAMERY.

By N. G. WILLIAMS, Bellows Falls, Vt.

Mr. President, Ladies and Gentlemen:

I came here for the purpose of visiting your institutes and seeing how you conduct them. Thus far I have been very much pleased, and I have wished that many of my Vermont brethren could be here and see how they do things in Wisconsin. You may be aware that Gov. Hoard was with us at our annual meeting, and I can assure you we enjoyed him very much, and hope to have him again.

Dairying in New England.

You may be interested to know something of our methods of dairying in New England, which differ from yours in many ways. There are in New England something like 250 butter factories, three quarters of which are run upon the cream gathering system; the remainder being whole milk factories using separators. The rest of the dairying is private or farm dairying. In the northwestern part of our state, in Franklin county, is

a gigantic institution with a capital of $100,000, running centrifugal machines, which is hoping to absorb the whole of the milk of that county. It is to begin operations in a few days.

Co-Operative System.

There are about seventy cream gathering factories in Connecticut, which are run upon what is called the co-operative system; that is, the farmers own everything, buildings, machinery, etc. They unite to form a corporation under the laws of the state, furnish the capital, hire the butter maker and cream gatherers, and sell the butter and divide the profits. In 1891 the average price received by the patrons at the twelve factories of which I have a report was twenty-one and one-half cents per pound. The cream is taken at the farmers' doors and there is no expense to the patrons for gathering. Another thing that we make a good deal of, and of which I have heard very little here is the value of the skim-milk, which is kept at home. Many of the farmers raise hogs upon the skimmed milk. Prof. Cooke, of our station, tells them that the skimmed milk is worth 24 cents per hundred to feed to hogs that bring five cents per pound, dressed weight, the price at which they have been able to sell the them past year. So much for the cream gathering system.

The Factory System.

The factory system with whole milk is found in a few instances. Usually the factory is owned by a firm or by an individual who buys the milk at the best prices he can and sells the product. Many of the factories stamp most of the butter into pound prints, wrap in parchment paper, and ship in return cases, and this is one reason why they get larger prices than you do. Within a few weeks the product has been selling at between 35 and 40 cents at many of the standard factories.

We do very much more private dairying, proportionately, than you do. A very large proportion of the private dairy butter is put in prints and sent to market to regular customers. Being near the large cities it is possible for the dairymen to find their own customers and get handsome prices. Some of our fancy butter makers are getting as high as 70 or 80 cents per pound, although, of course, those are exceptional cases. Many of our dairymen contract their butter at 25 cents the year round. Some deliver the butter on the cars at their station, while others deliver in the cities. Others get 30 cents and even 40 cents a pound.

Abandoned Farms.

You have heard about the worn out farms of New Hampshire and Vermont. It is true that there are farms there that can be bought for very much less than the buildings cost. The young men have gone west; but foreigners are now coming in, partly through the exertions of the state commissioner. These new comers are reported as doing well. They have the advantages of near-by markets. Fertilizers have to be bought the first year, at least, but if a man runs a dairy he makes his own fertilizers after the first year and he is bound to make a good thing out of his investment.

In regard to the cost of creamery buildings, I will say that the dairy commissioner of the state of Connecticut has compiled a report showing the cost of the creamery buildings of that state. Most of these buildings have in connection with them a tenement and the butter maker's family lives in the second story. I believe, however, they are abandoning that plan now as not the

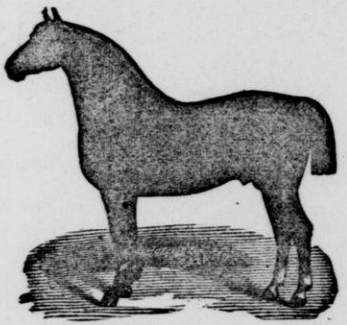
wisest course. The average cost of the creamery buildings in the state of Connecticut, taking all the creameries in the state, was a trifle under $3,000, including the apparatus and paraphernalia necessary to do the work. Factories without tenements are built and equipped for less than $2,000. Several as complete and substantial buildings as there are in New England were constructed for less than $1,000.

DISCUSSION.

MR. FLEMING—What would be the cost of a separator creamery with an ice-house and a capacity of 6,000 pounds of milk?

MR. WILLIAMS—They can be put up for $2,000 and upwards. There is, in Saratoga County, New York, a creamery building, 72 feet long, 26 feet wide, containing an ice-house, refrigerator, cream-room, wash-room, and engine-room, the building so arranged that the cream runs by gravity from the place where it is received until it reaches the churn. That building, above the foundation, with the apparatus, cost $2,000. With the foundation, the cost was about $2,500. This does not include a separator.

I have heard a great deal about the poor returns of farming in the West, and have picked up some facts here which I shall be glad to carry home with me. One of your speakers stated that his potatoes cost him seven and one half cents per bushel to raise and harvest; and another gave the cost as eleven cents, including the interest on his investment. Being asked the net profits, they replied, from sixty to seventy cents per bushel. One of these speakers raised from 5,000 to 6,000 bushels, the other from 9,000 to 10,000 bushels, and sold them for from seventy to eighty cents per bushel. These same farmers, no doubt, were among those who used to make such complaints of the great profits on sewing machines that they had to provide their wives and daughters with. Machines that retailed for $50 to $60 cost to manufacture from $10 to $15. It will be seen that the manufacturers' per centage of profits were very much less than the potato raisers'. I shall go back to manufacturing New England and tell them that the profits of farming are very much greater in Wisconsin than the profits of manufacturing in New England, and therefore they had better dispose of their shops and go west and raise potatoes, as their gains will increase much faster in Wisconsin than in the east running manufacturing establishments.



CREAMERY OR CHEESE FACTORY.

By S. FAVILLE, Madison.

Number of Cows.

Shall we build a co-operative butter or cheese factory? I answer yes, in any community where there is a fair prospect of sufficient patronage so that it will prove a financial success.

How much encouragement will warrant the starting of either? The milk from at least 300 cows to start with, and a reasonable certainty of increasing to 500 or 600 in the near future. Why demand so large patronage? So that you will be enabled to employ the best skilled labor and to purchase the most approved machinery, instead of cheap labor and imperfect machinery, as you would be obliged to do with a small patronage. How shall the factory be built? By a stock company, by all means. Make the shares small, so that every one intending to furnish milk (though it be ever so little) may take one or more shares. In that way you secure a large number of stockholders, and each one is interested in the success of the enterprise to the extent of his stock, and their united influence will make success almost a certainty. And then, again, when the average man becomes a stockholder in a concern of that kind, he will stand the discipline necessary to make him an intelligent milk producer. But when he is not, but has only the interest at stake of the amount of milk he is furnishing, and any attempt is made at discipline, or even positive instruction, he will coolly advise the cheese or butter maker to go and make his satanic majesty a visit and he will take himself off to some other factory, or will sell his cows, so in either case the factory will lose the support they expected from him. It is not necessary that I should, in this paper, go into the details in this matter. Every business man will understand that a concern of this kind will need its officers, such as president, salesmen and directors, etc., etc. Of course, the plan I propose is not the only one. They may be started as a private enterprise, and may succeed fairly well, but the experiment is hazardous for the man putting his money into it, as I know to my cost.

Advantages.

What are some of the advantages of the factory when started?

The first, and perhaps the most important, is that it puts the small dairyman on an equal footing with the large one. It enables him to put his product in shape so that it commands as good a price as the large dairyman's. This he could not do if he made his butter at home. The reasons for this are so plain that I do not need to repeat them. And then it puts all, both large and small dairymen, in shape so they can get the very highest price for their goods. Not only the average quality will be much improved, but it is a rule in commercial transactions that small quantities have to seek a market, while to large ones the market comes, and at better prices. This is an advantage that is very important. Every farmer who has tried trading his butter at the corner grocery for other goods will fully appreciate this when he tries it.

And another thing. The factory relieves the already over-burdened housewife of the labor of making the butter. The problem of how to provide the indoor labor is becoming so serious and so difficult of solution, that anything that tends towards light on this subject is well worth our consideration. Farm machinery has done very much to lift the burden of out-door work, while so far very little has been done to make the house-work lighter. Almost everything has to be done much as it was in our mother's day. I do not forget that we have the sewing machine, with its wonderful ability to add stitches. And I also remember that the demand for added stitches in the ladies' wardrobe (in the way of ruffles and such things) has fully kept pace with the ability of the machine to furnish them. So that it really amounts to but very little as a burden lifter. And then there are some other things, like the washing machine (which, by the way, would be a good thing if with each one you could send along a good strong man or a steam engine to run it), and other things that are some help. Yet the fact remains that the house-work is the most serious labor problem that confronts us to-day, and the butter factory comes in to help us out to some extent. And then the butter or cheese factory is a sort of a farmers' institute.

Pooling Experience.

I believe that one of the important benefits derived from the institutes that have been held in the state these past years comes from the farmers getting together and talking over their business and comparing notes, comparing methods, discussing the ways and means, etc. And so the factory calls the farmers together, not once in the winter, but every day in the week. And the address that is delivered to them by the scale beam when their milk is weighed is one that they are compelled to heed. Superintendent Morrison may send a man that will discourse ever so eloquently and truthfully about the benefits of the silo, and the average dairyman will shrug up his shoulders, and if he don't say "Bosh!" out loud, will think it and go away and act his disapproval. But when the scale beam tells A. that his neighbor B. is getting one-third or a half more milk from the same number of cows, he begins to open his eyes and look for the reason of the difference. Then will follow a discussion of the ways and means, the care, feed and treatment of the cows come in for consideration. I have known discussions of this kind to last for an hour or two, especially on a rainy morning, and out of them will come a strife to see who shall get the best results. I have known the strife to be so earnest in a few cases that the pump handle was called in to help out when the cows did not quite come up to the mark.

Pay for What There Is.

One other thing, and I am done. The system of paying for milk according to the butter fat that is in it, that is just now being adopted by a good many of the factories, will send a large number of cows that are now being boarded at the expense of the rest of the herd, to the butcher. The man that finds his milk deficient in butter fat will set himself to work to ascertain whether it is the whole herd, or only part of it, that makes the shortage, or whether it is in his feed, or what it is. You will tell me this ought to be done, factory or no factory, and that is true, but the average dairyman will not do it unless he has some extra

stimulus to do so, and the milk test is going to awaken thought and action on this subject that I am quite sure will result in great good to the dairy interest.

Recapitulation.

To briefly recapitulate some of the advantages of the factory system: First, to place the large and small dairymen on an equal footing as regards the price they will obtain for their goods, and to enable both to get a better price than they could without the factory, first because the quality will be much more uniform and much better, and because the increased quantity to be found in one place will bring the buyer to the factory instead of being obliged to hunt a market. Secondly, the relief it will bring to the already over-burdened housewife. And thirdly, the convincing education that will come from the lecture that will be delivered by the scale beam when the milk is weighed. And the fact that the Babcock test will demonstrate that a large number of the cows are not paying for their keep, and so will result in sending the unprofitable ones to the butcher.

BUTTER-MAKING ON THE FARM.

By C. P. Goodrich, Fort Atkinson.

Private Dairies.

I don't wish to say anything to discourage any man from patronizing a factory. I believe that the factories have been a great blessing to Wisconsin; they have lifted a heavy burden from many a tired housewife and put thousands of dollars into the pockets of the patrons. But there are those, who, because they live a long distance from the factory, and for other reasons, find it best to make their butter at home. Now, those who are doing so, or intending to do so, of course want to carry on the business so as to make it as profitable as possible. They are desirous of making an article that will bring the highest price in the butter market, and also to get the most they can out of their milk. The butter that brings the highest price in the market is judged by an expert dealer, who knows the demands of the market, and the scale by which it is usually judged is a scale of 100 points; 45 points for flavor, 30 for grain, 15 for color, and 10 for salt. You see, the flavor is reckoned a great deal the highest, and perhaps it is because it is the hardest to get. The most important point in the whole matter is to know how to get a good flavor that will suit the market.

Flavor.

Now where does this desirable flavor come from? It comes mainly from the food, modified in some small degree by the individual character of the cow. For winter food the best things to give good flavor are good clover hay, good corn fodder, good ensilage, good bran, good oats and good corn. There should be fed no damaged forage of any kind. Damaged ensilage will make damaged butter; moldy corn fodder will give a bad flavor to the butter; so will musty

grain. Cows that drink impure water will make bad butter.

In summer the best flavored milk is produced from upland pastures containing a variety of grasses—clover, timothy and June grass. Marsh pasture is not so good, especially if weedy. Some weeds give a decidedly bad flavor to milk. In the season for them there is nothing that will make better flavored milk than pumpkins.

Condition of the Cow.

Then the condition of the cow has got to be taken into account. Fresh milkers give a better flavor to the butter than strippers, and cows in an advanced stage of gestation will sometimes give a decidedly bad odor to butter. If a cow is in bad health, it will damage the flavor of the butter, even though it is scarcely noticeable in the appearance of the cow. We must have a healthy cow kept in a clean, well ventilated stable, milked with clean, dry hands, in a clean pail. To illustrate to you what a difference the condition of the cow makes in the product, I will relate some things that happened at my place. My wife is the expert on our farm, in dairying. She can detect a flavor that none of the rest of us can. She said to me one day that the butter was not just right. She examined all the utensils, everything about the dairy house, but nothing could be found that could in any way account for the trouble. Then she said something must be wrong with the cows. I did not know of anything wrong with the cows or with the feed. But the milk of each cow was brought to her separately to examine, and finally she found it. There were two cows that had been giving milk about ten months and a half. As soon as she examined their milk she said, "That is it." That milk was kept out from the rest and fed to the pigs, and the butter was all right. That was in June, when we should be making good flavored butter from good grass.

Consult the Commission Man.

A year from that time I had business away, to be gone two or three weeks, and on my way I passed through Chicago and of course I stopped at the commission house. Some of my butter had just arrived, and as I came into the store the commission man said to me, "Mr. Goodrich, what ails your butter?" I told him I didn't know as anything ailed it. He put a trier in and handed it out and says, "smell that." Well, by hard trying, I could detect a faint flavor that was not just right, and I told him so. He says, "I don't know as anybody would notice it, but you know we are selling your butter at a high price, considerably above the market price. The customers are very particular, and I supposed you wanted to know, did you?" Well, of course I did. And I knew what that flavor meant. It was the same thing as it was the year before. I wrote right home then and there, "Stop milking Jane and Molly, their milk is hurting the butter." These were the same two cows that made the trouble the year before. About three weeks after that I came through Chicago again, and I asked the commission man how the butter was, and it was all right.

Eternal Vigilance.

And another time, my wife discovered that the butter was not quite right, and as I had been away I asked my boys what kind of feed they had been giving the cows, if there had been any damaged ensilage or anything of that kind. No, the feed was all right, first rate. I asked whether they knew of any of the cows

being out of health. No, they were all right. I told the boys to try to think of anything that could be wrong, and finally, one of them, the hired boy, remembered that one night when he went to milk one cow, a quarter of her udder was a little inflamed, and a little clotty milk came out. Of course, he didn't put that in he said, but he put the rest of the milk in. Now that was gargetty milk, and that is what did it. My boys would have known better than to have put it in. There wasn't to exceed four pounds of milk of that kind in the whole lot, and still in that was seeds of decay enough to taint the churning of fifty pounds of butter, one thousand pounds of milk. When that butter was first made it seemed all right, but we kept some of it for use in the family and in less than a week it was decidedly bad. That small quantity of milk that was diseased before it was drawn from the cow did it.

So you see that "eternal vigilance is the price of" good pure milk, and without good milk it is impossible to have good butter.

How Shall We Manufacture?

Now that we have got good milk, the question is how to manufacture it. There have been, for some years past, two ways of getting the cream from the milk, namely, setting in deep, cold setting, and in shallow setting. There is a newer way of which I shall speak a little, which appears to me, from what I have learned of it, to be a good thing. I refer to the use of the hand separator, or, as it is called, the Baby separator. My son, in northwestern Iowa, who has a dairy of forty cows, purchased one in January. He runs it with a tread power and he thinks well of it. Before he commenced with this separator, he was setting in deep cans in cold water, he was making thirty-three pounds of butter a day from forty cows, twelve of them two-year-old heifers. Since he used the separator he gets thirty-eight pounds of butter daily from the same cows. You can calculate how long it will take him to pay $150 for the separator. He has a contract at twenty-five cents a pound for his butter by the year, delivered at Sioux City, distant 24 miles. There is $1.25 a day, and in one hundred and twenty days he will have saved enough money, to say nothing about the saving in labor, to pay for it. And in one year he will pay for the the machine and have $180 besides.

Now, the deep cold setting is set on the principle that the falling temperature facilitates the rise of the cream. Now if it is set at a temperature of 90, right from the cow, in cold water at 40, you get a fall of fifty degrees, and by the time the milk has cooled down to the temperature of the water, you have practically all the cream. If the milk gets cooled down too much in cold weather before it is set I have always put in hot water to raise it up to 90 or 100 before I set it in the cold water. It makes a surer thing of the cream raising properly.

An Old Fogy.

I am considered by some as an old fogy, and my practices are condemned by some of our most advanced dairymen. I have a set of pans I have used for some time. I can get just as good an article as I could by deep setting, and I can save labor by it. I set my milk in broad shallow pans, each one large enough to hold the milking of the whole herd, the pans are five feet long, two and a half wide, and six inches deep. The milk has never been over four or five inches deep, usually about three. They are so arranged that water runs under and around

the pans in warm weather, so as to keep the temperature of the milk down to 60. I don't use ice, I have got a well of very cold water, and the wind mill pumps the water into a reservoir which is so arranged that it keeps the water moving around the pans. Faucets are arranged so I can regulate the flow of water. In the winter time we have a coal fire in the room, keeping the temperature always at 60. After standing thirty-six hours the milk is skimmed and it is just beginning to turn acid. The cream is put into a can that holds 20 or 25 gallons, which stays right there in the room at a temperature of 60 until we churn, which is four times a week, and then the temperature is raised to 65 in the winter and 62 in the summer. My churn runs with a geared wind mill if the wind blows, and if it doesn't, it is run by a geared up man.

DISCUSSION.

MR. J. A. SMITH—Did you ever have any of your skim milk analyzed?

MR. GOODRICH—I never have, unless it has been done since I left home. I presume it has been. I have got a Babcock tester at home, and if there is a great deal left in it I will have a separator sure.

SUPT. MORRISON—Do you think there is any perceptible quantity of cream left?

MR. GOODRICH—It don't seem to me there can be a great deal, when I get five and a half pounds of butter from a hundred pounds of milk, from not very high grade cows.

MR. SMITH—Why should you have any better success than Dr. Babcock creaming milk in that way?

MR. GOODRICH—I couldn't say. It may be the Lord has endowed me with some power that He hasn't him. But I don't know as I have any better success than Mr. Babcock in that respect.

SUPT. MORRISON—Your average of 357 pounds of butter from your herd has been the result of long years of thoughtfulness and care. It has not been luck. The good Lord loves a kind, considerate, industrious, systematic man, and will shower blessings and success upon him, and I know Mr. Goodrich so well that if Prof. Babcock's test will show him that there is a fraction of an ounce of butter fat left in the milk he will go for it.

MR. GOODRICH—If there is more there, I am going to have it.

QUESTION—How long do you churn this cream?

MR. GOODRICH—Till the butter comes. It takes from thirty to forty minutes to churn. It is churned until the granules are about the size of grains of wheat. Then the buttermilk is drawn off and about a pailful of water to say 15 to 20 pounds of butter is put in, the churn is revolved two or three times, and that drawn off, then as much more water put in, churn revolved, then that drawn off, and that is all the washing it gets. You will perceive that I do not wash the butter as thoroughly as many recommend, because the granules are larger and I use less water. If I should wash thoroughly with brine till it run away perfectly clear when the butter was as fine as clover seed, I know what would happen soon after it got to market—because I have tried it. I should get a letter saying: "The last lot of your butter lacks flavor." "Oh! but," you say, "that is buttermilk flavor." Well, suppose it is? If customers want that flavor and will pay a better price for butter having it, I am going to give it to them. I am making butter for them and will suit them if I can, notwithstanding some

scientific crank may say I am practicing wrong methods. But I am not at all sure that excessive washing and brining does not take out some of the fine flavoring oils as well as the last vestige of buttermilk. I used to bother about setting the cream can in a tub of warm water, raising the temperature by degrees, but now we pour it right from a teakettle, carry it to the churn and pour it in, at the same time stirring the cream vigorously. The butter is taken out and weighed and put on a butter worker, and an ounce of salt to each pound is worked in, and it is left on the butter worker from two to four hours. Then it is worked again, and packed in boxes holding eight pounds, or presumed to. I pack it that way because the customers want it that way, and if the butter that I packed in that box (holding it up) tasted or smelt so that I couldn't eat it, I would do it that way just the same if they wanted it. To do the thing up nice, I line the box with parchment paper, and that prevents the box soaking, which gives an untidy appearance to the box, and makes it come on to the market just as bright and clean as the day it was made. It also prevents the butter tasting of the wood.

QUESTION—How do you market that butter so as to get such a good price?

MR. GOODRICH—That is the main thing that I was after all the time. It is one thing to make good butter, and it is another to get a good price for it. I have seen butter that ought to sell for 30 cents a pound sell for 15 because it was not sent to a butter market, reaching the customer who was willing to pay for it. I have tried a good many different plans, but finally about eight years ago, I settled down to business and I wrote to the commission man that handled my butter, and I said to him: "I am going to ship butter to you every week in the year just as long as I live, and now if you will do as well as you can for me, you can rely on its coming, and I will suit customers if I can. You send me two stencil plates, one with my name on, and another with some device that you will know that it is mine and nobody else knows, so that if I have any butter that it is not just perfect you can sell it on its merits and not as mine, and it won't injure the reputation of my brand." I have got two such plates. One of them, I am happy to say I haven't been obliged to use very much. My butter has gone down there with my name on it. After a while the commission man began to find customers who would be sending back after my butter, and he could get a little more for it, till now for a year it has averaged from 5 to 7 and sometimes as high as 8 cents above Elgin quotation. I don't want you to think that I think that this butter is so much better than yours, I only tell you this to show you there is skill in marketing. My commission man writes to the many people who are complaining that they don't get as good a price as I do, something like this: "We have handled Mr. Goodrich's butter for a great many years. There is a set of customers who are able and willing to pay a good price in order to have that particular brand, and we can't satisfy them with anything else. We charge them an extra price as a penalty for their indulgence." Then he goes on further and says: "We see no reason why you or any one else who will use the same care and skill in manufacturing, and the same methods in marking, cannot do the same," and I don't either.

MR. THOM—I think it is the sense of this convention that all honor should be given Mrs. Goodrich. In view of that I

would like to enquire what percentage of the profits of that butter she obtains?

MR. GOODRICH—She has it all. She allows me to live down there part of the time.

MR. MARTIN—What are you getting for your butter now?

MR. GOODRICH—It brought 32 cents a pound from the 1st of November up to two or three weeks ago. Then it brought me 37 cents. The Elgin price runs from 25 to 28. It cost me last year 13 cents a pound to make this butter. It netted me, taking out freight and commission and package, 24 cents. There is one thing I want to emphasize. If you are going to get a good price for butter when you have got a market like that, you will find it will pay you to be thoroughly honest and careful. When you put a brand on a package of butter, it is just the same as saying, "That is just such butter as I have been sending you right along," and if you are telling them a lie you will soon get paid for it. Then there is another thing, if you begin at all, you must supply them right along. It don't do to have an over supply this week and run below next. I have shipped butter every week, and nearly the same day in the week, to the same house, for over eight years. Some families have used my butter during all that time. They rely on my sending it regularly, and I rely on their taking it. This condition of things is mutually satisfactory to us. I don't want they should get a taste of any other make of butter for fear I should lose them as customers, therefore mine is there for them every time they want any. The commission man finds the customers for me, and deals with them. He knows how high a price it will do to make them pay, and they pay it. He does the business, and the five per cent. commission pays him for it, and I get as good a net price as I could get in any other way, without any trouble at all, and the money invariably comes the same week the butter is shipped.

QUESTION—How do you ripen your cream?

MR. GOODRICH—It just ripens itself, but if I could tell just how acid it is, I would like to, but that is something I cannot describe. You see it stands in the pan until it begins to ripen, then it is put in a can and kept at sixty degrees. Some of it will be kept forty-eight hours, part of it thirty-six, part twenty-four and part twelve. That is just right and the conditions are the same every time or very nearly the same. In the summer time when it is very warm we set the cream in a reservoir of water sometimes.

QUESTION—Suppose the cream should get thick before you churn?

MR. GOODRICH—It does not get so but what we can churn, but if it did I would thin it with water or warm it up if necessary. Of course cream can be kept too long.

QUESTION—What makes cream foam?

MR. GOODRICH—I believe it is because it is too cold. If it has been frozen it will foam.

QUESTION—Do you use salt in the water you wash the butter with?

MR. GOODRICH—Not usually. My boys salt the butter in the churn but I don't. I take it out and weigh the butter and salt, and salt it on the butter worker. In the churn they have to estimate the amount of salt necessary to put in and cannot get it every time alike.

QUESTION—I looked over a package of butter in the exhibit room that secured the premium this morning under Mr. Goodrich's judgment. I noticed if

one would look carefully there were certain white specks in that butter, slightly mottled. What causes that?

MR. GOODRICH — The salt had not been evenly distributed.

MR. THOM — Would not a little salt in the water you wash your butter with, make the work go easier?

MR. GOODRICH — Yes, that is a good way to wash butter if you are going to pack right from the churn.

MR. HYATT — Could you make as good butter from common native cows as you make from your herd?

MR. GOODRICH — I do not believe there is a man living that can tell by the flavor of the butter what the breed of the cow is.

QUESTION — What do those boxes cost?

MR. GOODRICH — These boxes cost down at Fort Atkinson a dollar a dozen. They are made at Sheboygan Falls.

MR. MARTIN — I wish to say that I think Mr. Goodrich's theory as to setting the cream, the time of ripening, etc., will make better butter than any creamery on earth, and I believe that the private dairy is the place to make money in butter and that there is no industry in the state of Wisconsin that will give you the quick returns that butter making will. Up where I live in the northwestern part of the state dairying has come up since the farm institute was started there five years ago. The banker at our place said to me a few days ago, "George, the dairy interests are helping out St. Croix County."

QUESTION — Do you think it practicable to turn the hand-separator by hand?

MR. GOODRICH — I hardly think, from my present knowledge, that it is practicable, though I know, of course, that it is possible. To do good work a separator must be run at a perfectly uniform rate of speed. *You* might be able to do it, but I am afraid your hired man wouldn't. In less than half an hour he would begin to get tired and the speed would slacken. A one-horse treadpower will run it perfectly and separate as fast as three or four men can milk. Commence milking, get two or three pailfuls and then start the separator. The milk coming right from the cows is at the right temperature; and in ten minutes after the milking is done you have your cream separate and your skim milk perfectly new and sweet to feed.

QUESTION — Why work butter a second time?

MR. GOODRICH — The second working is done after the salt is dissolved. The salt has cut or dissolved some caseous matter and other impurities that were in the butter. These run off with the brine that escapes at the second working, and the result is you have purer, drier, better keeping butter. The operation has taken out not far from five per cent. of the weight, but leaves an article that *suits the consumer* better and he will stay by you. Care should be taken not to work too much. The first time just mix in the salt. The second time just enough to take out the streaks. That will show that the salt is evenly distributed.

QUESTION — What other ways of marketing have you tried?

MR. GOODRICH — I used to ship to different markets — Boston, Philadelphia, New York and other cities — trying to strike the highest market. Then I would change from one commission man to another in Chicago. The result of all this changing was that I did not secure consumers who were looking for and expecting my butter, who could be induced to pay anything above ordinary market rates.

Then, at one time, I worked up a trade with private families in Chicago. I thought that by supplying them — dealing directly with the consumer, I would save some of the profits made by the middle men, and the butter reach the consumer in a fresher, better state. I thought when I had the arrangements made I had just struck the right thing at last. But this proved unsatisfactory and vexatious. They sometimes wanted all and more than I could make, and sometimes I had a surplus left that had to be disposed of some other way. Then there was higgling as to price, etc. But my present method obviates all these vexations and I am satisfied.

ADDRESS.

BY COL. PARSONS.

Mr. President, Ladies and Gentlemen:

I was sent for and then ordered to come here for the purpose of speaking about the department at Washington, which belongs to you. The department of agriculture at Washington was made because the farmers of this country asked for it, prayed for it and worked for it years before they got it.

They wanted to raise the office of agricultural commissioner up to a cabinet official as a secretary, so that your voices would reach the administration, whatever it might be. You have received this department and you have a right to know something about what it is doing. Now, that department has a main building entirely inadequate. Another poorer one, the seed division, and the third, a wooden shell, under lease, and these are crowded to discomfort. The department has many divisions, each presided over by one expert, in all embracing every feature of land tillage, as well as the diseases of plants and animals. The object is to bring out information and give it to you by bulletins. For instance, Prof. Galloway, chief of the division of plant diseases, has issued bulletins which will give you remedies for the treatment of certain diseases of apple trees, pear trees and grapes, which you can get by writing for them. You know something about the statistical department, sending out bulletins in advance to give you an idea of the markets and to keep you posted as to where crops are heavy or light and the state of the market.

The bureau of animal industry, with which I am connected, deals with the diseases of animals. This department has done grand good work by stamping out the pleuro-pneumonia, and hedging in Texas fever, by quarantine and otherwise, and opening up the markets of the world to American cattle.

The disease that is carrying off thousands and thousands of hogs cannot be handled in the same way, and you should use forceful arguments with your legislature, to get a law which will compel you and everybody else, to bury every hog that dies of hog cholera, to quarantine your premises and thoroughly disinfect them, according to the rule that will be given you from Washington. Then you will

be in co-operation with the national government in this matter and this disease will be checked.

There seems to be a suspicious feeling towards veterinary surgeons, but I tell you they are in demand now; every skilled one is needed to carry on this great work, but he must be learned, and it takes more study than it does to be an M. D.

Now, my friends I have told you briefly of some of the work that is being done by this department. We come and ask you to put yourselves in touch with the department that belongs to you. Your agricultural department in this state as it has been carried on, is an honor to the state, and it stands as a bright star that all the states of this country can look at. Wherever I go, east, west or south, it is known and praised. In Iowa they said they had but one thing against Prof. Henry, and that was, that he would not come to Iowa to live.

I will tell you what the department wants of you. It wants your encouragement, your advice, your co-operation, and it wants you to tell the legislators and congressmen that this department should be sustained by reasonable appropriations, enough to carry out its great work.

EXHIBITS.

The Wisconsin system of farmers' institutes, in addition to the regular sessions, when short papers and talks by the most successful farmers are given, followed by questions and a general discussion, have invited the exhibit of samples of farm products to be made by the farmers in attendance. At this closing institute a large vacant store near the hall was well filled with exhibits, and the public spirited citizens of Waupaca offered many premiums to encourage competition.

M. T. Allen, chairman of the committee on Exhibits, made the following announcements of premiums:

Potatoes—44 entries.—George Martin, Hudson, Judge.

The Waupaca Starch and Potato Co. offered $10 for the best display of Burbanks, Beauty of Hebron, Early Rose and Peerless.

M. T. Allen, first premium - - $5.00
Henry Dunbar, second premium - 3.00
C. E. Constance, third premium - 2.00

W. C. Baldwin, potato dealer, offered $5.00 for the best half bushel of Burbanks. 23 entries. Jacob Hansen received the premium.

A. M. Penny, potato dealer, offered $5.00 for the best half bushel of any variety. L. Miller received the premium on Beauty of Hebron.

Butter—17 entries.—C. P. Goodrich, Ft. Atkinson, Judge.

J. F. Faulks — First, scored 97 points, - - - - - - $5.00
A. Custard — Second, scored 95 points, - - - - - - - 4.00
G. R. Lindsey — Third, scored 94 points, - - - - - - 3.00

Cheese—J. T. Fleming, Watertown, Judge.

"Spring Hill" factory, M. T. Allen,

proprietor, A. D. Allen, maker, received premium, $3.00, 94 points. "Lind" factory, C. Gibson, proprietor, Mrs. West, maker, received second premium, $2.00, 84 points.

Corn—Geo. McKerrow, Sussex, Judge.

Wm. Brooks received first premium, a copy of the Waupaca Republican and Mrs. Logan's magazine, one year. H. Hanson received second, a copy of the *Orange Judd Farmer* one year.

Oats—Premiums offered by C. E. Holman.

Benny Penny, first, 2 bushels Banner oats; A. L. Rowe, second, 1 bushel Banner oats.

Wheat—Premium of 1 bushel choice winter wheat offered by A. Custard.

S. Rasmus received the premium.

Roberts & Oborn, proprietors Crescent roller mills, offered 1 barrel patent flour for best display of wheat, oats, rye, corn and buckwheat. Hans Larsen received the premium.

Honey—O. C. Harrington received first premium, a copy of *Waupaca Post* and *Ladies' Home Journal*, both for one year. S. Taylor received second, a copy *Chicago Weekly* one year.

Fruit and Miscellaneous—M. A. Thayer, Sparta, Judge.

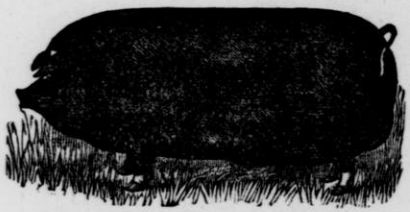
Apples—Mr. Springer received first premium, ½ dozen apple trees, offered by A. D. Barnes. J. C. Green received second, ¼ dozen apple trees, offered by A. D. Barnes.

Vegetables—Wm. Shaw first premium, oil painting 22x36, offered by E. B. Knapp.

Peas and Beans—Jessie Bemis first premium, $1.00, offered by Wm. McIntire. No second offered.

Canned Fruit—Mrs. C. Rogers received first premium, 1 dozen currant sets, offered by A. D. Barnes. E. Townsend second, 1 dozen blackberry sets, offered by A. D. Barnes.

Wool—C. E. Constance received first, $3.50 flannel pattern, offered by J. W. Evans, of Waupaca woolen mills.



EVENING SESSION—MARCH 19th.

The Institute met at 7:30 p. m.
Geo. Wylie in the chair.
Music—Male Quartette.
Recitation—Miss Jessie Donaldson.

SUPT. MORRISON — We come to the closing session of the most successful institute that we have held in the state, and nearly 400 have been held in the several counties during the past six years, and for fear that a better opportunity may not present I wish to improve the present in thanking the citizens of Waupaca and vicinity for their hospitality and for their active assistance in making this closing institute a complete success. The bulletin that will be issued reporting fully the papers, questions, answers and discussions, will be a publication packed full of the solid meat of practical experience and scientific instruction in reference to every leading topic of the farm. The educational value of these farmers' gatherings is beyond estimate, and our material prosperity as a state and the advancement of the horticultural, dairy and live stock interests is due in no small degree to their inspiring and educating influence. If the farmers of each township could only be induced to organize, to study, read and think how to make their business more remunerative, we would hear less about the depression of agriculture.

CHAIRMAN GEO. WYLIE—It gives me pleasure to introduce you to a graduate of our State University, a farmer, who is proud of his profession; residing and working the farm upon which he was born, in La Fayette county. A badger, proud of Wisconsin and her bountiful resources—Mr. T. J. Van Matre.

NOW AND THEN IN FARMING.

By T. J. VAN MATRE. Fayette.

Ladies and Gentlemen: I think it very unkind in Supt. Morrison to place an unsophisticated granger like myself upon the programme with H. C. Thom and Prof. Freeman, gentlemen whose literary ability is known and recognized, not only in this state, but throughout the nation. It must have been done to show to you the contrast between the sparkling diamond and the unwrought granite. And occupying this position, I feel much as did Belshazzar at that impious feast when he beheld this ominous hand-writing on the wall: "Mene Tekle Upharson." I feel weak in the knees. However, I am glad to be here to-night, not because I expect to say anything which will instruct this meeting, but on account of the instruction I expect to derive from the gentlemen with whom I am associated. When these institutes were first organized Mr. Morrison wrote

and asked me if I would prepare a paper to be read before the La Fayette county institute, to be held in the city of Darlington.

Swine Husbandry.

I made reply that I would, and would take for my subject the hog. I had always felt a sympathetic throb for the hog, because he had helped me out of two or three very embarrassing financial difficulties. So when the time came for the institute I came there with my paper and I gave the hog the very best possible send-off. That is, I gave him the best send-off it was possible for me to give him. As the saying is, I painted him red. This was one of the best attended institutes ever held in La Fayette county. There were a great many men and boys there, and quite a few ladies, and for a year after that when I would be passing through the different towns and villages of my county I could see the men and boys pointing and hear them say: "There goes the hog man." Now this didn't sound exactly right, nor to my ears polite. So when Mr. Morrison wrote and asked me this fall if I would prepare a paper for two or three of the local institutes I wrote back that I would, but I would not take for my subject the hog.

Wisconsin.

I would take the subject which you see upon the printed programme, "Now and Then in Farming." And I believe, ladies and gentlemen, that I might be permitted to speak with some degree of assurance in regard to farming, because I have watched the rise and progress of agriculture in southern Wisconsin. Fifty years ago my eyes first beheld the light of day upon the same farm which I now own and cultivate. At that time Wisconsin was almost a trackless wilderness, where might be seen the smoke ascending from the Indian wigwam, and the wild fox dug his hole unscared. So you see I am a badger born, and to the manor born. I was born and bred a farmer, and have never had the least inclination to abandon my life work or emigrate to a milder clime. I have seen Wisconsin grow from a territory of less than 20,000 souls to a state of more than a million and a half. I have witnessed the development of her agricultural and mineral resources, until to-day they are second to none in quality and high above the average in quantity. I have seen the primeval forests denuded and the stubborn glebe subdued, until now, as far as the eye can reach in the proper season may be seen cultivated fields groaning under their weight of agricultural products which find a market in the most remote parts of the civilized world. I have seen the patient bovine which was used as a beast of burden to transport the agricultural and mineral products of southern Wisconsin to the great metropolis of the state superseded by the more fleet and agile equine, and he in turn superseded by the iron horse, whose labored breathing and frantic neigh may be heard through the length and breadth of this great commonwealth.

Education.

I have seen the educational system developed from its primitive, crude form to the almost perfect system of to-day, which makes it possible for every son and daughter to receive an education which shall fit them for future usefulness. I have seen the old log school-house give way to the more neat and attractive stone and frame buildings, which may be seen at every cross-roads. State normal schools, seminaries, academies, and colleges of

the highest order may be numbered by the hundreds. Benevolent institutions may be met with wherever their presence is required. And here and there all over this land may be seen churches whose spires, pointing heavenward, seem to admonish us to raise our eyes from earth to heaven, that mysterious source from whence cometh every blessing. But in the very shadow of these sanctuaries may be found the licensed grog-shop, placed there by and with the consent of the Christian manhood of this land. I say, shame! shame! I have seen this deadly Upas tree strike its roots deeply into the earth and spread its poisonous branches all over this state, until its baneful effects may be traced to every village and hamlet, and its blighting influences too plainly written upon the countenances of helpless infancy and dependent womanhood.

Two Kinds of Farmers.

You are aware, ladies and gentlemen, that there are two classes of farmers in this country, namely, the yeomanry and the kid-gloved class. The former class may be represented by Mr. Everett, Mr. Convey Mr. Wiley and myself. The latter class might be represented by ex-Gov. Hoard, John L. Mitchell and Prof. Freeman, gentlemen who have grown rich in some other vocation in life, and now follow farming for pastime. And I know how difficult a task it will be for one of the former class to say anything which will entertain or instruct this latter class, and unfortunately for me, a large proportion of this audience seems to be made up of this latter class. An eminent statesman, years ago, taking a prospective view of our American institutions, said "we must educate, we must educate, or short will be our race from the cradle to, the grave." Taking a retrospective view of American agriculture, I say we must educate, we must educate, or short will be our race from the farm over the hill to the poor house. And I do not mean that kind of an education which will enable a man to sit in a comfortable room surrounded by all the luxuries of life and farm upon paper, neither do I mean that kind of an education which will enable a kid-gloved farmer, backed by his inherited thousands, to make farm operations a partial success. But I do mean that kind of an education which will enable the hardy sons of America to buy stock, improve and pay for 160 acres of American soil.

Hope in the Farm Institute.

And the most hopeful signs of an education which I see along this line is the organization of these institutes and the endowment of agricultural colleges by the different state legislatures and placing them under the supervision of such eminent instructors as Prof. Sanborne, of Missouri, and Prof. Henry, of Wisconsin. There are gentlemen present at these meetings who have told you what constitutes a true ration for your stock, there are others who have told you which is the best kind of horse to breed and raise, and still others who have told you how to follow the golden butter tub to success. And I am here, and at the risk of being thought egotistical, will say something to you about our own shortcomings as farmers. And as I said before, my intimate connection with the farm and farm operations for the last fifty years entitles me to speak with some degree of assurance.

Distress and Depression.

All over this land may be heard ascending the cry of distress, not on account of the terrible destruction of the storm,

or the cyclone, not on account of the extended ravages of the parasite, but on account of the general depression in the price of farm products, the consequent hard times and indebtedness of the farmer. Now as farmers it behooves us to inquire into this matter and if the cause can be discovered, apply the remedy. Every cause produces an effect but it is sometimes very difficult to take the effect and trace it back to its legitimate cause. We have hard times, low prices and consequent indebtedness, but it is very difficult to trace back and discover the true cause of this condition of affairs. This gentleman will say it is the result of our protective tariff. That one will say it is on account of the extravagance in governmental expenditures. And a third will affirm it is on account of the trusts, combines and railroad monopolies which infest our land. Now these gentlemen having discovered the cause would apply the remedy. This one says change the national administration. That one would advocate the governmental control of lands and railroads and the single tax system as advocated by Henry George, and a third would say give us an equal distribution of the property. This class, ladies and gentlemen, is a class we want to look out for, they would rob labor of its hard earnings, spend it in riotous living and in ten years call for a re-distribution.

Largely Our Own Fault.

Now I belong to a class who believes that the difficulty rests very largely with ourselves and may be traced almost directly to our own stepstones. Go with me if you please, throughout the farming districts of southern Wisconsin, which is only an index to all of the great northwest and mark the extreme appearance of negligence and unthrift which prevades the surroundings. You will see thousands of dollars worth of expensive farm machinery, yet unsettled for, lying in the fence corners exposed to the driving storms and bleaching suns. You will see the fences broken down, the gates off the hinges, the hogs industriously cultivating the door-yard, and the low grade cattle without sufficient food or shelter, leaning up against the fence, trying to muster sufficient strength to utter one faint protest against the inhumanity of man. Enter the home if you can find the way despite the hogpens, stables, woodpiles and other debris which occupy a prominent position often in the front yard, and listen to the anathamias pronounced against the drudgery of farming by the parents within, who have prejudiced the minds of their children against their life work long before they are able to take up the burdens of life.

No Love For Their Vocation, Grumblers!

From force of habit and early education these children become chronic grumblers, and we are raising up generation after generation of grumblers. Hence the truth of the statement. Farmers are as a class, chronic grumblers. Last year we raised an abundant crop and we grumbled because prices were so low. This year we have sustained a partial failure and prices are high and now we grumble because we have nothing to sell. You say this is an overdrawn picture and does not represented the true state of affairs, I say in far too many cases it is literally true and the truth of the statement is borne out by the facts. Now I would advise as a remedy the adoption of better methods, move on or quit. The haphazard,

slipshod methods of a generation ago will not do now. If a farmer does not keep step with the advancing progress of the age, he may as well throw up the sponge. It is useless to sell out and seek some richer soil or more favorable climate because the same methods will produce the same results the world over. And there is much truth in the old saw "The rolling stone gathers no moss."

Industry Brings Thrift.

Work, constant and intelligent, is required in every climate and land, and he who lies supinely on his back waiting for a fortune to roll into his hands will enter eternity a pauper. Cultivate habits of greater economy. Stop the leaks and wastes. Competition is more pressing and intelligent than in days past. Remember fine clothes, fine carriages and expensive musical instruments do not help to raise the mortgage off the farm. Breed and keep only the best kinds of stock. For such are always kept at a profit, while poor and low grade stock is kept at an actual loss. Provide warm and clean quarters for your stock, with all of the best food available. Much valuable food is wasted each year by allowing the corn to ripen and bleach in the fields. Prof. Henry estimates 40 per cent. of the value of the corn crop is found in the husks and stock.

We can only succeed by making every thing count and carefully counting every thing. On a farm or elsewhere a man seldom rises higher than his aim. If a farmer gets ahead and wins, it is because he is a business man and directs his farm on business principles.

Ignorance and Bigotry Beget Failure.

One great trouble with many farmers is *they think* they know *too much;* they are wiser in their own conceit than seven men who can render a reason. They will not read Prof. Henry's farm bulletins, because they say he is a kid-glove farmer, hence his methods are not practical. They will not attend these institutes, because they say they are run in the interests of a certain political party, and not in the interests of agriculture. Such men are affected with a complication of incurable diseases—ignorance, superstition and bigotry. If you wish to make farmers of your children beautify your home and its surroundings. Place here and there an evergreen or a flower bed; and above all, have a well-kept lawn. There is nothing on earth which will attract the eye or captivate the senses so perfectly as a well-kept lawn interspersed with flowers. If your boy manifests a little more than an ordinary degree of intelligence, don't educate him and put him into some of the professions, but educate him for the farm.

More Brains and Less Brawn.

One of the prime needs of agriculture to-day is more brains and and less muscle. A farmer cannot know too much. We hear a great deal said about educated fools, but there is no telling how much greater fools these same men might have been without education. It is not the men with knowledge, but the men who assume to know so much that disgust the world; and the farmer who knows it all is just as great a nuisance as the other fellow who knows it all. But the farmer who reads his agricultural papers, keeps his eyes and ears open, and learns something from every body and every thing with which he comes in contact, is a farmer who will grow and broaden into a wise and wealthy man, making a better neighbor and a better citizen. I claim you

can only judge of a man's ability to farm by visiting his premises and noting his methods. If you find growing this year two blades of grass where but one grew last year, you may very safely conclude the man who has brought about this condition of affairs is a successful farmer. But there is a vast difference between the words and works of men, and it takes some time to become thoroughly acquainted with these tongue-tied gentlemen. I mean gentlemen whose tongues are tied in the middle and both ends flap. I once had a neighbor who could make the best agricultural speech to which you ever listened, but that was all on earth he could make. He couldn't make a living off the best farm in the state of Wisconsin, because I saw him try it for forty years, and he finally became a bankrupt. Let your children see the bright side of farm life, remembering "All work and no play makes Jack a dull boy." Boys early in life manifest a liking for some kind of sport —hunting, fishing, base-ball, or some kindred amusements; guns, dogs, boats and balls should be provided, and time given for their enjoyment.

All Labor is Honorable.

Teach your boy that it is just as honorable to haul manure, plow corn or dig potatoes, as it is is to stand behind the counter, measure off calico and ribbons, and with a sickly smile cater to the whims and caprices of the senseless butterflies who come to buy. Teach him it is just as honorable to raise a perfect specimen of the bovine or equine as it is to stand at the bar of justice and plead the cause of some worthless vagabond or soulless corporation. Teach your daughter that it is just as honorable and *much more useful* to know how to milk the cows, feed the pigs and prepare a good, wholesome meal, as it is to know how to play the piano or dance the latest fashionable *glide*. Do not think me indifferent to the accomplishments of life; do not understand me to say it is a woman's place to milk the cows, feed the pigs, or even attend to the kitchen drudgery. But I do say the mother who raises her daughter up in ignorance of these matters makes a grand mistake. Because circumstances in life may render such a knowledge necessary, and the success in future may depend very largely upon such knowledge. If there is a probability that your daughter will become the wife of a farmer, then a thorough knowledge of the details of farm life is absolutely indispensable. And if she should chance to become the wife of a business man, this knowledge will make her no less aimable or attractive. Teach her to be a lady of brains as well as muscle, teach her her rights as an American citizen; teach her to demand the right of the ballot and to use it for the protection of her home and her family, against the arrogant and supercilious demands of the ever increasing rum traffic. Teach her the man who would deny to her this right is unworthy the sacred name of husband.

Love and Enthusiasm for Your Calling.

Now I would say to any young man, if you don't like to farm, don't farm, for I never saw a man follow a business he didn't like with any degree of success. But if after mature deliberation you make up your mind to follow farming for a life work, be sure and begin right. "A battle well begun is half won." Select a farm adapted to the particular kind of farming which you propose to follow; and after the selection of a farm the next most important thing pre-supposing you

have already selected a wife, is the selection of a site for your building. Choose the most eligible and sightly spot which you can find, and be sure and let it be upon the public highway, the simple fact that your buildings are in sight of the passing public will stimulate in you a desire to beautify your home and its surroundings, which add much to the value and comfort of your home, and enhance the value of all adjoining property as well. Situate your buildings upon an eminence and never in a hollow. Many people suppose it warmer in the hollows than upon the hills. No greater mistake can be made. There is always a cool, damp atmosphere in the hollows which makes it uncomfortable and unhealthful. Protect your buildings on the north and west with a plentiful supply of evergreens which will surprise you with their rapid growth and beautiful appearance.

Plant Trees and Beautify the Home.

When I built in 1875, I surrounded my home with Arbor Vitæ, Norway Spruce, Hemlock and American Spruce, many of which are now forty feet high. All of these evergreens named may be pruned in any conceivable shape, so the beauty of your surroundings will depend upon the development of your taste. Don't conclude that your decision to become a farmer also includes a decision to become a careless drone, but rather an active working bee. Make your home and its surroundings a monument to which succeeding generations shall point and exclaim, alas, behold the benefactor of mankind. This idea has obtained for ages, if I have neither sense nor capital with which to enter other fields of industry, I may enter the agricultural field. This mistaken idea has led to many failures. A reasonable amount of good sound judgment and a few hundred dollars of capital is just as essential to success in farming as in any other department of business. And he who enters the agriculcural field relying upon muscle alone, may have his epitaph written with that one single word failure.

Educate the Farmer.

The primary object of these institutes is to educate the farmer so he shall have a just appreciation of the importance of the work in which he is engaged. And men who oppose an agricultural education will generally be found opposing a literary edcation; such men are entirely out of sympathy with the advanced American idea, and should be at once relegated to the rear. Now I have farmed during my entire life, and I want to say to you people assembled here to-night, in all candor, I would not change my chosen profession with its pleasant home surroundings for any other business on earth. As farmers, we are entitled to the fat of the land, and if we fail to get it we alone are to blame.

THE FARMERS' READING.

By FRANK S. GRUBB, Superintendent of Schools.

How to Make More Money on the Farm!

Those of you who have been in attendance at this institute during these two days and have listened to the papers and discussions, have noticed that the interest centers on the financial success of the farmers. The questions that have most concerned us were, how to make more money out of our cows; how to produce higher priced horses; and how to get better marketable swine. These are the things that always interest us when we meet at farmers' institutes or gather at farmers' meetings. Nor is it at all unnatural that they should; for whether our farms produce much or little is purely a question of method, and as the conditions are alike in all cases, our conclusions in regard to the best methods for the different kinds of soil can safely be based upon a digested analysis of our combined experiences.

To Become Intelligent!

But there are other subjects, with which we all come in contact more or less, that are of quite as much importance as the one we have been discussing. "How to make intelligent men and women of our boys and girls" is a question more troublesome to us than "How to produce salable cows and horses from our calves and colts." Our specific rules in regard to the quantity and quality of food and exercise for our boys and girls are good as far as they go. But they only touch on the physical part of our make-up. They are of no consequence in treating of our moral and intellectual natures. In treating of these, specific rules are entirely out of the question. For a way of doing things that in one family might make the home the center of the universe throughout the period of childhood and youth, and leave a potent influence for good in after years, would be impossible of application in another; or, perchance, if it could be applied, would prove a total failure. Yet there is no doubt but that a few general principles based upon the natural workings of our minds could be laid down, which all might utilize in outlining a course of action.

As the Twig is Bent the Tree Inclines.

It can safely be laid down as an acknowledged axiom that our young people are what our homes make them. Just as a well trained and enthusiastic teacher, surrounded by right conditions, insures the success of the school in general and of the scholars in particular, so does a well regulated home to a large degree solve the question we have raised. If we would secure for ourselves the desired results we must look to our homes. It is the home that makes the boy, and it is the parent that makes the home.

While not with the same spirit, yet with as much skill and dexterity as the spider shows in casting his web in such a manner as to retain the fly, must the parent cast an unseen web about the young folks that will continue to bind them to him, be they separated by distances ever so great. This imaginary web contains many threads. Sincerity must be the substance of all of them. Of these threads two are much stronger than are the others. These a wise parent uses to keep the others in place. The

one is the unseen love that the parent bears toward his child, the other is the attractiveness of the home that fondly lingers in our memories. Lack of experience bids me keep silent on the first of these, while a desire to promote our common interests prompts me in enlarging on the second.

For reasons which we can not now stop to question, we were all made intelligent beings with intellects that want to be fed and eyes that want to be pleased. Our love of the beautiful is not satisfied when nothing but rough and barren walls surround our sitting-rooms. And a picture skillfully hung, or a little needle work tastily arranged, invariably serves to make them more home like. But our desire for new knowledge—something to read—is not so easily satisfied.

Newspapers, Magazins and Books.

Nothing short of newspapers, magazines and books will here answer our purpose. I do not mean to say that our farms will not produce as much wheat, or that our cattle will require more food without these than with them, but I do mean to say that without them we are neither satisfying the inate desire for learning in our children, nor are we making our homes as attractive for them as we might. I think that we will all admit that books and papers serve us this one purpose for which it is impossible to find any substitute. By furnishing us with strong and healthy food for our minds they become a factor in home attractions that can be obtained in no other way, and if we can succeed in making the home a real home, and keep our children there until they are sufficiently matured to leave it, we can usually succeed in making men and women of them. But some of you, perhaps, think that a well-arranged library for the home necessitates a greater expense than most of you are well able to bear; and you are not wrong in your opinion. A library that would fully supply the wants of an ordinarily intelligent family would cost several hundred dollars, which, with most of you, is no small item.

A Town Library.

Owing to this condition of things the legislature of the state enacted a law a few years ago that if carefully executed will make one library serve the entire town for reading purposes, thus giving us the desired reading matter for our homes, and at the same time avoiding the enormous expense of repeating the library for each and every family.

From the time we became a state the government at Madison has assisted us in keeping up our public schools by distributing annually among our school districts the income of the state school fund. To this has lately been added the one-mill tax. This is apportioned among the districts according to the school population, and at present amounts to about $1.40 for each child of school age. The law which passed a few years ago instructs the treasurer of each town to withhold from each school district therein ten cents for every child reported; the same to be invested in suitable books for school and general reading, selected by the town clerk, who may be assisted by the county superintendent. Inasmuch as these libraries are educational institutions, affecting the whole community alike, it is highly proper that the money used in their establishment should be taken from the state fund income. Nor will the annual extraction of ten cents for each child from the several school district treasuries impose any very heavy burden on

our tax payers. For when we come to compare this small amount with the total amount received from the state and county it seems small indeed; we must remember that the $1.40 spoken of is but one-half of the total the treasurer annually receive, the other half being levied by the county board; and what is ten cents out of $2.80 received? Last summer the number of children reported in the different towns averaged about 400. Ten cents for each child would amount to about $40 to be invested in books each year as long as the law is kept in force. Of course this is not much; but we should not expect to build up a large town library in one year.

A Well Equipped Library.

The continued with-holding of the money for a few years would give to every town and to every home in the town the full benefits of a well equipped library. Thus in some cases adding and in others strengthening an attraction and influence in the home that is considered the most powerful factor in the proper rearing of children.

The method of selecting the books has already been touched upon. The town treasurer is instructed to with-hold the money from the different school districts and the town clerk, assisted by the county superintendent, selects and purchases the books. In order that the books may be the more appropriate for the intended purpose, the state superintendent has prepared a classified list by which the town clerks may be guided. In selecting the books it should be remembered that there are three classes, namely: reference books, supplementary reading books and books for general circulation, while the first and second of these are of great importance in the school-room, the third, or books for general circulation, will find its way to the farmer's home and thus aid in bringing about the much desired result.

449 Town Libraries.

A letter received from the state superintendent states that of a total of 1032 towns and villages in the state, 955 have reported and in 449 of the 955 the law is being complied with. In Waupaca county the law is not faring as well as in other parts of the state. We have 22 towns and village, and, if I am correctly informed in only 6, have any steps been taken to comply with the law. Nor has the law been anything like a failure where it has been applied, for the letter from Mr. Hutchins who has this matter in charge says: "The replies from the teachers and town clerks show that where the town clerks have purchased books adapted to the needs of the scholars, and where the district clerks have placed the books in the school-houses during term time, that the books have brought new life and spirit into the district, and the teachers, pupils and parents have all been pleased with the law and have been helped by the books. The remarkable results obtained where there has been proper management prove, beyond doubt, the value of the system as a whole." I trust that the people of this county will consent to give a system that promises so much and at the same time costs so little, a hearty welcome and a fair trial, and, if it proves a success, reap its benefits.

SHALL WE HAVE PURE FOOD?

By H. C. THOM, Dairy and Food Commissioner.

That we should have pure food goes without saying. There are four reasons why we should have pure food and no reason why we should not have pure food. They are:

1st, protection to the buyer.

2d, protection to the producer.

3d, protection to the manufacturer.

4th, protection to the public health.

A dairyman pays $18 per ton for shorts and middlings. He discovers that the flow of milk decreases and that his herd is losing condition. An investigation follows and the trouble is traced to the miller, who is trying to turn a dishonest penny by mixing an inferior article of mill sweepings with shorts and middlings. There is no hesitation on the part of the dairyman as to what his course is regarding the rascally miller. There is a remedy at law and the miller loses the dairyman's trade for all time.

Stone for Tobacco.

There is a stone weighing 60 pounds in a Janesville tobacco warehouse, bearing this label: "This stone cost 10 cents a pound and was bought for Wisconsin leaf."

It was snugly stowed away in the heart of a bundle of tobacco and was delivered by an honest farmer, "who kept the Sabbath day and everything else he could lay his hands on." No one presumes to think that that man escaped the wrath of the tobacco buyer, and it is safe to venture that it will take him a long time to explain the matter satisfactorily to the Lord.

The Horse Jockey not Alone.

Mr. Jones says, with the blandest of manner, that his gray mare is sound in limb and wind and is as mild tempered as a lamb in harness, both single and double.

The price is paid and the new owner leads away his prize. The new owner makes no pretensions towards horse lore and his sense does not run in the direction of quadrupeds, but he knows how to get a judgment against Mr. Jones when his friends notify him that his purchase is "trading stock," and has the heaves and thrush, and that Ginger, the mate of Black Beauty, is an angel compared.

So in all matters of barter and exchange, the laws of commerce and trade, supported by the common law, protect the party imposed upon and furnish him a medium of redress. Whatever he buys, whether lightning rod or swamp land, Michigan hedge or promissory note, the seller must establish, in the understanding of the court, that he has rendered value received, in order to restrain the collection, by the buyer, of a sum which represents the fraud. To establish the amount of fraud is more difficult in human food, drink and drug than in any other department of trade. The compounds are more occult and numerous, consequently they require greater skill to pass upon.

Adulteration.

To illustrate: One hundred and forty-eight samples of vinegar are upon the

shelves of the commissioner's office. There is nothing in the appearance which would indicate that but 18 of the 148 are made from apples. There are 70 samples of baking powders, 63 of which contain substitutes of lower cost and poorer quality than is essential to a healthful and pure powder. Of the 39 samples of cream of tartar 10 were found pure. Thirty-two samples of syrup are found to conceal 10 glucose substitutes. Allspice contains clove stems, cracker dust, ground shells, charcoal, corn. Pepper contains rice, mustard hull, charcoal, cocoanut shells, beans, bran, corn and ground olive stones.

I have here for the examination of those who are interested, samples of adulterants which are used in pepper, cinnamon and cloves. This stuff is sold by the ton to compounders of spices, who mix with the genuine article such amounts as will enable them to sell at prices to suit the purchaser. I invite the closest scrutiny of these samples, and if any one can discover the slightest trace of the article which they are manufactured to represent, he can have one of Supt. Morrison's reports without pay. What is true of spices is true of all compounds that will admit of sophistication. The list might be extended indefinitely. We work for the few dollars we have, and when we pay it out for things which support and preserve life, we have the right to demand that we are not deceived.

Vicious Business.

And yet we are paying out every day $1 for life and strength and getting 75 cents' worth of life and strength in return. For instance: Fifty cents is paid for a pound of baking powder. For this we should receive about one-half pound of cream of tartar, one-fourth pound of soda, and one-fourth pound of corn starch. The chances are that we will receive a mixture of cream of tartar, tartaric acid, alum and acid phosphate of lime. It is the rule, rather than the exception, that plaster of Paris, acid phosphate of lime and sand are found in cream of tartar. It cuts no figure whether an article is intended to sustain life or save it, if an opportunity is presented to compound it, the vicious business goes on the same in bread as in medicine.

Producer and Consumer Alike Interested.

How is the producer interested in the question? If beer is best made from hops and barley and some substitute is found that will take the place of both, the farmers of our state have received a sorry blow.

If bottle washings make vinegar, what inducement has Wisconsin to give our horticultural friends $1,000 every year? If cottonseed oil and refuse beef fat make butter, then the dairymen of Wisconsin are $23,500,000 out of pocket every year.

Chicago Frauds.

If Chicago compounders can make cheaper butter and cheese than Wisconsin farmers, and can supply the demand, the gentle Jersey can be shipped for a "canner" and the dark-eyed Holstein can be yoked to the plow that she may dream that she can again smell the salt marshes and hear the swish of the Baltic sea.

If 1,000 men can make in Chicago what 600,000 cows can yield in Wisconsin, then the churn can be used for a salt barrel and our cheese factories and creameries may rot and crumble to their foundations. It does not take a vivid imagination to foretell the future if this nefarious traffic goes on without constraint. The farmer who groans under

the burden of a $40 tax upon a quarter section of land, had best be looking for relief, not in the management of state affairs, or the adjustment of the tariff, but in seeing to it that the profit on a pound of butter is not cut in two, because an imitation pound of butter has usurped the market of the genuine product of the cow. The most careful estimates that have been made after years of research, that so 25 per cent. of honest production is displaced by fraudulent sophistication. Make a rapid calculation with me if you please. What is the sum total received by the producers of Wisconsin? How many times would one-fourth of this sum pay all the taxes on all the farms in this state? It is well to have a voice in the affairs of the nation, but many of us have yelled so loudly about taxes that our eyes have closed under the strain, so that unscrupulous manufacturers have charged boldly upon us from behind and carried away hundreds of dollars where we have paid one in tax. That we are mentally blind has made this feat easy. Will we not take kindly to the suggestion that while we may howl never so hard about the $40 tax, it is wise to keep one eye, at least, upon the thief who steals our market. Edison made some great discoveries in the use of electricity. The world has been greatly benefited and the United States has rewarded him by protecting his invention with a patent.

Public Benefactors.

Westinghouse made an air brake that has saved the lives of thousands of railroad men, and fathers and mothers have gone to their long home blessing living sons. It is meet that a man of such genius should be rewarded with the approbation and money of the public. A skilled chemist and physician compounds a medicine that proves to be a panacea to suffering humanity, and the "Trade Mark" makes it possible for him to reap personal reward. The manufacturers of human food have no protection. They may invest millions of money in experiments and machineries and factories. They may employ thousands of men in making drugs, and drinks and butter and cheese, and though we are dependent upon them for our very life, we stand idly by and see conscienceless murderers mix up deadly drugs and medicines, compound lime and sand and alum in our daily bread, and pour entrail strippings and cholera hog grease down our throats for butter, which makes our tongues so limber that we can fervently pray to Almighty God to prolong our lives and make us thankful for the humble repast that Providence has so graciously set before us. There is but one other phase to speak about:

Public Health.

Protection of the public health. We have the state board of health, the city boards of health, the town boards of health. Then we have the city councils and the town supervisors, men everywhere, skilled and eagle-eyed. They look after the sewers and back yards; they issue orders that dead horses shall be cremated, and that defunct dogs and cats that have gone before shall be laid away. They are active in attending to the contagion of disease. They put red cards on sensative doors that warn all fashionable callers. They burn midnight oil in learning how to take out and repair broken down stomachs, and how to check typhoid fever. They know what is the best thing to do with dyspepsia and how to prolong life under difficulties. These wise physicians know all about the blood circulation and the causes that set the whole business out of joint and

have at hand the best known remedies. They are very patient with us, but we pay them to be patient and they call again at the same price and shade the terms somewhat if we remain long ill. A village of about 1,000 people who eat much of everything without asking what it is made of, requires about four well equipped doctors who know what antidote to prescribe after they have asked the patient "what he has eaten?" In order that over-worked doctors should be relieved, I would suggest an old saw that seems applicable here, about an "ounce of prevention being worth a pound of cure."

Criminals in Disguise.

Then too, physicians are laboring under a great disadvantage. A bright little girl belonging to one of the best families is taken suddenly ill. The good old doctor is called and he finds his young friend tossing upon her bed with a bright scarlet flower painted upon either cheek. "Yes I see," he whispers; "I understand the case. I will make you well in a little while." He rapidly writes out a prescription and sends the father to have it filled at once. The directions are on the bottle and the anxious mother sits at the bedside all night so that the tiny drops shall be taken at the minute. The gray morning comes at last, then the sun, then the doctor. His face grows grave when he sees that the flower has deepened its color and has shot out its leaves. "Madam, did you follow the directions?" "Oh, yes sir; very carefully sir. Is Lizzie not better?" "No, I am alarmed that she is not better. I hoped that the medicine I ordered would drive this fever away. Something must be wrong." Yes, something is wrong, cruelly wrong. The scarlet flower grows from day to-day. It spreads out its net work of leaves and branches until their direction is hidden by the soft night dress. The seventh morning comes. The old doctor reverently closes the eyes of his young friend, and the deadly scarlet flower slowly changes to a white rose and a mother's tears silently speak of a great loss. If a man comes into your town and takes the life of a young girl in his hand and flings it into eternity, justice is too tardy to satisfy the cries for retribution. But a cold, level-headed, grasping business man may deliberately mix a potion that looks like a drug that is food for fever, but which, in truth, has been so debased and degraded by inferior ingredients that a life slips away in seven days, and the mercenary compounder escapes without censure, while the good old doctor wonders if his right hand has forgotten its cunning, and the sunshine has gone forever from the home where the flower bloomed and faded.

Virtue and Honesty Cannot be Legislated into the People.

To the philosopher it matters little when death comes, so that the end is sudden. But no school of science has taught us to look forward to a daily visit from the grim angel with pleasure, when he looks over his victim deliberately and says: "You are not quite ready; I will call again in the morning." If a choice were offered, we all would take a single large dose and there end it, rather than wait for a hundred small doses to do the same service. There is no gain in ranting about an evil if no remedy is offered. A man cannot be defeated for a political office by howling about him, but some good fellow must be trotted out who can get more votes. No law can be framed to keep the miller from putting sweepings into the middlings, neither can the honest Rock County farmer be made to leave the sixty-pound

stone out of the tobacco; nor the every-day jockey be made to tell the truth. "Virtue cannot be legislated into the people," but the "dear people" can be restrained. Robbery, drunkenness and manslaughter are of frequent occurrence, but who dare say that these crimes are as common as they would be if all penalties were surrendered. That the manufacture and sale of all unwholesome articles of food should be prohibited is clear. That cheap articles of food should be manufactured is equally clear.

Label Each Package for What It Is.

Then the only question necessary for us to consider is that of imitations. This is especially delicate because so many men, women and children are trying to make themselves out what they are not. I venture that there are not a few in this assembly who could set up a claim that they did not get what they thought they were getting. That this last proposition is true makes it easy to call upon you to aid me in reform. In many forms of food adulteration the manufacturer goes to considerable trouble and expense to make his article appear like the genuine. In other cases the resemblance is natural. In the former I would suggest that the manufacturer should be restrained by law from imitation; in the latter, that the manufacturer should be compelled to label every package with the per centum of each ingredient. If these simple suggestions are followed the buyer need never complain; the producer can rest assured that his market is not juggled; the manufacturer can figure on honest competition, and if our stomachs break down at the half-mile post we can make no just complaint against anyone but ourselves.

Dont Look for Immediate Results.

To unthinking tax payers who want one hundred cents return on a state investment within the year, I will say that a liberal appropriation was made in 1889 to adjust the evils in food adulteration. To these same tax payers I beg to say, that if you invested $7,000 in private business you would consider yourselves very fortunate if your enterprise declared a dividend of seven per cent. at the end of twelve months. Some of the share holders in the Dairy and Food Commission are disgruntled because they do not get 100 per cent. on their investment at once. They forget that millions were put into the Atlantic cable before a single message swept under the sea. They forget that men put their money into real estate in Chicago and died before land took a jump. They forget that France, Germany, England and Sweden have been studying the question of food adulteration for hundreds of years, and that they are perfecting their laws every day. They forget that because the laws are stringent and severe in Continental Europe that it makes the United States the dumping ground for their ostracised manufactures. They forget that they are expecting of the commissioner to do in one year what the same official can do in France when the latter is backed by the laws of 300 years. They forget that our legislature did not know what evils existed, and therefore could not apply law remedies. They forget that trade and commerce is sensitive and that we have fostered large business interests with our approval. These shareholders forget that their demands are out of reason when they require the commissioner to stand on trial and report at the end of one year whether his business is successful or not. What kind of a report do you think the North-

western Railroad Company would have rendered twelve months after organization? If a merchant were told that he must start his business and bring it to a successful issue in one year or shut up his shop, he would never open it.

Honest Goods.

Business principles must be applied to state as well as to personal affairs. I do not advocate that rice should not be used in the manufacture of beer, that vinegar should not be distilled, or that cotton seed oil should not be spread upon our bread; but I do insist that rice beer shall not be sold for barley malt, that whisky vinegar shall not rob the orchard of its prestige, that cotton seed oil and tallow shall not pass before the innocent public as butter, the product of the cow.

Store Made Food.

These conditions of honesty can never be fairly maintained without a bureau of enforcement. If one will stop to consider the matter he can but see the growing dangers that beset the health and happiness of mankind from the consumption of factory-made victuals. This is pre-eminently the era of ready-made goods. The home-made article is rapidly becoming a thing of the past. This change is noticeable in food products, as well as in other lines. In the larger cities families subsist almost entirely upon factory-made food, even to prepared meats, condensed milk, pies and pastry, jellies and canned goods. Therefore the people are becoming more and more dependent upon the honesty of these purveyors for the quality and healthfulness they take into their stomachs. While it is very important that the public health should be protected, we ought not to lose sight of the importance and necessity of making honest goods at home. A large proportion of our factory products find a foreign market. The reputation of a state is established the same as in individuals, and is, therefore, subject to the same conditions. We can lose in a day what it has taken years to secure. I will call your attention to the article on cheese. Note the following table:

Exports of cheese, showing decline in price and quantity.

	Pounds.	*Per Lb.*
1881	147,995,614	11.0c
1882	127,989,782	11.0c
1883	99,220,467	11.2c
1884	112,869,575	10.3c
1885	111,992,990	9.3c
1886	91,877,235	8.3c
1887	81,255,994	9.3c
1888	88,008,458	9.9c
1889	84,376,053	9.3c
1880	95,376,053	9.0c

Wisconsin a Synonym for Value Received.

It is useless to emphasize these figures. A decrease in our export of cheese from 1881 to 1889 of over $8,000,000 speaks louder than words. You ask what has made it? One circular, issued by the Liverpool exchange last season, to the effect that Wisconsin was exporting cheese filled with stale butter, cost our factories, that then had cheese in England, more than enough to maintain the Farmers' Institutes five years. Not that all the cheese was filled with stale butter, but poor Tray always suffers from bad company. Three counterfeit bills in a community gives a peculiar color to all the bills in circulation. Wisconsin is a proud state. She has a right to be proud. No state is better than ours. Shall we let a few unscrupulous men pull down our reputation? Shall they be allowed to ruin our health and our markets? Can we afford to live a life of constant fear and suspicion? Away with the thought. The day is near at

hand when the word "Wisconsin" shall mean *honesty and straight goods;* and when the merchant prince of Hamburg or the artisan upon the dock at Liverpool shall discover the magic word "Wisconsin" upon his invoice from across the sea, he can say with a sigh of relief and assurance, "I have value received."

AN OPEN LETTER TO A FARMER BOY.

By B. H. MEYER, Principal of Port Washington School.

PORT WASHINGTON, Wis., Feb. 26, 1891.

My Dear Karl: The very modest request, that I write you once each year, made in your last letter, is one to which I gladly respond at this time.

Your letter contained much of a surprising nature. Uncle Hans' removal to Elmhurst, Erna's return, Hugh's marriage, the sale of a part of the old homestead—all these were so unexpected. And then all the questions you desire me to answer! Those relating to yourself and your brothers I shall attempt to answer in this letter, but the queries of Uncle Hans, as well as the many interrogations of Frida and Edna, must be deferred to some future time, lest this letter shall weary both you and me.

So uncle has left the old farm in charge of Hugh, and his brothers and sisters are to be under his care. May you all be happy together. You miss Uncle Hans and Aunt Stella? Indeed, you must. How kind they have always been to you! Surely, none but they could have occupied so well the two chairs left vacant four years ago.

But enough. I must hasten and answer those questions. For want of a better way I shall take them in the order of your ages, beginning with those you ask about Amos.

The Example of Two Noble Lives.

Amos is the only one of the family who must grow up and go through life without personal recollections of his parents. The inspiration of two noble lives, the soft whispers of a fond mother, the kind words of an affectionate father, these are not, alas, for him to remember. And the noblest way for you to requite for your possession of these is to be to him, so far as you can, what they would have been to him.

Since Amos is now in his seventh year he should enter your district school at the opening of next term. And do nothing in the line of preparing him for school work. No, do not try to anticipate the teacher's work. Do not cram him with the A B C. Let him say the letters of the alphabet neither forward nor backward. Teachers have out grown the idea of sending little tots to their seats after the first day's recitation with the request that they study the first nine letters of the alphabet.

Doing Things.

One thing, however, that you can do; nay, but you should do, is to have Amos continue doing those little things Uncle Hans and Aunt Stella had him do, and which he loved to do so well for their sake. I know that you would willingly

and gladly take those little duties off his shoulders, giving him all his time for himself; but that would be unwise. The little boy who can call a little spot in the garden, his garden; who can feed the hens and say it is his work; who can bring in an armful of wood and say it is his duty; who can regularly and systematically do a score of little things, and do them well; such a boy has learned a lession which will last through life, and by which many a boy of a larger growth might profit.

If Amos continues in such a manner he will enter school with a habit of doing things. He will have learned to deny himself of some things. He will have learned to see some proper relation between will and can, between work and play. And this is vastly more essential than that he be taught the A B C's, for which no teacher cares; or a little 'rithmetic, which will rack his little brain quite enough after he has entered school. This is the best possible preparatory training Amos can have.

Regularity.

Then, after he has once begun going to school, he should attend regularly, every day — *evsry day.* In order that a teacher may work to the highest advantage of his pupil, it is absolutely necessary that the pupil be in attendance, daily. An irregular pupil wrongs both himself and his class-mates. He wrongs himself by failing to get what is necessary for him in order to keep up with his class. He wrongs his class-mates by jarring the harmony of the smooth, regular work of regular scholars with the discords of his broken and imperfect recitations. He is thus a double, if not a triple sinner against school ethics.

The best teacher fails to get a thorough hold on a boy who is in school one day and out of school the next day.

I shall never forget the remark Miss Cady made about your early school-mate, Tom Jones. Said she, "Why, Tom was as hard to hold as a greased eel. And after months of toil, after he had learned to do at least a few things for me, after I had gained a fair hold on him"— and now her face saddened and her voice became serious — "after I had accomplished that much, his mother, who not unlike some other mothers who occasionally let their piety run away with their judgment, said, 'My dear little Tom, poor boy, cannot stand the severe strain of school so steadily. He needs a little rest; a little relaxation.' And the lad was sent away for a two week's visit with his aunt in St. Paul. Well, Tom did come back relaxed. The relaxation which his mother thought he needed he got. And got so much of it that he never got together again, after that. All my former grip on the boy, his willingness to do some work, all were completely gone, never to be recovered. And all because of a supposed need of relaxation, which for Tom meant increased deviltry."

Don't Lose a Day.

Pupils like your brother Ed., who have attained some degree of maturity may, perhaps, lose a day or two with impunity; for they can work more for themselves, and by extra effort may be able to make up for lost time. But the average pupil needs the stimulus of daily recitations, and the vigor gained by working shoulder to shoulder, with pupils who are his equals or superiors. Generally, each day's task is dependent on the work of the previous day. It is one link to be joined to that part of the chain forged in days gone by. Losing a

day means losing a link; losing a link means a broken chain; a broken chain means being handicapped by those who did attend regularly and whose chain is complete.

Above all things, then, let this impress Hugh with the importance of sending Amos to school regularly, every day.

Puzzles Will Bring no Mental Growth.

I have already mentioned Ed. He will probably be disappointed in not receiving answers to his puzzles. Such chaffy material may amuse him, but I doubt whether his teacher, Miss Cole, is taken with them as much as he is. Ed. must remember that Miss Cole's school duties are heavy, and that she can not be expected to spend time in solving "sums" which only an expert mathamatician could be expected to do. It may be all right for old Mr. Goff to work at them, for his great object is to kill time, and puzzles — and such like — serve that purpose admirably. But Miss Cole is an ambitious, hardworking young teacher, and finds a thousand and one very profitable things to do in her few spare moments. She is well qualified to teach in your district, even though she has no ready answers for big Joe's queries, "What is the difference between the number of drops of water in the Atlantic and the Pacific oceans?" "Who is the oldest man living?" "What is the difference between the magnetic north pole and a modern electric car?" "A man bought a hundred animals for one hundred dollars, paying eight dollars for sheep, fifty cents for chickens, and seventy-five cents for turkeys. How many did he buy of each kind?"

To an idle person such things may not be repulsive, but to an earnest young lady, like Miss Cole, they are an abomination. Moreover, the days are past when the ability of a teacher is gauged by her ability to solve the problems with which old Mr. Goff so liberally supplies the big boys. Such tests are relics of bygone days, and I trust Ed. will find more valuable things to question his teacher about.

Through Equipment.

You say Ed. will finish the common school course at the close of this year, and that he has decided not to become a farmer. If that is positively settled, he wants to decide upon what he *does* want to become without delay, and then strike out for it at once. Now that Ed. has decided not to be a farmer, he should remain no longer than is absolutely necessary. For him to leave as soon as practicable is much better for Ed. and vastly better for your farm. To remain and work at farming, after he has determined to learn some profession, means to live *away* from his aim; to go north, after he has decided to go south; to dig a ditch, where he has determined to erect a mound. It means cutting off time from the allotted three score years and ten.

Take the Up Grade.

Remember, Ed., time is flying fast. Strike out for something definite, and remember that the first requisite of a high shot is a high aim. "Don't join a dying profession. Take one on the up grade. Take one that you will have to hurry to keep up with. Don't choose one that you must needs loiter behind, and hold back, if you stay on speaking terms with it. Select as a life's work something that is of the present and and future; don't nail your flag to a sinking ship." Decide not only on what you want, but also on what you do not want. It is not so much a question of what to learn as what to be willingly

ignorant of. Education has made such great progress that to cover even a small part of the ground is out of the question with the genius, let alone the common clod. There are a thousand different roads to travel over, but to approach the end of one means to be a hero.

"He who seeks one thing, and but one,
May hope to achieve it before life is done,
But he who seeks all things, wherever he goes,
Only reaps from the hopes which around him he sows,
A harvest of barren regrets."

And now, Karl, I have come to that part of my letter which specially belongs to you.

Bread, Butter, and Business.

Two years ago you completed the common school course—it's a pity that every farmer's boy doesn't do as much, at least—and you say you will be able to complete the course of the Kingston Graded schools within a year. By all means finish it; you will need it some day. The man of the future needs as much of the three R's as he can possibly get, in order to contend successfully for the three B's—bread, butter, business. Besides, there is something in "doing up a job." That course will give you broader views; it will give you an insight into different subjects, which will be invaluable to you in later years. Few, perhaps none, of your studies will bear directly on farming; but that is not necessary. Those you will get later, when you are in a position to enable you to take advantage of one of the winter courses offered at our University. The branches of the Graded School course will teach you to think. You will learn to use books; you will learn to discriminate between the important and non-important things; you will learn to use your mind. Much of history, geography, grammar, algebra, civics, much of these you may forget before you attain your thirtieth year, but that matters not. Forget it all, every word; your early school training will still be of incalculable value to you. But how can it be of value when it is forgotten? Let me illustrate:

Acquire a Habit of Study.

My friend, Dr. March, a man of fifty, left for Northern Wisconsin, one day last fall, to go hunting, and after several days' absence returned with the following, to wit: One porcupine (dead, but not wounded), one cub (quite domesticated), and one deer (which, by the way, had on it the brand of a well-known dealer, and which the good Doctor evidently forgot to take off). All this! the result of several days' hardship. Now, you will not entertain for a moment that the Doctor went for the money there was in the game, for you see there was n't any.

The Doctor knew that every stroll, every jump, every excited chase, meant increased vigor for his muscles, more invigorating air for his lungs, and more rest for his brain. In short the Doctor went, knowing that it would result in gain—gain in physical strength and mental vigor; and that meant gain in the usefulness and effectiveness of his work.

Apply this. Your game, the few valuable things you always will remember, may not be great in quantity or so very fine in quality; but while you are in school getting it you unconsciously gain in strength of mind; without knowing it you acquire a habit of study and application which will last a lifetime. And this habit is what constitutes the inquiring progressive man. This habit forms the men who move the world.

Hard, Concientious Work.

The boy who goes through the country

school and does no more is a failure. The boy who goes through a high school and stops there is a failure. The boy who goes through a college and learns nothing after that but better ways of parading his swelled head is a failure. Whoever ceases to grow before he enters the fall of life, is he not a failure? Success in life, in any line, means years of constant, hard, conscientious work. Be it on the farm, be it in business, be it in the professions, success means work; work and toil, toil and work. Therefore, I repeat, Karl, finish that course at all hazards; gain the power it affords, and then you can begin life on the farm intelligently.

The trouble with so many of your farmer friends is not that they did not learn anything in school, not that they cannot learn, but that by leaving school so early, or worse yet, by neglecting school, they did not learn enough to know what learning means. They did not gain the habit I speak of, and consequently they rarely reach and never pass beyond the mediocre. They may become what people call "good fellows," but that is all. They are never to be found among our most progressive and successful farmers.

Something More than Muscle.

In this age of progress and sharp competition, to win any reasonable amount of success, means the utmost exertion on part of every fibre in our bodies. It means a summoning of our best efforts, and the closest concentration of all our forces. Notice, I say, all our forces. There was a time when physical power was considered the only qualification requisite for a successful farmer. The man of muscle, he was the man. If he possessed something beyond the mere ability to write his name and read a letter, it was deemed, if not absolutely useless, not much of an advantage. But times have changed.

The Sickle—Muscle. Self-Binder—Intelligence.

The farmer of ten or twenty years ago stands in the same relation to the farmer of the future that the sickle does to the improved binder; that the backbone of a fish does to a modern scroll saw. The farmer of the future will be—must be—quite as much a man of muscle as the farmer of the past, but he must be more. He must be a man of business tact. He must be an educated man. The farmer who twenty years ago, without both learning and money, squatted on government lands, and made a success of it, if transplanted into the future farmer-world would find the wolf howling at his door. Why? Because he would have to compete with men, not only his peers in physical strength, but vastly his superiors in mental power. While he would hold his own at the plow, he would be completely out-done in the business management of his farm The farmer who puts into his occupation the same tact, the same amount of care and accuracy in details that the average business man does, comes out ahead every time. To use a parody, the farmer must mix the soil not only with fertilizers but also with brains. But you see, Karl, that means better preparation.

Read Good Literature.

The many long winter evenings and many an hour on rainy days may be utilized in gathering useful knowledge. Keep some good newspaper. Mind you, I say newspaper. Read it. If then, in stead of reading, "The Hunch-back of Hellgate," "Gypsy the Girl Ferret," or others of Tom's favorite books, you read "Downing's Rural Essays" and "David Copperfield" you will certainly not be

much the worse for it. You should also be a subscriber to some good agricultural paper, say the "*Wisconsin Farmer.*" You may not be able to do all this at once. It is not necessary, not even desirable that you should. Begin with one. Then add another. Read them. Read them again. Think about them while you are out in the fields. Apply some of the good things you read about on the farm. By pursuing such or a similar course you cannot help but become an intelligent farmer, and did you ever hear of a good, strong, intelligent farmer's failing?

The plea so often heard that a farmer cannot afford these things is rather weak, is it not? Don't you think that the farmer who puts off subscribing for a good paper, or buying a good book until some future time when he fancies he can afford it, will never see that day? Readable editions of our great classics can be bought for from fifty cents to a dollar. A dime will buy, not a dime novel, but well printed editions of our largest and choicest poems. No one need hunger for the most palatable mental food for which princes in by-gone days were only too glad to pay fabulous sums. Really, Karl, in these days when the best books and the choicest literature can be had for little more than a song, I see no excuse for the notable absence of good books and papers in so many of our farmers' homes. In many cases it means but a few cents less for an old hay-rake, a broken wagon, or a two-tined pitchfork at someone's auction. It means but a few cents less for some patent medicine peddler, a "nigger" show, or the man at our fairs with the fortune wheel.

Report of Experiment Station.

And while I speak of reading matter, another thing comes to my mind. The Agricultural Experiment station at Madison issues bulletins several times each year, and sends them gratis to all who will go to the trouble of sending in their names and addresses. These bulletins contain detailed accounts of experiments made at the station in the various branches of agriculture, and furnish most profitable and entertaining reading matter.

For instance, while in Madison last summer, Prof. Henry showed me some tomatoes which grew on stout, upright stems, probably more than two feet high, quite unlike anything I had ever seen before. These plants were the result of what is known as cross-fertilization. The flowers of our common, prostrate-stemmed tomatoes had been fertilized with pollen, so-called flower dust of the tree tomato of France; and these nice little tree-tomato plants were the result. But still more startling was the account he gave of some melons which stood in close proximity to the tomatoes. The pollen of African melons had been employed in fertilizing the flowers of our common musk-melons. The first experiment with the melons was made a few years ago, resulting in over-growth of leaves and vines with only a few melons. The seeds of the best of these were planted the following year, and so on until now, and the professor could justly point to them with pride — there was a bed well covered with choice African-American melons. "Wonderful," you say? Indeed, wonderful, but any farm will produce things equally wonderful. Pages upon pages might be written about what I saw in the garden; let alone the dairy, the fields and animals. But why multiply accounts when you may get them in print for the asking? Shouldn't every farmer have enough interest in his calling to study

these things? For a young farmer to grow up and continue in total ignorance of all this great work, is not that base ingratitude to the great state of Wisconsin which so generously provides for it all?

Farming a Great Science.

Agriculture is a great study, yet undeveloped. Men like Henry and Babcock have done great service. And even they say, "We have hardly begun." The future will see some heroes in agriculture. And why shouldn't you do some original work, Karl, and contribute something to the science of farming? Investigate and experiment for yourself.

Ah, but that recalls to my mind a sentence in your letter. You complain that Hugh does not care to give up a part of the lot back of the barn for you to try some of the good things learned at the Farmer's Institute.

Plenty of land lying idle under the misnomer of pasture. Acres of land useless for want of a ditch. Strips a rod or more in width stretching across large fields covered by what once was and still is called a rail fence. Here large vacant spaces about barns and sheds; there waste because of an old pile of rails or a half rotten stump, but nothing for an inquiring minded boy to use as he pleases.

The Farm an Experiment Station.

I tell you, Karl, what to do; and I warrant that neither Hugh nor any one else will find fault with it. Gather the pieces of wood and stones lying southeast of the house, condense the size of the wood-pile from ten square rods or more to about one-tenth its present area, and use the ground so gained as a little experiment farm. That will be double gain; an improvement in surroundings of your house, and a piece of land of which you are sole controller. Then you can probably get your neighbor's boy to co-operate with you, thus doubling the work. At definite times compare results and act accordingly. Careful experiments, close observation, wise conclusions and intelligent application, these do much towards raising farming to the plane which it is destined to occupy.

Hugh does not believe in such work, does he? Well, you go right on and by-and-by he will notice the difference. "One can't make practical use of what the Farmers' club does." "The Farmers Institute handles subjects which do not help directly on the farm."

"You eat bread, do you not?"

"Yes."

"Butter?"

"Yes."

"Meat?"

"Yes."

"Potatoes?"

"Yes, yes; and lots of other things, such as most people eat."

"But, pray; show me the meat in your bones. Where is the bread in your muscles, the potatoes in your sinews, the butter in your blood?"

"Idiot. How foolish to expect to find the food you eat in —"

"Ah, ah. Please allow a word of explanation. These words should not provoke you, for I am only applying a little of the logic Hugh applies to the Club and Institute. You might as well expect to see the meat you eat in your bones, as to go home from the Club or Institute and literally apply everything on the farm *at once*. Just as the digestive apparatus of our bodies draws nourishment from the food we eat, so should our minds digest and assimulate the various things presented at these meetings. A wide-awake, vigorous mind al

ways finds abundant material for growth among the great variety of goodly things offered at these gatherings. An occasional banquet brings enjoyment for scores of people, but would you condemn the banquet because some sickly individual with a deranged digestive apparatus speaks lightly of it?"

"Cracker-Barrel" Education.

Old Mr. Goff used to tell the boys who congregated regularly every evening, on the cracker barrels of his grocery, that about all the president of the Farmers' Club did was to draw his annual salary of two hundred and fifty dollars; that the whole organization was nothing but a fraud, a humbug, and some other words beginning with *st* and *r*.

Now, Karl, I shouldn't advise anyone to waste time trying to convince old Mr. Goff. He has passed the stage of convictions open to reason. He has completely fossilized. But if he should ever again attack you on this question, admit what he says. Admit the Club's being a fraud, a humbug, and a ——! Yes; admit it, but say something more. The Club has given some men—to use Mr. Goff's pet phrase—a chance to catch on to more schemes, and scoop more of what there was in them than scores of others have been able to do. Every member of that club has robbed Mother Earth of loads of plenty that lay hidden in her bosom. Every member of that Club has discovered new avenues by which to reach Nature's treasures. New and better ways of utilizing the gifts of the soil; new and better ways of *living upon the fat* of the land.

District School Board.

It was gratifying for me to hear that the many years of excellent service of your father on the School Board of District No. 13, received substantial recognition in the election of Hugh to the directorship; and I hope that he will prove true to his trust, and continue the good work left undone by his father. To be director of a country school is a far more important position than it is often reputed to be. A man of sensible views and good judgment, in that position, has abundant opportunities to apply his metal, especially in resisting the eloquence of such men as Mr. Goff, when he expounds principles of teaching and ways of running a school, standing on tip-toes on a cracker box, behind the counter, and emphasizing every one of his pet arguments with a vigorous descent of his right hand, "For," says old Mr. Goff, "our school is a small one, the pupils are young, and there is no need of looking round much for a teacher. Mostly anybody will do, provided he isn't too steep." Probably you remember, Karl, the rage Mr. Goff was in three years ago, when the school board engaged Mr. Collins in preference to Mr. Bonner; how he talked all day long, and most of the night too, of the fearful extravagance of the board in hiring one young gentleman teacher when another would teach for less. "For," he continued, quite out of breath, and his right hand raised high above his head, "Mr. Collins wants forty-five dollars a month, while Mr. Bonner says he'll keep the school for forty-four dollars eighty-seven and one-half cents, and I tell you," his hand gradually descending to the counter, "it is extravagance, boys; it is extravagance to hire Mr. Collins. It is squandering the people's money."

"Now, is old Mr. Goff quite alone in taking such and similar stands on school questions? Has he not some company? Mr. Collins was a teacher, Mr. Bonner a school-keeper. But aren't there more men, who like Mr. Goff,

would waste — I mean literally waste — forty-four and seven-eights dollars by hiring a school-keeper instead of paying forty-five dollars in securing a teacher? In the eyes of Mr. Goff, the difference was twelve and a half cents per month. In the eyes of one who knows a teacher and sees the difference between school-keeping and teaching, the difference was a wise expenditure of forty-five dollars in the one case, and throwing overboard forty-four dollars, eighty-seven and one-half cents in the other. You know uncle Hans used to say, "De letzten fief Dahler hoelt de School uprecht." (the last five dollars teach a school), and wasn't there sound logic in this homely saying of his?

Preparation for Life's Work.

And I must refer to Uncle Hans once more in commenting on Mr. Goff's statement that because the pupils are young and few in number anybody will do.

During the many years that Uncle Hans grew trees, not once did he allow you boys to prune them while they were delicate in stem and branch. He well knew that unless the dainty sprout received the tenderest care, and unless the pruning was wisely done, the plantlet could not grow up into a beautiful, well-formed tree. "When you get to be a man," he used to say to Ed, "then you may help caring for them, but until then you must be content in doing such work as I may give you." And how sad he looked one day when Ed., in his eagerness to help uncle, had attempted to prune the young pear trees. "Indeed, Ed., you meant well," he said with a serious voice, "but that is not the question. This is work for men, not boys, and I wish you to wait patiently until you grow up a man. Some of those little pear trees will grow up unsymmetrically and scarred in spite of all that I may do for them in the future. Some of these scars mark the places where, if the trees grow up, they will begin to decay. Those very marks may weaken them in power to withstand the storms of years."

Easy to Find Fault.

But again I ask, "Is old Mr. Goff the only one who takes such a view of the question, and is Ed. the only boy who in his kind motives of helping Uncle Hans, takes the pruning knife and attacks the pear trees of the nursery? Ed. was strong enough. He could hold the pruning knife quite as well as Uncle Hans could. But he lacked that maturer judgment which, with the exception of the genius, comes only with maturer years.

The lesson which this teaches is obvious, and a further opposition of it unnecessary. How often do we find a Mr. Goff urging an Ed. to go pruning in the nursery! How often do we find the little babies that should live on milk alone fed on ham and bacon! And how often do we find the propelling force of this very urging to be, as in Mr. Goff's case, a matter of twelve and one-half cents! And once more,— how often is this to be done over again?

"O! let not then unskilful hands attempt
To play the harp whose tones, whose living tones
Are left forever in the strings. Better far
That heaven's slightnings blast his very soul,
And sink it back to Chaos' lowest depths,
Than knowingly, by word or deed, he send
A blight upon the trusting mind of youth."

Mr. Goff's name recalls another incident in the career of that most excellent teacher of your early school days, Miss Cady. After she had recited to me the events connected with Tom's visit to St. Paul, she drew from her pocket a piece of paper, saying, "Here

is another thing the country school teacher has to contend with."

At a glance I found it to be a communication addressed to your father who was at that time school clerk. The note read as follows:

Uniform Text Books.

"MR. FREDERICK HANDEL,
Clerk of District No. 13.

My Dear Sir:

Although I do not desire to teach your school another year, in the interests of education, for the good of those little ones whose welfare lies so close to my heart, and for the good of my successor, whovever it may be, I submit the following facts to your serious consideration; and with the earnest request that you kindly present them at the next annual meeting, and do what you can to change things for the better.

There were in use in your school, during the last winter, three different arithmetics, four kinds of readers, two kinds of geographies and five different spellers, five parents refused to purchase any book. To add to this confusion and make matters worse, Mr. Brown sent word that unless Sam could study in Robinson's arithmetic he would take him out of school; and unless Sam's sister Kate was allowed to read in McGuffy's Fifth reader, he (Mr. B.—) would come to school and look after matters himself. Mr. Brown's neighbor, Mr. Wilson, claimed there were no geographies equal to Mitchel's, for they were the ones he had when he was a boy, and insisted upon my using them in school. Such and similar cases were a source of constant annoyances and incessant worry to me.

By way of changing the monotony of these dry-as-dust, old-as-Methuselah text books, I gave the pupils frequent general exercises; such as, the study of leaves and common flowers; the study of prevailed which divided the farming common insects and birds. To say that my school enjoyed these is saying but little; nevertheless, these exercises can not supplant the regular book work, and a uniform list of text-books is the crying need of your school.

There are many more things which deserve immediate attention; such as, the building of a wood-shed, repairing the fence, etc., but as all these will easily present themselves to an observing eye, I shall refrain from enumerating them.

Very respectfully yours,
HARRIET CADY."

Reading this letter to the meeting, when your father came to that part of it where Miss Cady mentions the general exercises, and the study of flowers and insects, old Mr. Schopmann suddenly interrupted him by exclaiming:

„Dat will ick ju man seggen, dat ick nie wedder Tax bethalen do, wenn eene Lehrerin anstellt werd, de de Jungens wieder nix lehrt als Ameisen in die School to dragen und Sommerrogels to fangen, und damit unnütze Tieb in de School verschwenden dod."

(This I will tell you, that never again will I pay taxes if you engage a teacher who teaches the boys nothing but to carry ants to school, and to catch butterflies; and in that way waste time in school.)

To which Mr. Goff manifested his hearty approval by planting his feet squarely upon the floor and shouting: "Good, Schoppman; good."

Guard the Common School.

The matter of text-books brought on a profound silence, which was broken after a period of coughing and side-glancing, by Mr. Goff, who then addressed the meeting in his usual eloquent manner. It is hardly worth while to repeat what he said. Suffice it to say that his words on this occasion were

quite as hollow and emphatic as those he gave vent to standing on the cracker box; but that there wasn't a man in that meeting who dared get up and urge the recommendations of the letter. However, on their way home from the meeting, men could have been heard accusing one another for submitting so calmly. Yet the fact remained, Mr. Goff's logic had decided the fate of the school, and Miss Cady's successor had to work under the same crippling influences that she had worked under.

Again I ask: "Is Mr. Goff the only individual who is allowed to control a country-school meeting, and determine the fate of a room full of young children? And were those men the only men who have not a word to say at the meeting, but who have plenty of time later to accuse one another for neglecting the school?"

The True Teacher.

This letter may have wearied you by this time; nevertheless, I cannot close without saying a word more about Miss Cady. You ask: "What is it that makes me remember her?" It is now eight years since she was my teacher. It is not the arithmetic she has taught me; it is not the geography or spelling lessons she used to hear me recite. What *is* it? The answer to this question may be *felt*, but never can it be expressed in words. Miss Cady was a teacher, a true teacher. There was a *something* about her which affected not only you, but all her school. To give it a name would be sacrilege. It is some nameless, indefinable quality, that unconscious outburst of the innermost soul, which goes forth as the evangel of purity and the inspiration of justice. It is that quality which kindles in us the divine spark, to glow forever. That is what makes you remember her. It is that same quality in our teachers and dearest friends, which challenges us to the good, the noble, the true. It is that same quality that arouses in us those latent powers that develop symmetry, strength and sweetness of character. It is that same quality which mirrors our inward lives, and attracts or repels those with whom we come in contact. And it is this same quality which I would have you hold far above all the other things mentioned in this letter, and have you strive to attain it. Above all, Karl, strive to be, throughout your life, A TRUE COUNTRY GENTLEMAN. Very sincerely yours,

THE WRITER.

COMMON SENSE IN FARMING.

By A. X. HYATT, Sheboygan Falls.

He That Is Wise Taketh Counsel.

Mr. Chairman, Ladies and Gentlemen:

Noah Webster did not define common sense. Let me try: One hundred common cents make one dollar. It takes uncommon good common sense to make many dollars farming nowadays. Help with good common sense is scarce and dear, and it takes many common cents to pay them, and more common sense to please them.

The lack of common-*cents* in this world keeps many wretched and ragged. The farmer that has been sitting by the stove the long evenings of the past winter, sleeping, smoking, or whittling, devoid of agr cultural or dairy literature, has not common sense enough to ever know what he has been losing. Whether we sow turnips, feed calves, burn a coal pit, or get up a gentler warmth to forward a tomato plant in a hot bed, common sense is all essential.

Thought, Kindles Thought.

A young farmer may have his head full of common sense and his pockets full of them, and yet alone and unassisted he will make slow progress. The farmer that expects to be in the advance line needs something like the startling blasts of the steam whistle to quicken his pulsation. Practical farmers can educate each other, and it is the most common-sensical way to secure knowledge. Light, on doubtful subjects, is what is needed. Any attempt to urge men forward, even in the right path, beyond the measure of their light, is very difficult. Augment their light and they will follow of their own accord. Farmers together, anywhere, discussing questions of farming are learning something, the theory of manure, for instance, the successful application of which lies at the bottom of all good farming; the right way of applying it to the different crops and the different soils, has so many phases that one man is hardly able to understand it all, in all its length and breadth. By being together, the farmers of the county, and discussing the matter fairly and fully, difficulties can be mastered that would be insurmountable to one. The rotation of crops, giving rest to the soil, requires many experiments, and can be proved to be correct soonest by the aid of many. Bring men together in Farm Institutes, Clubs, or even the grocery. Thought kindles thought, and leads to inquiry; one successful farmer, or experiment, leads to imitation and improves the whole people.

Make the Best.

The farmer feeds the nation. It is thought that if all the women should leave the world in one generation the men would all go out after them. If all the farmers should leave the earth starvation would stalk the land at best. Assemble the farmers together, then, and impress upon them their importance to this great people. Let them help each other to explore the mysteries of agriculture, each joining in the discussion, and progress must certainly be the result. Theory, in this way, will soonest become knowledge. A thousand bushels of roots can easily be raised on an acre of land if one knows just how to

do it, and they can be fed to milch cows, and gilt-edged butter be made of the milk, as I have often demonstrated to the people of Sheboygan county.

There is a very simple way of having all our cows give 8,000 pounds of *good* milk a year. Buy a Babcock tester and keep none that will not do it.

To make good butter Monday and Tuesday and fail Wednesday is conclusive evidence that you are guessing at something. The dairyman that churns all the evening and his wife the balance of the night on a contrary churning, should seek knowledge. Science is knowledge. The scientific butter-maker is the successful one. It is disgraceful to make any more poor butter in Wisconsin.

My mother was, in her time, a good butter-maker, but I well remember the time when the sheep dog and boys were all tired tramping the tread-power, and the thirty or forty pounds of cream were used for shortening.

I presume her best butter would not be called "gilt-edged" now, in the Chicago market.

Truth Often Dumb-Mouthed Before Ignorance and Prejudice.

Were it not for ignorance and prejudice poor butter would soon be banished from among us. We have cases of prejudice yet in Sheboygan county harder to cure than "fits" or rheumatism of the joints. It has always been so. It is now universally admitted that Socrates brought down philosophy from the heavens to the earth, so to speak, yet he was accused of "pratling without end" and condemned to die. Great inventions have been made and forgotton, because men could not be induced to use them. An enlightened Englishman at a fair, suggested that "a piece of plate be presented to Robert Bakewell, for the service rendered his country in improving the English breeds of sheep and cattle." A counter proposition was put forth by an ignorant farmer, that "he was an enemy to his country for trying to change the best breeds of England for a race of *rats*." The last proposition was carried by an overwhelming majority. An attempt to reason with such men is absurd. The only effective way it can be done is with a sled stake across their backs. Whatever improvement we make tending to increase the quantity, quality or variety of the fruits of the earth is a direct enlargement of the comfort and well-being of our fellow-creatures.

Agriculture is Heart and Back-Bone.

Agriculture is the bone and sinew of this wonderful country. A majority of the people rely upon agriculture for their subsistence, and derive from it all the means they have of obtaining culture. Common sense would dictate, if so important, it should be the most perfectly developed branch of human industry. I think it easier to teach one how to construct the most complicated chronometer, to make and operate the magnetic telegraph, than to inculcate the rational culture of the soil, agriculture being the most difficult, and, *certainly*, the most progressive of all the sciences. No state is fully organized until agriculture has received its proper development and its importance fully acknowledged. In agriculture nearly every science could be called into requisition, either directly or indirectly, to mix in with good ordinary common sense, to improve its quality. Some king, I think it was, gave it as his opinion "that whoever could make two ears of corn grow where but one grew before would deserve better of his coun-

try than the whole race of politicians put together."

"Turnip Townsend."

This could well have been applied to Lord Townsend of England, who retired from public life in 1730, and devoted the balance of his life to "high farming." He was the "king of turnips" of England, as I am of the United States, and he originated practices that increased the products of his country not only two, but, in many cases, two hundred fold, of which the world is yet receiving benefit. Lord Townsend became so strong an advocate of the turnip that he was often called "Turnip Townsend." It took over a hundred years to establish the turnip crop in England. The farmer would not sow them; or, if he sowed them, he would not hoe them. When common sense gave them the drill, it was scoffed at as "sowing pepper out of a cruet."

Townsend had "sense" enough to see that the root crop could be made the parent of all future crops. Without them much less stock could be kept, much less manure could be made, and therefore much less of everything else could be had. The root crop secured a bare manure heap, and a large manure heap secured a large root crop. Thus "Turnip" Townsend was a national benefactor on a mighty scale, and was the cause of adding countless masses of corn, cattle, mutton and potatoes to the resources of England. When we know that it took 3 or 4 of the brightest lights of England nearly a century to cure the farmers of their prejudice against the turnip, is it any wonder that I am not succeeding better in the United States.

Men and brethren, what are you going to do about it? While the Roman farmer with all his garden-like care, was tormented with a decreasing fertility, England after ages of croping—had arrived, through the agency of the turnip to a point of over fertility.

Clover, Sheep and Potatoes.

With sheep and turnips, soils, light and sandy like those around Waupaca may be consolidated, enriched and made very valuable. In England, sheep are penned successively on every part of a field at night, compressing as effectually as any roller, the light blowing sands preparing soil that would scarcely feed a family of rabbits, for luxuriant corn crops. In this way, hundreds of thousands of acres of the boundless sands of England were turned to gardens. With roots, sheep, clover and potatoes, this county could bloom like a rose. Muzzle or kill your dogs, stock up with sheep, sow clover, raise roots and potatoes and become immense. There can be no common sense farming without good plowing. The first requisite is a good plow. There should be two good plows. I do not believe in a "general purpose plow." A strong, well trained team is essential. I keep one yoke of oxen, they are less expensive, and draw a plow with more evenness and force. The furrow slice should be no wider than can be completely turned. Not plowing deep enough is a mistake we most often find in plowing. Stiff, heavy soils, retentive of moisture should never be ploughed in the spring. Clay soils should never be ploughed deep in the spring. Next in importance is manuring. Common sense should teach us that always extracting and never replacing, will in time impoverish the soil. England has been cultivated thousands of years, and yet her soil is richer to-day than ours. Thorough drainage, a proper rotation, good cultivation and generous manuring with barnyard manure, and our soil will

increase steadily in fertility. Common sense is needed all along. The rule of breeding only from the best for dairy cows, holds good in breeding all our domestic animals.

Select Good Seed.

Corn, potatoes and our garden seeds and small grains should be from the best that grows. I do not believe it necessary that a choice potato should "run out" in a few years, if common sense was used in selecting seed and planting. Plant whole tubers from the most prolific hills and my experience is that they will steadily improve. A farm should be worked like a garden. Why spade our gardens twenty inches, and plough our land four or five in the fields? Why plant our peas four inches deep in the garden and most of them on top of the ground in our fields? Land well tilled in an unfavorable season will yield more than the same land slovenly tilled in a good season. There are principals underlying all good farming, and these must be mastered if one expects to succeed. God made the earth to produce food in abundance for man and beast, and human skill will turn wastes into gardens. Farmers must compare notes with men of science, and men of science learn the wants of the farmer. Theory and practice will in this way soonest find their true relations. No farmer of common sense will be willing to plod on as 100 years ago, but every new improvement adapted to his wants that will lighten his labor and do his work better, he will adopt at once as so much added to his capital and laboring force of his farm.

Meet Often and Compare Ways and Methods.

The farmer should meet often and cultivate social sympathy. The amount I get from my farm depends very little upon the products of my neighbor's farm. That his cows yield abundantly does not a whit lessen my own. Between his success and mine there need be no clashing. All classes should bid the farmer "God speed," from the fact that the products of their labor directly maintain their lives.

Agriculture is the base of all industry, therefore ought be on friendly terms with all and honored for the beneficient relations it holds to mankind. Have the farmers of this country used good common sense for their own protection and well being? It is universally conceded that they have not. Well, why not?

The people that settled this country came from the monarchies of Europe. In those countries the feudal system prevailed which divided the farming population into landlord and tenant. The former, though few in numbers, through the machinery of the government, possessed the wealth and power of the country. No matter what might be the intellect of the latter he must work the farm of another. He belonged to a subordinate class. From this class mostly was this country settled.

The opinion prevailed that they could not govern themselves; therefore some of the needy members of the nobility in their kindness came along over with them, to take care of them and govern them as loyal subject should be governed. Their pay for this service was fixed by the common mother across the sea.

Is there any Disgrace in Tilling the Earth?

They brought their laws and religion, their caste and their prejudices. In this country the farmer tilled his own fields, yet he was ranged in the subordinate class. Not only the official, but the lawyer, the clergy, the physician and the commercial man regarded the farmer as not of their set. The farmers led by

young farmer, George Washington, came forth to shed their blood and feed the soldiers, to carry their country through the fierce struggles of the revolution; yet as soon as independence was achieved and a nation established the farmer, by common consent, was kindly permitted to fall back to his former condition. Thus they continued for nearly a hundred years, only as one was wanted for a governor, a cabinet position, or the like.

"Speak to the Earth and It Shall Teach Thee."

Is it a disgrace to work or be a farmer? The great Carlyle said: "There is a perennial nobleness, a sacredness in work." No man is so low but there is hope for him if he actually, earnestly works. Progress can only be the reward of labor. Hence labor *is* no curse, but one of the divinest blessings. I embrace all men that work in this great brotherhood.

He who plies the shuttle at Lowell, works steel at Sheffield, stands swart and grim at the fiery forges of Pittsburg, is not one jot the better laborer than a Kane penetrating the Arctic regions, Washington, in midwinter, crossing the Delaware; Milton, with throbbing brain, defending English liberty; Payne, writing *his Common Sense*, that made rulers tremble; Tallmage, preaching at Rome or in his tabernacle; Morrison, running the Farmers' Institutes; Fleming, testing some rascal's milk; or, Hyatt, on his bended knees, in the burning sun, pulling the last root out of a Canada thistle patch—these, one and all, belong to the great fraternity of labor. Without work Adam would have tired of Eve and Paradise, and continued to have "raised cain." All growth of character, all true manhood, all noble energy, is the result of work. The true nobility of this country is the untitled nobility of labor.

"He that Tilleth His Land Shall Have Plenty of Bread."

Although the earth is a bountiful mother, and can supply all our wants with a liberal hand, we can see that a tax is imposed upon all who would enjoy her bounties. She has formed ores in the earth, fish in the sea, given to seeds their germinating principle, to soils their life-nourishing power, but she has not given us metals wrought into forms for use; she has not given us food, shelter and clothing; she has provided for no drones in her system—they are interlopers, living on the industry of others.

When this government is controlled by the highly civilized farmer an era of high social and moral development will dawn upon us. We will show the world a country where the people are governed by the people, and coming nearer filling the position an "All-wise Being" intended for man than any preceding nation. When this time comes, and come it must, human toil will be more evenly divided, many of the "middlemen" will be pushed to the outside, and ignorance and prejudice lose much of its power. The farmer's mind will be broadened and elevated, and he will realize his importance and assume places of trust and honor that have too often been given to the dead-beat and demagogue.

"As Ye Sow, so Shall Ye Reap."

There is no stopping the wave of progress that has set in. From age to age the farmer has worked on, advancing but slowly up the heights of human progress. They are yet only in the middle passage, but they are looking upwards, and we will pray God that these toiling hosts will yet stand up, the peer of kings, and all their rights acknowledged.

Brother farmer, do we fully appreciate our farms, our homes? To acquire

land, men have consented to everything, even to the seeing of their native land no more. They have bid adieu to aged parents, loved wives and babes, and emigrated—gone great distances—with the hope of some time owning land—a home.

The little Savoyard boy became a slave for ten years, that he might buy a little ryefield and a scanty pasture on the mountain. A slave for ten years!! No matter. For a few feet of vineyard the Burgundian woman has taken her bosom from her own child's mouth and put a stranger's infant to it, weaning her own before time. Thou mayest live, mayest die, my son, sayest the father; but if thou livest thou wilt have land, thou wilt not be a hireling—taken to-day, discharged to-morrow.

The Pioneer Farmers.

There are grave and gray men here to-day, who have been soldiers — the pioneer farmers. The great things that have been done by them to acquire land in Wisconsin would read like a romance; but they went to the charge and would not retreat. It was a battle of Austerlitz with them; there was no retreating. To such men the farmer of to-day owes his rugged individuality, his robust self-reliance, his strong manhood.

From such fathers have sprung our greatest jurists and statesmen; men whose wisdom is the glory of the American people, the pride of American agriculture, and as enduring as the Constitution and Union, to which they devoted their *mighty power.*

PUBLIC HIGHWAYS.

By S. L. MARSTON, M. D., Hartford, Wis.

The great problem that economists have been endeavoring for centuries to solve, is that of providing facilities for transportation with the least possible delay, waste or expense, for the various articles of commerce, from the producer to the consumer; and no part of a community can be more interested in the solution of this problem than the cultivators of the soil.

Quick Transit.

When we consider the facilities for quick and economical transportation furnished by railroads and steam ships to almost every part of the world, we are inclined to look upon the problem as solved, at least so far as our own country is concerned; for as a result of the energy of commercial activity, the whistle of the locomotive can be heard crossing and recrossing almost every county in the United States, taking from every town and hamlet their surplus products and rapidly distributing them in the markets of the world. The producer in most localities may well be content with the facilities for transportation afforded by railroads; but the great expense incurred in their construction and operation, together with the short time required for the complete removal of the products of a large section of country, make it impracticable that they run on parallel lines in very close proximity to each other; so that in transporting the products of the farm to market, there is

another factor to be taken into consideration, and that is, the common wagon roads of the country, and I cannot better illustrate the importance of this factor than by reading to you a brief statement from a Chicago paper in regard to the condition of the roads throughout the northwestern states during the present winter:

The Country Roads.

"The bad country roads never were a more impressive object lesson to state legislators than the present winter. Throughout the entire west the majority of country roads, as well as of leading county roads, have been so nearly impassible as to block almost every avenue of business. Nothing is so much needed for the comfort and prosperity of the west as good country roads. The cities suffer from it almost as much as the rural districts. The *Inter Ocean* feels the pulse of a dozen states, and every day comes the cry, "We can haul nothing to market this winter," and the country merchant says, 'We can not sell nor can we collect until the product of the farms can be moved.' The legislatures of western states should give special attention to practical work for the betterment of country roads. People cannot go on making sacrifices every open winter, and mud-bound farmers will grow discouraged." *Daily Inter Ocean, Feb.* 26, 1890.

It is in these country roads that you have constructed, and for the conditions of which, at all seasons of the year, you are regarded by many as being in a measure responsible, that you as farmers have the greatest personal interest. It is upon these roads that you frequently injure your draft animals, meet with other accidents, and waste time in your efforts to convey the products of the farm to market; but as these roads are the arteries through which the life blood from the great producing heart of the country flows to enrich the veins of commerce, all that relates to them is of immense importance to every one whether he be a cultivator of the soil, merchant, professional man or artisian; or whether he resides on the farm, in the country village or metropolitan city.

Good Roads Promote Intelligence.

The business activity and prosperity of commercial and manufacturing communities is closely related to the condition of the rural highways. When the roads are good, business is active—when they are bad, the reverse is true; and it is to these common country roads, their history, present condition and future prospects that I respectfully invite your attention. In doing this, I do not propose to confine the discussion simply to the financial aspect of the subject, for the roads of a country have much to do with the social development and culture of the people. Good public roads promote and facilitate human intercourse; and it is from that interaction of man on man, that comes the largest elements of that condition which we term civilization.

The countries of Europe that have made the greatest advancement in road building are, France, England and Switzerland. In France, the work was pressed forward with remarkable energy during the reign of the First Napoleon. It may be said of him that he was the first great modern road builder. His keen economic and military sense saw the advantage that would accrue to a people and nation from well constructed highways. He not only recognized their importance in war but perceived their relation to the development of a high civilization. Other European countries soon followed the example of France, but as a result of the local government that enters in the largest measure into the scheme of their communities, Eng

land and Switzerland far outstripped them all. It may be truthfully said of these three countries, France, England and Switzerland, when comparing their carriage ways with those of our own and other countries, that in them only does life have what may be called a free circulation.

160,000 Miles of Railway.

There are no people of any country of equal culture who have paid so little attention to the building of carriage ways as those of our own. We have built canals and one hundred and sixty thousand miles of railroads; we have improved rivers and harbors, and done many other things in the interest of commerce, but thus far we have not devised and put into practice any efficient method of building public highways. It is true that we have carriage ways; roads upon which we have toiled and wasted our substance for years, but they are as yet very imperfect ways.

I will briefly refer to some of the circumstances attending their development.

For more than a century after the first settlement of this country, the communities consisted of small, compact bodies of people, located mostly on the sea coast, or not far back into the interior of the states bordering on the Atlantic.

Westward Ho!

Then came the rapid westward extension of the population to the rich and far more inviting lands for cultivation west of the Alleghenies; and as many of you are numbered among those who, forty or fifty years ago, came to the then far west to make for yourselves new homes, you can, from personal knowledge, bear witness that the trials and difficulties incident to the settling of a new country, were so great that but little time could be devoted to road-making; that for years you were compelled to be content with such roads as the soil in its natural condition afforded, after temporarily bridging streams that were unfordable, and corduroying the swamps and marshes through which they were laid; but with an indomitable energy and a soil that produced abundantly, together with numerous cheap draught animals, you were enabled by taking the advantages of certain seasons of the year, to overcome the difficulties these imperfect roads presented to the carrying of the products of your farms to market and to accumulate wealth, notwithstanding the great tax they laid upon your industries.

The early settlers, in their migration from the Atlantic states to the country west of them, took with them to their new homes and into their social lives, the traditions, customs and forms of local government of the states in which they were bred. The communities of the New England states have always made and maintained at the expense of the people, free public highways, while Virginia, from her first settlement, has willingly placed her roads under private control, so that those emigrating from the old Virginia group of states bordering on the Atlantic to the country west of them, looked kindly upon the toll gate, and readily permitted their roads to be built by corporations, who acquired by their construction the perpetual right to embarrass the commerce of the country by a tax laid upon every vehicle that uses their improvement.

Toll Roads.

At this time the principal roads of the southern states are toll roads. On these roads the ordinary rate of toll for a vehicle that can carry a load of two tons

is about five cents per mile, or about ten cents a bushel on wheat which is transported a distance of ten miles. It has been estimated that the people of one of these toll-gate states (Kentucky), are taxed annually by these roads not less than a million dollars, an amount nearly or quite equal to the entire revenue of that commonwealth.

The burden of this toll gate taxation falls heavily upon the poor and is not without weight upon the richer part of the population. The roads are generally owned by local capitalists. Their profits go in to but few pockets, and the revenues from the investments, often relatively very great, are mostly returned to commercial people—bankers and other small capitalists who dwell in the towns. Certainly, roads so taxing the people should be good roads, roads over which heavy loads could be transported at all seasons of the year; but that such is not always the case with the toll roads of the south, is shown by the statement of a gentleman who has recently traveled over that once much used toll road from Central Kentucky to Cumberland Gap, and thence southerly to Virginia. He says that: "The roadway has been in good part destroyed by frost and flood, yet I was compelled to pay a toll of several cents a mile for passing over it, though it was necessary to take a pickax and spade in the wagon, in order to render some parts of the road passable by wheels. At times this road is blocked even to horsemen."

Retard Civilization.

It is not alone on account of the burden that toll roads impose upon the industry of the people that they are objectionable; a greater evil is their effect in limiting human intercourse to that required for the necessary commercial transactions; and I am disposed to attribute in good part the retardation in the economic development which is visible in those regions, where transportation is thus burdened, to the effect of this incumbrance.

In the toll-gate districts of our country, the people have a momentous economical problem before them; the vested rights in the toll roads are, in most cases, yearly becoming more profitable to the individual holders and a heavier burden upon the people.

Charters should not be granted for the construction of toll roads, and those that are in existence should be discontinued as such by the exercise of that right of eminent domain which is fortunately retained in the organic laws of our states.

Throughout the New England States there is scarcely a single toll road, except it be where, as in the White Mountains, ways have been constructed for pleasure traveling alone; and, as I have before stated, it is a tradition of those states that the roads shall be constructed "by the people and for the people."

New England Stock.

It is exceedingly fortunate for us that the first settlers of the northwest came from nearer Plymouth Rock than Virginia; that they were the descendants of men who once made Boston harbor a great tea receptacle rather than submit to unjust taxation; and that they foresaw in the toll-gate system of roads a perpetual taxation without representation for themselves and their posterity. The first settlers and founders of these Northwestern states were men that would not tolerate that interference with their personal rights and liberties that would result from having the roads

between their homes and their market places owned by corporations. Rather than submit to this, they would be content with the free ways they had marked out, even though they were compelled to travel them unimproved as they were; at times, through mud knee deep.

The limited means and the immediate necessities of a people settling a new country require that they economize their time and money, hence the statutes for the maintenance of public highways throughout the northern and western states were not so framed as to permit of the immediate building of roads. It was believed, however, that they would ultimately accomplish that work. That they have failed in this, I will show later on.

Straighten and Improve the Highways.

Under these statutes the alignment of the roads, as we at this time find them, have been made, and in some localities it is very satisfactory; the roads centering, as they do, in nearly direct lines from the different points of the compass toward the railroad stations, and in reasonably close proximity to each other; but in other localities, especially where there has been manifested an unyielding disposition to make the roads follow section and quarter lines regardless of the topography of the country, and the increase of distance to be traveled to the station in order to preserve the square or oblong contour of farms, there is much room for improvement. In many places crooked roads should be made straight, while in other localities, where they pass over sharp hills or soil unsuitable for their construction, they should not be permitted to remain straight when a little divergence from a straight line would remedy the difficulty. The rights of the individual are secondary to the rights of the public, but private property cannot be taken for public use without a just and equitable compensation.

The statutes framed for the maintenance of public roads in the west, with the exception of our state, Indiana (where the road taxes are paid to the state in cash or its equivelant, good and faithful labor), are the statutes with but little change that are in force to-day. They provided that the roads of a town be subdivided into roads districts, and the taxes be levied to maintain the roads of each district upon the property of the district, to be paid in labor on the roads of the district in which they were levied, under the direction of an officer, to be chosen annually from among the residents and tax-payers of each district, to be known as the overseer of highways, Statutory provisions have also been made permitting appropriations of money from the town treasury to certain districts in which the taxes levied for road purposes are not sufficient to make and maintain passible public highways.

Present Laws Impracticable.

Taking a brief retrospective view of these statutes, we will first notice the impracticability of making an equal taxation or distribution of labor as a consequent of the arbitrary division of the roads of the town into districts, and the requiring of the working of the road taxes in the districts where they are levied.

In districts whose topography is favorable for road making, the most valuable farms are to be found upon which to assess road taxes; but the amount of labor required to keep the roads in repair in such districts is much less than in districts that may be, and not infrequently are, situated between them and their market place; districts where the

roads pass through swamps and marshes, or over hill land in which the farms must necessarily be far less valuable and less profitable than in the more favored locality, that is, relatively free from swamps, marshes and hills; so that the residents of districts in which the roads require much labor to maintain them in passible condition, and who are the least able to devote time to road work, have vastly more labor to perform than their more fortunate neighbors who are equally benefitted by the improvements that may be made. The same inequality that exists between districts, exists in a larger sense between towns.

It is true that provisions have been made for the appropriation of money from the town treasury for the accomplishment of work in districts where a sufficiently large road tax cannot be levied to make and maintain passible highways, but the rule has been that such appropriations have not been sufficiently numerous to attract much attention, except it be in instances where large streams have been bridged at the expense of the town. Frequently, the improvements that should be made, and for the making of which, districts require help from the town treasury, are so located that a majority of the people of a town feel that they have no personal interest in them, and decline to vote a sufficient amount of money to accomplish the work. Under these circumstances the burdened district must continue to toil on in its own interest and in the interest of the people of other towns, and if not in the immediate interest of the whole, in that of a large majority of the people of the town of which their district is a part. In the meantime, all whose immediate interest demand that the roads should be made and maintained in a passable condition, are compelled to take long and circuitous routes in carrying their products to market.

Highway Commissioners.

In these statutes it is provided that the districts should not only furnish the labor for improving the roads, but that they should also furnish road masters or overseers of highways, under whose direction the labor is to be performed. There has been no difficulty in complying with the first requirement of the law. Men who can perform labor are quickly forth-coming when legally called upon to do road work, but to find the man within the bounds of a district who possesses that scientific and practical knowledge of road making that is requisite in order to skillfully, economically and properly direct labor, and qualify him for the responsible office of overseer of highways, is in most districts an insurmountable difficulty, so great indeed, that considerations of this kind have had but little bearing in the selection of this officer. It has been taken for granted that the presumption of the law that any resident of a road district who may be elected at any annual town meeting, to the office of overeeer of highways, is fully competent and every way qualified to discharge the duties of that office, so that we find that there are but few individuals who have been continuous residents of districts for twenty years or less, who have not been overseers of highways. It seems to have been a custom to let the office go around until every resident of the district has had the doubtful honor of trying to fill it, so there are but few districts who have not had twenty or thirty or even forty different overseers during as many years; and it frequently happens that the most competent man in the district

is displaced by one that is incompetent and good work that is done one year is undone the next.

Under these statutes our highways have reached their present stage of development. Notwithstanding their imperfections, something has been accomplished. In localities where people have contented themselves with providing for the drainage of the soil over which the road is laid, with hauling gravel upon the road bed, and reducing the sharp declivities of hills together with removing stone, both large and small, from the road track, perhaps all has been done that could have been done under the law; but as a general rule in most of the road districts of our state, the common roads are constructed and maintained in the most ignoront and inefficient manner.

The Present System a Farce.

In no other phase of public duties does the American citizen appear to such disadvantage as in the construction of roads. He in unwilling to admit that the impost upon his labor for road maintenance is a tariff and not a tax; he rather regards it as direct taxation, and this he has a great indispositisn to endure, and hence works on the road grudgingly. He knows that with the improvement of the highways, the value of his farm property is relatively increased, but his ambition to accumulate wealth does not lead him in that direction. He has not the time to spare for road work. This, together with his indisposition to acquire the necessary engineering skill, greatly disqualifies him as a road maker.

Cicero tells us that "it is the first and fundamental law of history that it should neither dare to say anything that is false, or fear to say anything that is true, nor give any just suspicion of favor or disaffection."

Bearing in mind this teaching of the great orator, let us look into the horoscope of the past and take a cursory glance of ourselves as we appeared from year to year in the capacity of road makers, even though we have to admit with the imigrant from Erin's green Isle, that,

"I was niver much given to road work,
It wasn't a gift of the Bradeys."

Working (?) on the Road.

At an appointed time, generally in the month of June of each year, the voting population of the several road districts assemble on the highways with teams, ploughs, scrapers, hoes, spades, shovels, etc., at places designated by the overseers, to work out the annual road tax, and ostensibly for the purpose of repairing and improving the roads. Arriving on the ground, generally a half hour late, they proceed to discuss the general subject of road making and other matters of public concern until some one with a troubled conscience looks at his watch and admonishes them that time (which they all remember is the equivalent of money) is flying. They are then divided into squads and distributed along the highway, and as the overseer is not omnipresent, commonly some elder of each squad is by common consent absolved from labor and made superintendent of operations. They then with much deliberation, commence to take the loose soil and mud from the road side ditches, if it so happens that the way has been ditched at all, and with it fill up the ruts and plaster the surplus upon the center of the road. Teams, ploughs and scrapers are brought into requisition, and the soil whether it be loose and porous, or clay, is scraped or hauled on wagons into the cradle holes or sloughs,

and into the center of the road in a general way. Sometimes brush is cut and laid upon the road in places previous to scraping on the clay or loose soil, all of which gives very frail support to the wheels of loaded wagons. In some localities at times gravel has been placed upon the loose soil of the road bed. This is commendable, but the successor of the overseer who may direct this, may subsequently, perhaps the next year, cause the whole to be covered with clay a foot deep.

Mr. Robert Fargo, of Lake Mills, in a paper read before the farmers institute held in that place, made this statement: "Not a mile from this hall not long since, the overseer covered a good gravel road with clay from either side, making it, later on, impassable for a load, and the public were forced to take another road into town." This is not a solitary case. Such work is not uncommon, and it is an illustration of the fact that good roads do not come by chance, but are to be intelligently constructed upon correct scientific principles.

They Make the Roads Impassable, and Should be Fined.

In some localities, where the soil is sandy, it is not infrequent for these road-makers to plough on either side and, with the scraper, round up the road track, thus preventing the conservation of moisture by destroying the best part of the road, that which is partly grass and bush grown, and making the road almost impassable in times of drought. Whatever tends to hasten the drying of sand should be avoided as much as extreme wetness in the case of clay. Two or three days or more, having been devoted to this kind of work (at a season of the year when labor upon the farm is almost invaluable) and the road tax having been worked out, each man having been credited at the rate of one dollar an fifty cents for each day's work of eight hours, and those who furnish teams and tools having been credited at the rate of one dollar and fifty cents for each team, fifty cents for each wagon, and twenty cents for each plough and scraper, the roads are said to have been repaired and put in such a condition that no further repairing will be necessary for a year. But not being quite content with their work, and not fully recognizing the fact that the whole four rods width of the road are for the uses and benefits of the traveling public, they proceed to trespass upon rights and privileges by placing obstacles to travel, such as stone, small logs, rails, brush, etc., upon each side of the road track, so as to compel the intelligent and humane traveler—who, for his own comfort and the ease and comfort of his horses, would find his way along the road side—to travel upon the heavy, tiresome and uncomfortable track they have made for him. A greater objection to these obstructions to the free use of the public highways, is that they are sources of danger, especially in the night, and serve no useful purpose. And now the overseer, who, apparently had not learned the first lesson of roadmaking, together with the time-serving crowd, whose chief desire seems to have been to get the road tax out of the way, leave the highways, but unfortunately to return again at the end of twelve months.

Millions of Dollars Wasted.

I say unfortunately, and I speak advisedly, for not less than ten million dollars have been worse than wasted in the state of Wisconsin within the last twenty years in hauling into the roads mud or the material to make it.

I know you are asking: "What is the remedy?" We will consider that later on; but now having given a description as to how the roads have been repaired, I will say a few words in regard to the condition in which they are left. In doing this, it is only necessary to refer in a general way to your own experience and that of the traveling public. You, as farmers, having full knowledge of the time when the road repairing is to be undertaken, generally arrange to have all the hauling that it may be necessary to do on the roads done prior to the annual road picnics, for you have learned that it is not until the summer and fall rains have in a measure undone the work, by washing the mud and loose soil from the track, or rather until nature has by a process of reconstruction remedied the damage done, that you can with ease transport any reasonable load to or from the market place. The experienced traveler, if possible, always avoids these freshly repaired roads. He prefers to take a circuitous route, even though the distance be greatly increased.

We have no reliable data upon which to estimate the cost to the public, arising from our present ineffective road ways, but if we include with the waste of time and money expended in road repairing, which amounts to at least one-half of the road tax assessed each year, the loss of time and transportation power of vehicles, the wear and tear of wagons and carriages and the beasts which draw them, it is not improbable that the expenditure will be found to be greater than the amount that is annually required to pay all the taxes assessed against you. It will not average less than twenty dollars per annum to each farmer.

After 40 Years' Patient (?) Work.

For more than forty years the people of the state of Wisconsin have continued to annually work out their road taxes, as required by law. During that time they have expended in this work vast sums in time and money. There are but few towns in the more thickly settled part of the state that are not assessed annually two thousand five hundred dollars road taxes; these taxes represent so much solid cash, and that better results have not been obtained by its expenditure for so many successive years, is due in a great measure to the fact, that under our system of management a sufficient number of men possessing technical skill and special knowledge of road-making, have not been placed in charge of the work.

The numerous matters that demand consideration by overseers and all engaged in road construction, are of such extremely varied nature, that I cannot discuss them at length at this time. I can only indicate in a general way some of the factors in the problem to be solved, but before doing this, I will direct your attention to what constitutes a good carriage way. I do not mean how such a way is to be constructed, but rather what are its external appearances, when constructed, and what its capabilities of endurance. First, it should be level; and, second, it should present a wheel and foot bed that is lasting, that cannot be disturbed in any climate at any season of the year by the oscillating motion of the wheels of heavy vehicles, or by the iron shod hoofs of the domestic draught animals that are used to transport heavy loads.

Let Us Have Trained Men—Skillful Engineers.

It is true that you cannot build perfect roads being handicapped in every effort in that direction by laws that are framed for road repairing and not for

road building; yet you can in a measure, imitate their essential features, and in order to do this, careful consideration should be given to three important factors of the problem of road construction, together with a careful study of all the multiplies of these factors. You should consider first, the character of the surface over which the roadway is projected, which includes not only the nature of declivities but the character and variable constitution of the soil and sub-soil; second, the form and action of the vehicles that are used in transporting loads, and third, the work done through the feet of draught animals. The deductions that you will make from a careful study of these basic facts will not permit of the disturbing of a hardened road track in which the roots of all vegetation have been destroyed and the soil, by long use, has become impacted to such a degree that it is in a measure impervious to water by ploughing or otherwise, but will require that in the repairing of such a road track, or in the bringing it up to a proper level that suitable material (not loose soil from the road side) but gravel or something better if possible be used. If gravel is used, it should be of a somewhat limey nature, for in this kind of gravel, a natural process of cementation goes on whereby the mass becomes very firm.

In dealing with clay roads, either on high or low ground, you will appreciate the necessity of deep ditches each side of a road track, which should be of no more width than is imperatively necessary for the uses of the structure. From these ditches others should be cut in such a way as to keep the side ditches constantly drained to the bottom. The ditches should extend to a depth which will maintain the crown of the road two feet above the water level.

Good Drainage Necessary.

It is only by effective drainage that clay roads can be made into passable ways at wet seasons of the year. The grains of which clay is composed are so fine that they hold considerable water between them by capilary attraction; the contained water expanding when it freezes, pushes the particles asunder and destroys all the adhesion which tended to grow up between them; the result is that in the spring of the year, its loose texture, the spaces for the storage of water having been increased by the expansion of the ice, it is incapable of bearing up the wheels of a vehicle, and the clay when cut by the edges of the wheels, quickly slips around and grasps the spokes and felloes, and creates so great a resistance that it is very difficult for a strong team to draw for any considerable distance an empty wagon over the road.

Upon clay roads, even though they be well drained, an artificial surface should be constructed. To accomplish this with timber or stone is expensive and you will resort to the mingling of some cheap binding material with the clay to prevent that slipping of its particles which would result from the sheering strain of wheels. To accomplish this end, various materials have been used; the cheapest and least serviceable is the repeated covering of the road bed with shrubby vegetable matter, the finest branches of trees, the leaves of pine and even rushes have been used to advantage. In northern Minnesota, a material is used called excelsior, which is strip-like shavings cut by machinery from blocks of wood, and is reported as serving admirably to prevent the motion of the clay, but more permanent and far better results will be obtained by using gravel or shale. Whatever material that may

be used should be commingled with the clay and in the proportion of one-half and extend at least a foot below the surface.

Sandy Roads.

If you are the resident of a district in which there are sandy roads, you have found them to be in the best condition during rainy weather, and at seasons of the year when clay roads are almost impassible, and the reverse is true. At seasons of the year when clay roads may be regarded as excellent, sandy roads will be found to be in a very incoherent state. The explanation of this is, that as long as the sandy soil contains a certain quantity of water, the grains, owing to their general irregularity, are held face against face as bits of glass are when their several surfaces have a little water between them. Sand of an angular character is thus pretty well bound together when wet, but when dry the adhesion is destroyed and the particles are free to slip by each other when the wheel presses upon them. It is apparent that the principle object in the maintenance of this class of roads should be the conservation of moisture. There should be but a single track with occasional places for teams to pass. This track may be improved somewhat by the intelligent use of a little clay. The growth of plants and shrubbery should be encouraged along each side and in close proximity to the track. Shade trees that have heavy foliage should be planted on each side of the road; they will not only tend to prevent the evaporation of moisture, but their leaves falling in the road track will be of some utility.

In all your efforts to make a hard and durable road by mixing material with the sand upon the surface, you will probably meet with the same disappointment as the man of old, who built his house upon the sand.

None but skillful engineers with ample means at their control can build perfect roads; fortunately, for them, sandy soil is not an unsurmountable obstacle. Wherever hills may occur in a roadway it will not be erroneous to cut them down, even to the level of the road track on either side, and if they are of a gravelly nature (and the roads are not sandy), to distribute the material along the road bed throughout the district. Where the roads are laid over gravelly soil, you will not trouble yourselves to haul clay or sand to make an artificial surface.

Our Civilisation Demands Better Roads.

The essential features of such a roadway as the wealth, necessities and culture of the people demand, is that it should be level or of easy grade; that the road bed should be constructed upon a firm foundation and of solid compact and indestructible, material such as gravel and stone; that it should be equally serviceable at all seasons of the year. It is claimed that the building of such a road is very expensive, and that it would burden the people with heavy taxes. In considering this question, the expense of building, their durability should be taken into consideration, and due recognition given to the fact, that when completed but little will be required to keep them in repair, and that in the long run, they will be more economical than our common roads. The expense of constructing such a road has been greatly diminished within the last two decades by the invention of stone crushing machinery. The process of preparing stone by hand-breaking as was formerly practiced, has now become obselute. Blakes' stone crusher, or a

modification of it, moved along the road from place to place and operated by means of a portable engine, does the work with great rapidity and with comparatively little expense. The cost of grading and constructing double track roads, one of stone and the other of gravel, under the direction of skillful road masters throughout the greater part of the state of Wisconsin, will not much exceed two thousand dollars a mile, and as the average number of miles of road in a town is about thirty, the cost would be equal to sixty thousand dollars to each town, which sum if raised on the twenty-three thousand and forty acres of land that constitute a township, would be a pro rata of two dollars one and seven-tenths cents per acre, and as there can be no question but that such an improvement would more than double the cash value of every acre of land in a town, it cannot be regarded otherwise than as a good investment. In order that taxes might not be burdensome, many years should be taken for the accomplishment of the work.

What Have You to Show For All Your Work?

A sum equal to the taxes that have been levied from year to year for road purposes would accomplish the object in a reasonable length of time, were it paid in cash and its expenditure intelligently directed.

The amount annually assessed for road purposes will average twenty-five hundred dollars to each town; this would accomplish the work in twenty-four years, and could the amount have been saved that has been wasted during the past twenty-four years in useless road work, it would have accomplished it in forty-eight years and probably in much less time. A sum equal to the amount of the losses sustained annually by the farming communities and all the various business interests of the country in consequence of bad roads, would undoubtedly accomplish the work in considerably less than five years.

Time has demonstrated that road districts and towns cannot check this waste or build such roads; neither can it be done by the weak government of our county system. All the attendant circumstances connected with the building of a vast system of roadways, together with the nature of the work to be accomplished, will require that all existing statutes relating to roads be repealed and laws enacted for road building, and the work placed in charge of the state, which has the power and the means adequate for the purpose.

Highway Taxes Should be Cash.

Your road taxes should be paid into the state treasury, and it might be left to your option to pay them in cash, or in obligations to perform good and faithful labor on the highways, under the direction of the state. But you, as farmers, should be relieved in part of the burden of making country roads. Railroads and all other corporations and all that own taxable property in cities should be taxed equally with you for their building and maintenance. The consumer is equally interested with the producer in diminishing the expense of the transportation of products and should aid in accomplishing this result. The churches could not consistently object to a road tax being levied on their properties, for there are but few human agencies that present greater hindrances to a growth in grace and in a knowledge of the truth than bad roads.

A State Road Commissioner.

In regulating and directing the ex-

penditure of money for road construction, the state would be controlled by the same business principles that are practiced by corporations in the building of railroads and other extensive works. There should be a state road commissioner; one will be sufficient, for the multiplication of offices complicates the governing machinery and brings confusion and inefficiency. He should be elected every two years and be held responsible to the people for the proper and economical expenditure of their money. There should be a corps of engineers selected by its chief, who should be appointed by the governor and confirmed by the senate. This being done and proper legislation made in regard to the apportionment of road money to different localities, the work of road building, together with the maintenance of roads in a passable condition until the work is completed, should be commenced simultaneously at every railroad station, and such other localities in the state as may be determined by the road commissioner or fixed by law. Revenue from other sources than the direct road tax might be used for carrying on the work. The large sum that is due the state from the general government on account of war taxes could not be better used than for this purpose.

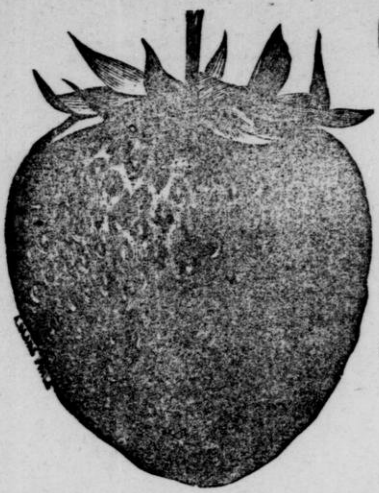
Numberless Advantages.

The carrying on of such a system of public improvement by the state would inure in many ways to the advantage of the communities. The monies that would be collected of them for road taxes would be expended in their midst, and would mostly return almost directly to their pockets for the products of their farms and workshops; work would be given to the unemployed, an impetus to business of all kinds and a general prosperity would result.

The most enlightened people in the world are those of our country; in the arts and sciences, in social and political economy, in civil and religious liberty we lead all others, and as the history of civilization is the history of good roads, I have no hesitation in saying, notwithstanding the wise admonition of Hosea Bigelow to "never prophesy unless you know," that the roads of our country in the near future will be good roads and free to the public; that they will be constructed upon the most approved method of road building, and will as far excel the roads of to-day as do the paved streets of our modern cities.

The Age Demands Better Roads.

This progressive age will not much longer tolerate roads that interfere with the regular transaction of business at any season of the year. The twentieth century, the sun of which is already beginning to dawn in the east, will relegate them among the roads of the past. Political economists are proclaiming loudly that every impediment between the producer and the consumer should be removed, and some of them claim to have discovered impediments that are not visible to other eyes than their own; but it requires no study of political economy or mental philosophy to discover and fully comprehend the hills and hollows and mud in the time-killing, the property and life-destroying roads, over which the farmer is compelled to transport his products to market.



COE & CONVERSE,

NURSERYMEN

—AND—

Fruit Growers

FORT ATKINSON, WIS.

Small Fruit Plants, Grape Vines, Fruit Trees, Ornamental Trees and Shrubs, Flowering Vines and Bulbs. Seed Potatoes.

Fresh Fruits in Their Season.

EVERY family that occupies a piece of land, whether a two rod garden or a thousand acre farm should grow fruit. We mention a few of the leading varieties that are easily grown, hardy, productive and every way good and reliable:

STRAWBERRIES—Jessie, Bubach, Warfield, Haveland, Wilson, Crescent, Park Beauty and many others.

BLACK RASPBERRIES—Tyler, Souhegan, Ohio, Nemha and Gregg. The new black raspberry Older's Seedling beats them all. See our catalogue for description.

RED RASPBERRIES—Brandywine and Cuthbert. Shaffer's Colossal:—A red raspberry that does not sucker but grows like a Black Cap.

Improved Dwarf Juneberry.

BLACKBERRIES—Stone's Hardy, Snyder and Ancient Britton.

GOOSEBERRIES—Houghton, Downing and Industry.

CURRANTS—Red, White and Black.

GRAPES—Moore's Early, Worden, Brighton, Niagara and Concord.

We also have Fruit and Ornamental Trees, Roses, Flowering Shrubs and Vines, Bulbs, Etc.

Progressive Farmers find it pays to change their Seed Potatoes frequently. We are making a specialty of growing choice varieties for seed.

Send for one of our Catalogues which tells all about the varieties of Plants, Trees, Shrubs, etc., that we have to sell and give prices on them. We will be glad to send it to you free, and should like to correspond with you if you find anything in it you want.

COE & CONVERSE,

FORT ATKINSON . . . WIS.

Uihlein Bros. Stock Farm

TRUESDELL, WISCONSIN.

ALCAZAR.

OWNED BY UIHLEIN BROS.

Record 2:30½; foaled 1883. (Sire of Mista, 2:29 at two years; Reverie, **2:38 at one year.**) **Lopalin, 2:29, Kebir, 2:22. Zola Zar 2:37 2yrs. BY SULTAN (sire of 24 in the 2:30 list): dam Minnehaha (dam of Sweetheart, 2:22¼,) (dam of Redheart, 2:29½ at three years;) Eva 2:23½ Alcazar, 2:20½; San Gabriel, 2:29¾, Beautiful Bells, 2:29½, who is the dam of Hinda. Rose, 2:19½ at three years; Bell Boy, 2:26 at two years; St. Bel, 2:24½ at four years, Chimes, 2:30¼ at three years; Palo Alto Belle, 2:28½ at two years). second dam Nettie Clay by Cassius M. Clay 22. Limited to 30 public mares at $400 the season.**

MARVIN 11359.

Record 2:28¼ at four years. By ELECTIONEER (79 in the 2:30 list); dam Bright Eyes (Sister to Prussian Boy, 2:26¼) By Gen. Benton (15 in 2:30 list); second dam Prussian Maid, 2:19¼, by Signal (4 in 2:30 list). $100 THE SEASON.

ALENCON 9342.

Record 2:39¼. By LORD RUSSELL (brother to Maud S., 2:08¾, 6 in 2:30 list); dam Alice West record 2:26 (dam of Altumara, 2:30 at three years) by Almont (37 in 2:30 list). $100 THE SEASON.

MANIPULATOR 9341.

Record 2:37 at four years By NUTWOOD, record 2:18¾ (sire 50 in 2:30 list); dam by Hetzel's Hambletonian (brother of Volunteer 55); second dam Julia B. (dam of Woodburn Pilot, 2:23¼ by Woodford Mambrino (12 in 2:30 list);third dam Bruna (dam of Romance dam of Farce, both in 2:30 list) by Pilot Jr. (sire of 9 in 2:30 list) by Pilot Jr. $50 THE SEASON,

GOGEBIC 8556.

Record 2:42. By RED WILKES (50 in 2:30 list); dam by Brown Dick; second dam Kate Smith (dam of John R., 2:28) by Spalding's Abdallah. $50 THE SEASON.

KING PIEDMONT 10938.

By PIEDMONT, 2:17¼ (sire of 9 in 2:30 list); 1st dam Daisy C (dam of Del-Paso 2:24.) By Electioneer (79 in 2:30 list); second dam Daisy D (dam of Millard 2:23): by the Moor (6 in 2:30 list); third dam Gray Dale (dam of Longworth, 2:19,) by American Boy. $50 THE SEASON.

ELECTRIFICATION 10982.

By ELECTRICITY, record 2:17¾ (son of Electioneer, out of Midnight; dam of Jay-Eye-See, 2:10; Nootide 2:20¼); dam by Del Sur, record 2:24 (sire of 2 in 2:30 list); second dam by Clark Chief 89 (sire of 6 in 2:30 list). $50 THE SEASON.

Free return privileges in 1892 if mare proves not in foal. Young stock by the above and other stallions out of great mares for sale at reasonable prices.

UIHLEIN BROS.,
Milwaukee, Wisconsin.

HENRY LAUGHLIN, Superintendent.
Truesdell, Wisconsin.

ASHTON'S SALT

Is the Only Salt fit for use in the making of the

Best Butter and Cheese.

It is poor policy to use anything but the best. CHEAP SALTS ARE POOR SALTS. Don't imagine that you are going to

SAVE MONEY

By getting low cost Salt.

Ashton's Salt

Costs but a trifle more than others.

1. Goes much farther than any other.
2. Gives butter and cheese a better flavor.
3. Adds its weight to the product more than other salt.
4. Does not wash away in the butter working.
5. It is free from lime, which all other salts contain in abundance.

The makers of the finest butter and cheese in the United States use ASHTON'S SALT. It has been the best Dairy Salt for Sixty Years, and its equal has not yet been found.

ELGIN, ILL., Dec. 15, 1890.

MESSRS. F. D. MOULTON & CO., NEW YORK:

Gentlemen:—We are going back to Ashton Salt. It has been a long road since we left it, but the turn is short. Lower prices for butter year after year, have compelled us with other factorymen to look about for cheaper supplies, and we have used at different times probably every brand of so-called dairy salt in the market, including Gene-ee and M. S. A. As a resu t of our experience we are convinced that we were mistaken in our ideas of economy and that only the BEST is the cheapest.

Want of uniformity and reliability as evidenced more especially in a failure to preserve and keep butter intended to be held, have at last forced us to abandon the use of what we believe to be the best of American salts, and go back to Ashton. We want a salt that will hold up butter, and keep and preserve it, and we know that yours will. So you may send us a car of large sacks at your earliest convenience, and make the price as low as you do to anybody.

Yours truly,

THE ELGIN BUTTER CO.,
W. H. HINTZE, President.

SIOUX CITY, IA., Feb. 17, 1891.

MESSRS. FRANCIS D. MOULTON & CO NEW YORK CITY.

Gentlemen:—If you will persist in selling such good salt you need not be surprised if your old friends go back to you. The facts are that we were offered Genesee salt, some time ago, coupled with strong statements as to its quality, and as it was lower in price, we decided to buy some of it, but we have had enough, having satisfied ourselves that we actually make money by paying the difference in price for Ashton's. We are satisfied that your salt will give our butter a better flavor, cause it to keep longer and with freedom from impurities, and being a natural grain, dissolves readily, and makes butter weigh more than the cheap salts. You have such a good salt, that it gives me pleasure to tell you frankly just how we feel. We feel that it is most profitable to make the highest grade of butter, and to do so we must have the best salt. We know that you control all of the Ashton Salt that is imported to America, and we must trust you in the future to give us your lowest prices, as we shall not use any other salt if it is offered as a gift.

Please ship us at your earliest convenience two car-loads, same size sack that you used to send us.

Yours truly,

HANFORD PRODUCE CO.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

Electric Lighted and Steam Heated Vestibuled Trains, with Westinghouse Air Signals, between Chicago, St Paul and Minneapolis, daily.

Through Parlor Cars on day trains between Chicago, St. Paul and Minneapolis.

Electric Lighted and Steam Heated Vestibuled Trains between Chicago, Council Bluffs and Omaha daily.

Through Vestibuled Sleeping Cars, daily, between Chicago, Butte, Tacoma, Seattle, and Portland, Oregon.

Solid Trains between Chicago and principal points in northern Wisconsin and the Peninsula of Michigan.

Daily Trains between St. Paul, Minneapolis and Kansas City via the Hedrick Route.

Through Sleeping Cars, daily, between St. Louis St. Paul and Minneapolis.

The finest Dining Cars in the World.

The best Sleeping Cars. Electric Reading Lamps in Berths.

6,100 miles of road in Illinois, Wisconsin, Northern Michigan, Iowa, Minnesota, Missouri, South Dakota, and North Dakota.

Everything First-Class.

First-Class People patronize First-Class Lines.

Ticket Agents everywhere sell Tickets over the Chicago, Milwaukee, and St. Paul Railway.

Chicago, Milwaukee, & St. Paul Railway Co.

GENERAL OFFICES:
160-172 Adams St., Chicago.

Industrial. Department.

The Chicago, Milwaukee & St. Paul Railway Co. invites manufacturers, wholesale houses and jobbers to settle on its lines.

Its Industrial Department is conversant with the resources, water-powers, advantages and facilities of the territory through which the lines run, and disseminates information concerning same. It cooperates with organizations seeking the advancement of cities and individuals interested in the development of natural resources. Eastern manufacturers contemplating a removal to western points nearer the actual field of consumption of their product; or companies desiring to embark capital in Western industry, will be cheerfully supplied with information relative to the adaptability of localities to their particular requirements. The information furnished is absolutely reliable and has a practical bearing on the nature of the particular industry. Inducements such as free sites, bonuses or removal expenses offered by active Western points, with the view of inducing factories to locate, are becoming more and more rare. In the course of a few years they will altogether cease, because of the absolute merits of the West.

The Chicago Milwaukee & St. Paul Railway Co., one of the greatest railway systems in the world (operating over 6,000 miles of road), runs through a vast territory rich in all the resorces and advantages that insure industrial success.

The Iron interests on the line will bear immense development. Large tracts of Hemlock bark will supply all the tanneries in the United States. Parties owning forests of hardwood offer concessions to furniture factories that would locate; the lumber interests are great.

For further particulars relative to industrial advantages on the line, address

LUIS JACKSON, Industrial Commissioner.
C., M. & St. P. R'y, 160 Adams St., Chicago, Ill,

GEORGE WYLIE,

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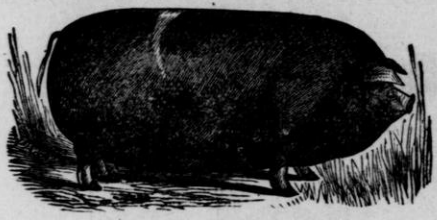


POLAND CHINA SWINE.

—SPECIALLY BRED FOR—

MUSCLE, BONE, CONSTITUTION AND EXEMPTION FROM DISEASE.

—ALSO—

SHORT HORN CATTLE.

STOCK AS GOOD AS THE BEST, AND PRICES ALWAYS REASONABLE.

COME AND SEE THE STOCK.

GEO. WYLIE,

Columbia County. LEEDS, WIS.

Babcock Milk Test

—— :: WITH :: ——

ROE'S IMPROVED SWINGING HEADS.

The Simplest, Most Compact, Most Convenient,

Most Accurate Milk Test on the Market.

FOUR SIZES OF HAND MACHINES

—— FOR ——

4, 8, 12, and 24, Bottles.

TWO SIZES OF MACHINES FOR BOTH HAND AND POWER

FOR 12 AND 24 BOTTLES.

Our 12 Bottle Machine for Hand and Power is large enough for the largest creamery. Will make as many tests per hour as any other machine made.

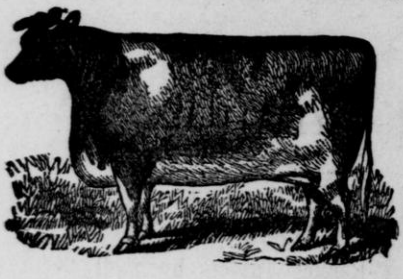
For full description and prices of these machines and anything else wanted in the line of Butter and Cheese Making Supplies or Apparatus, write

D. H. ROE & CO.,

54, 56, 58 and 60 No. Clinton St., Chicago, Illinois.

ALEX. A. ARNOLD,

Eastville Farm, Galesville Wis.,



BREEDER OF

SHORT-HORN CATTLE

—AND—

BERKSHIRE HOGS.

RECORDED CATTLE

—AND—

REGISTERED HOGS

OF ALL AGES AND SEX, CONSTANTLY ON HAND.

Stock Kept Constantly Thriving,

BUT NEVER PAMPERED.

MILKING QUALITIES MADE A SPECIALTY

IN BREEDING SHORT-HORNS.

The Short-horn is standard for beauty and utility and the most valuable breed for the average farmer.

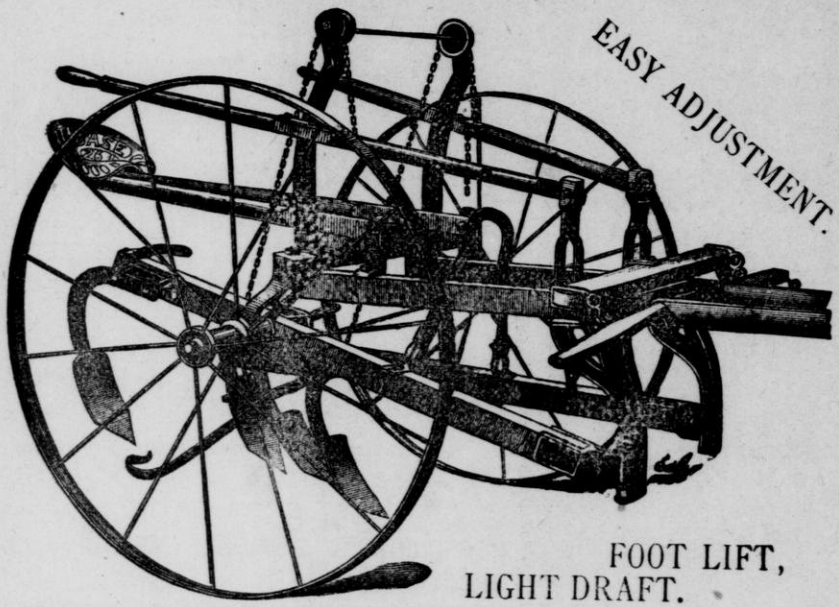
The Berkshire is also the standard hog, and weighs when mature, about 500 pounds, it furnishing, when ready for market, the best pork of all breeds, for the reason that the skin is thin, the bones firm and comparatively small, with more muscle or lean meat than any other breed. They mature early, are good mothers, prolific breeders, and when crossed on the large breeds produce best results.

COME AND SEE THE STOCK.

Correspondence Solicited.

A. A. ARNOLD,
GALESVILLE, WIS.

"OLD RELIABLE"

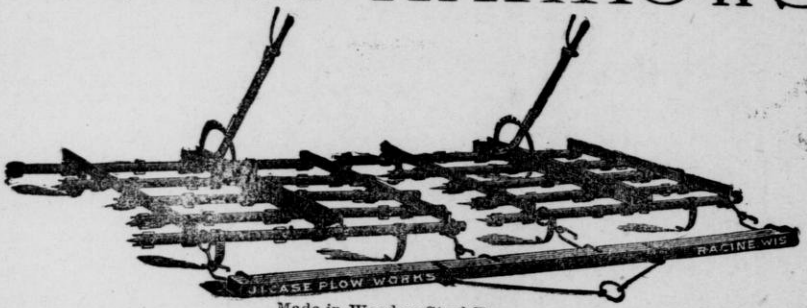


EASY ADJUSTMENT.

FOOT LIFT,
LIGHT DRAFT.

Furnished with Four or Six Shovels, also Spring Teeth Gangs.

LEVER HARROWS



Made in Wood or Steel Frame.

This illustration shows the STEEL FRAME LEVER HARROW resting on the Shoes. This device is used only on the CASE. To appreciate it one should use the Harrow through a season and they will realize how much hard work it saves.

SOME POINTS TO REMEMBER.

The Case Lever Harrows will pass over any obstruction, as all Cross Bars are on top; Levers are in center of Sections. Teeth can be adjusted to any angle by the Levers. Can not be clogged, as the Bars are free on the under side. Not even Washers on the Teeth to obstruct it. It is a labor-saving and time-saving implement, made entirely of Steel and Malleable Iron. Can never be worn out. It is finished and fitted so that it is an ornament to any farm. If you buy one you will never purchase another Harrow, as it will last as long as you live.

If you buy the CASE, you will have the best.

Manufactured ONLY by **Imitated by Many; Equalled by none.**

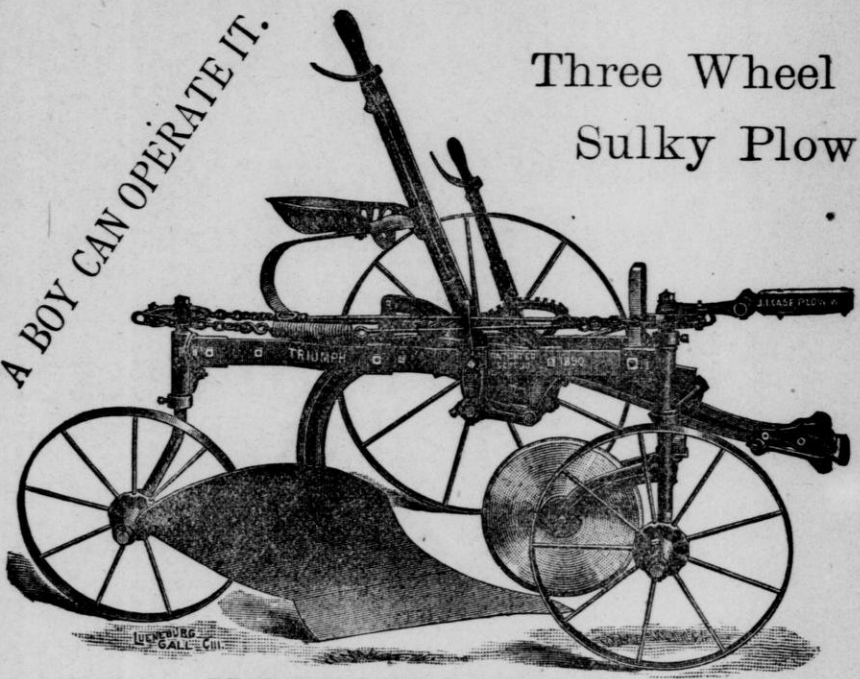
J. I. CASE PLOW WORKS,
Racine, Wisconsin.

(Mention "Farmer's Institute Bulletin," when writing to Advertisers.

Triumph Conquers All.

A BOY CAN OPERATE IT.

Three Wheel
Sulky Plow



READ WHAT THE FARMERS SAY.

Hartley, Ia., June 9, 1891.

J. I. CASE PLOW WORKS, Racine, Wis.

GENTLEMEN:— I Purchased of your agents Webster & Wesser of Hartley, Ia., one of the first Triumph Sulky Plows sold by them; have used it two seasons along side of the ——— (*we omit the name af our courtesy to our competitors, it is not our purpose to single out any one. We claim to triumph over all*) and are free to say that I know it to be far superior to it or any other sulky plow made for the following reasons: Because it draw lighter, will level from heel to point at any depth, handles easier, has more and better adjustment and in fact does the best work of any sulky plow made I remain,

Yours truly
H. M. SHIRK.

Racine, Wis., June 17, 1891.

J. I. CASE PLOW WORKS, RACINE, WIS.

The Triumph Sulky Plow I purchased of you last fall is giving me the best of satisfaction. I use two horses on it with a sixteen inch bottom, and to test the draft followed the sixteen inch Triumph with fiifteen inch walking plow and each cutting and turning the same depth of furrow, the walking plow being one inch narrower cut. And am satisfied that the sulky drey fully as light as the walking plow, which as stated, was cutting one inch narrower, depth the same. And for ease of handling and adjustment is entirely satisfactory and can recommend it to any one as a plow that will give entire satisfaction. Yours truly,

WM. E. LEWIS,
Western Union Junction, Wis.

Shamrock, Wis., May 27, 1891.

MR. MILLS: *Dear Sir:*—

[Extract.]

I have plowed on the marsh with the Triumph and it does good work, I have tried all walking plows but could do nothing with them. DAVID MANN.

TRY IT AND SEE FOR YOURSELF.

For Circular, address

J. I. CASE PLOW WORKS, Racine, Wis.

Mention "Farmers' Institute Bulletin" when writing to advertisers.

Prairie View Percheron Horse, Importing and Breeding Farm.

The home of Louis, 6337, (2430), weight 2130 lbs. And Fertois, 9801, (18508), weight at 3y. 6mo., 2100, and many other good Stallions and Mares, Imported and home bread REGISTERED stock for sale at such prices as these:

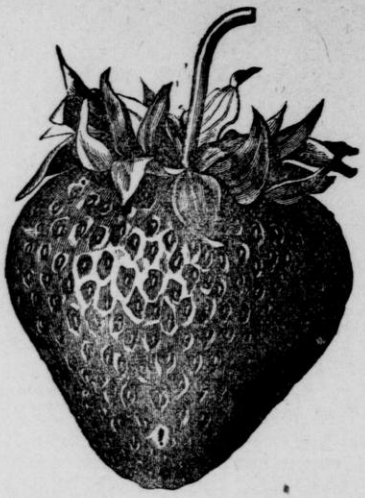
Good young mares that have proved themselves good breeders and now in foal by Louis, for $450, weanlings, yearlings and 2 year fillies at corresponding low prices. Also choice young stallions from weanlings to fully matured at the very *lowest*. Come and examine my stock and I will make it to your interest. All stock guaranteed breeders. As I do my own importing in person and have no expensive agents to pay I will give my customers the benefit.

Send for catalogue to

H. A. BRIGGS,

Elkhorn, Walworth Co., Wis.

On Chicago, Milwaukee & St. Paul R. R., 40 miles west of Racine and 25 miles east of Janesville.



BIG BERRIES!

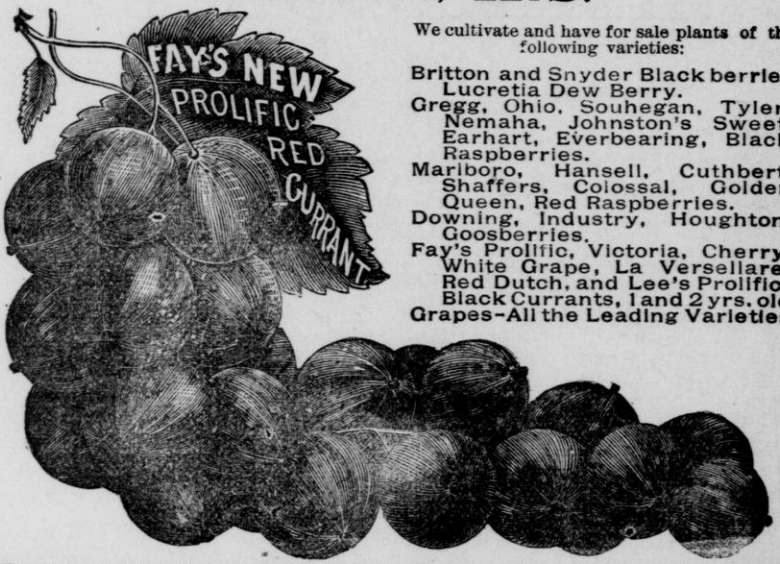
—AND—

Lots of Them

ARE GROWN ON THE

THAYER FRUIT FARM

SPARTA, WIS.



We cultivate and have for sale plants of the following varieties:

Britton and Snyder Blackberries
Lucretia Dew Berry.
Gregg, Ohio, Souhegan, Tyler, Nemaha, Johnston's Sweet, Earhart, Everbearing, Black Raspberries.
Mariboro, Hansell, Cuthbert, Shaffers, Colossal, Golden Queen, Red Raspberries.
Downing, Industry, Houghton, Goosberries.
Fay's Prolific, Victoria, Cherry, White Grape, La Versellare, Red Dutch, and Lee's Prolific, Black Currants, 1 and 2 yrs. old
Grapes—All the Leading Varieties

We make a specialty of raising nice fruits and best hardy plants. All plants sold are carefully packed, and warranted true to name. Prices furnished on application. We are pleased at all times to answer questions by mail or otherwise, and cordially invite you to make a personal visit to our grounds. Let us hear from you.

A plan of the **FARMERS FRUIT GARDEN"** ¼ acre—with instructions for growing small fruits, sent free.

M. A. THAYER, Sparta, Wis.

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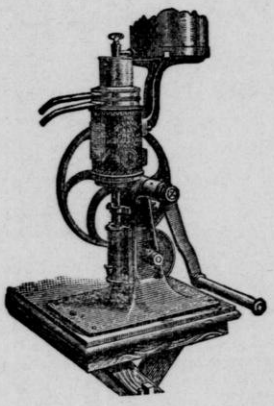
DAIRYING

THE NEW IMPROVED AND CHEAPENED

De Laval "Baby" Cream Separators

FOR FARM AND DAIRY USE.



Adaptation of the advantages of Centrifugal Separation to the means and requirements of the dairy farmer, thus ensuring him all the value that may be in his milk, and the ability to utilize it as may be most practicable.

10 to 30 per cent. increase in yield over any other system in use, with Separator Butter bringing the Best Prices on every market in the world—either fresh or kept.

Sweet Cream and Sweet skim milk—perfect Cleanliness and Purity, great saving of time, labor, ice and space.

Machines very simple, durable, compact, easily cleaned and very easily operated.

(WHAT PROF. HENRY SAYS OF THE "BABY" NO. 2.)

University of Wisconsin, Agricultural Experiment Station,

MADISON, WIS., Aug. 8, 1891.

"We have been useing the "BABY" separator for some time past, and now regard it as a fixture in our dairy. As soon as three or four cows are milked the skimming begins and it is finished a few minutes after milking is over We are skimming twice a day believing that to be the most economical way of conducting the work. The machine will skim 300 lbs. per hour down to one-tenth of one per cent. of butter fat left in the skim milk. We are greatly pleased with this separator. If is all you claim for it."

W. A. HENRY, Director.

Style No. 1 (capacity 150 lbs.) $100

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SATISFACTION GUARANTEED.

Address for circulars and any desired particulars concerning either the "BABY" or the larger Hand and Power machines,

The DeLaval Separator Co.,

74 Cortland St., New York,

"THE NORTH-WESTERN LINE"

IS THE

GREAT SHORT LINE

Between Principal Points as Shown on Map.

AND ITS MOTTO IS:

"ALWAYS ON TIME."

Solid Trains, or Through Sleeping Car Service, is as Follows:

SOLID VESTIBULED LIMITED TRAINS between
Minneapolis, St Paul and Chicago, and
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PULLMAN PALACE SLEEPING CARS between
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E. W. WINTER,
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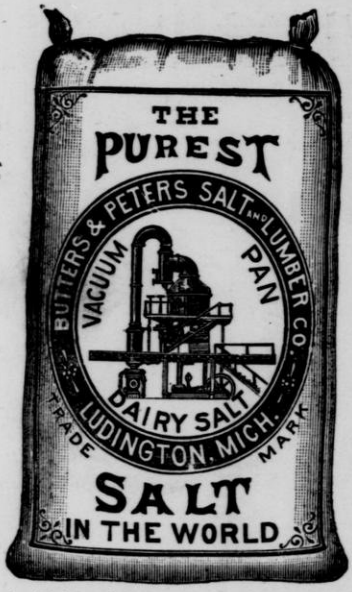
Vacuum Pan Dairy Salt

In Purity, Strength, Evenness of Grain and Antiseptic Properties, Surpasses All Others



It is the Purest, Cleanest, Strongest, Cheapest and BEST DAIRY SALT **IN the World.**

At Wisconsin State Fair 1891, Butter Salted with **VACUUM PAN SALT** Scored 100 Points and was awarded First Premium in **EVERY CLASS.**

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USE IT AND MAKE FIRST PREMIUM BUTTER.

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LUDINGTON, MICH.

For Prices Apply to

R. M. BOYD, Agent, Racine, Wis.

A Choice List of Summer Resorts.

In the Lake regions of Wisconsin, Northern Michigan, Minnesota, Iowa, and the two Dakotas, there are hundreds of charming localities pre-eminently fitted for summer homes. Among the following selected list are names familiar to many of our readers as the perfection of Northern summer resorts. Nearly all of the Wisconsin points of interest are within a short distance from Chicago, or Milwaukee, and none of them are so far away from the "busy marts of civilization" that they cannot be reached in a few hours of travel, by frequent trains, over the finest roads in the northwest—the Chicago, Milwaukee & St. Paul Railway, and Milwaukee & Northern Railroad:

Oconomowoc, Wis.
Minocqua, Wis.
Waukesha, Wis.
Palmyra, Wis.
Tomahawk Lakes Wis.
Lakeside, Wis.
Kilbourn City, Wis. (Dells of the Wisconsin.)
Beaver Dam, Wis.
Madison, Wis.
Delavan, Wis.
Sparta, Wis.
Pewaukee, Wis.
Wausaukee, Wis.
Marquette, Mich.
Clear Lake, Iowa.
Lakes Okoboji, Iowa.
Spirit Lake, Iowa.
Frontenac, Minn.
Lake Minnetonka, Minn.
Ortonville, Minn.
Prior Lake, Minn.
White Bear Lake, Minn.
Lake Madison, So. Dakota.
Big Stone Lake, So. Dakota.
Elkhart Lake, Wis.
Ontongon, Mich.
Mackinaw, Mich.

For detailed information, apply to any cupon ticket agent, or send stamp for a free illustrated tourist folder, to Geo. H. Heafford, General Passenger Agent, Chicago, Ill.

A GREAT RAILWAY.

The Chicago Milwaukee & St. Paul Railway Company now operates over sixty-one hundred miles of thoroughly equipped road in Illinois, Wisconsin, Northern Michigan, Minnesota, Iowa, Missouri, South and North Dakota. Each recurring year its lines are extended in all directions to meet the necessities of the rapidly populating sections of country west, northwest and southwest of Chicago, and to furnish a market for the products of the greatest agricultural and stock raising districts of the world. In Illinois it operates 317 miles of track; in Wisconsin 1,636 miles; in Northern Michigan 96 miles; in Iowa 1,551 miles; in Minnesota 1,115 miles; in South Dakota 1,092 miles; in North Dakota 118 miles; in Missouri 140 miles; and the end is not yet. It has terminals in such large cities as Chicago, Milwaukee, La Crosse, St. Paul, Minneapolis, Fargo, Sioux City, Council Bluffs, Omaha and Kansas City, and St. Joseph Mo., and along its lines are hundreds of large and small thriving cities, towns and villages. Manufacturing interests are cultivated, and all branches of trade find encouragement. The Railway Company has a just appreciation of the value of its patrons, and its magnificient earnings are the result of the good business tact which characterizes the management of its affairs.

The popularity of the line is attested by the fact that notwithstanding the strongest kind of competition of old and new lines. the Chicago Milwaukee & St. Paul Railway continues to carry the greater proportion of all the business between Chicago, Milwaukee, St. Paul and Minneapolis. It is the best patronized route between Chicago, Council Bluffs and Omaha and to and from all points in Wisconsin, Minnesota, Dakota and Iowa, and its Kansas City and St. Joseph line has taken equal rank with the older lines leading to and from the Southwest.

On all its through lines of travel the Chicago, Milwaukee & St. Paul Railway runs the most perfectly equipped trains of Sleeping, Parlor and Dining Cars and Coaches. The through trains on all its lines are systematically heated by steam. No effort is spared to furnish the best accomodations for the least money, and, in addition, patrons of the road are sure of courteous treatment from its employes.

TWENTY-SEVEN YEARS

A BREEDER OF

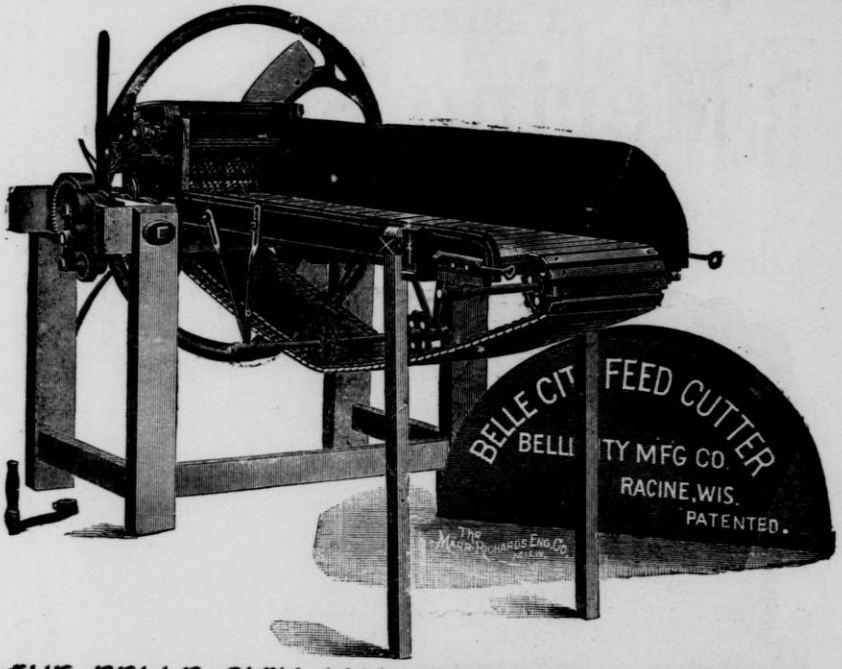
Merino Sheep.

C. S, CLELAND, Janesville Wis

I have been TWENTY-SEVEN years in the business of raising Merino sheep, and I have now 300 registered sheep of that breed for sale. I make a specialty of breeding sheep of large size, strong constitutions and with HEAVY FLEECES of FINE WHITE WOOL.

COME AND SEE MY FLOCK.

BELLE CITY
ENSILAGE AND FODDER CUTTERS



THE BELLE CITY MANUFACTURING COMPANY

Have sold over 15,000 of these Cutters the past season, which is the best recommend that can be offered regarding them. They are now used at most of the State Farms, also at the Government Experimental Stations. The above cut shows the self feeding attachment which they are putting on most of the larger sizes, and which is becoming so popular among the stockmen and ensilage feeders. These are the lightest running machines on the market, and have the greatest capacity of any machine now known and are all guaranteed to run at great speed with perfect safety. The capacity of these cutters is almost unlimited, taking fodder of all kinds more rapidly than operators can get it to the machine. The Belle City Cutters are made in twelve different sizes for both power and hand use, and most of the power machines can be easily turned by hand. Carriers of any length can be attached to these machines and run at any angle. The knives of the very best cast-steel, which this company are now importing direct from Sheffield, England, is used for these cutters. We carry a full line of

Horse Power Root Cutter, Hand Carts, Harrows, Cultivators, Saw Frame Etc.

Send for Illustrated Catalogue and Price List. **ADDRESS**

BELLE CITY MANUFACTURING CO., Racine, Wis.

(Mention "Farmer's Institute Bulletin" when writing to Advertisers.)

Big Berries!

—AND—

Lots of Them

CAN BE GROWN

By procuring plants at

Ripon Small Fruit Farm,

C. H. HAMILTON, Prop., Ripon, Wis.,

Who cultivates and has for sale plants of the following varieties:

Britton and Snyder Blackberries.
Lucretia Dew Berry.
Gregg, Ohio, Souhegan, Tyler, Nemaha, Carman, Johnston's Sweet, Earhart, Everbearing, Black Raspberries.
Marlboro, Hansell, Cuthbert, Golden Queen, Rancocas, Red Raspberries.
Downing, Industry, Triumph, Houghton, Gooseberries.
Fay's Prolific, Victoria, Cherry, White Grape, La Versellare, Red Dutch, and Lee's Prolific, Black Currants, 1 and 2 yrs. old.
Grapes—All the leading varieties.

Large Stock of First-Class Plants, and at reasonable prices. Correspond with me if you wish to plant and get prices. Yours truly,

C. H. HAMILTON, Ripon, Wis.

HOLLOW BLUFF HERD

OF

A. J. C. C. JERSEYS.

At the head of the herd is the bull RIOTER KEDIVE POGIS No 23132. One of the best bred bulls in the west. He is a grandson of PRINCESS 2nd No. 8046, with a butter record of 46 lbs. 12oz. of butter in 7 days (official test) the largest weekly butter record of any cow living or dead, Princess 2nd is half sister to TORMENTOR No. 3533 the NOTED TENNESSEE bull who has a list of 28 daughters with weekly records from 14 to 27 pounds of butter each. Kedive is also a grand-son of BLACK PRINCE of LINDEN whose dam is a full sister to Stoke Pogis 3d. The best bull known to the Jersey world, having 27 daughters with records of 14 to 36 pounds butter in 7 days. On the dam side Kedive is a double great-grandson of Stoke Pogis 3d. In every direction Rioter Kedive Pogis traces to some of the best blood known to the Jersey world.

In purchasing the foundation for this herd some 15 years ago, no time or expense was spared in procuring cows of the greatest dairy merit, and by careful selection ever since that time, this herd has become one of the best herds in the west, and a prize winning herd wherever shown. Nearly all the leading families of Jerseys are represented in this herd.

The mature cows of this herd are making from 400 to 500 pounds of butter each per year on good ordinary feed. No force tests have ever been made.

A few animals of both sexes always for sale.

Prices Reasonable and Satisfaction Guaranteed.

No Catalogue, Write for what you want.

Address

R. S. KINGMAN,

Sparta, Monroe Co., Wis.

Free Catalogue

—OF—

HOME GROWN

Northern Seeds, Plants, Bulbs, etc.

ALL FROM NEW CROP—TESTED AND PURE

NO OLD BOX SEEDS.

My Prices in Packet from 2 to 5 cents. In quantity as low as any Responsible House in America.

A. R. AMES, Madison, Wis.

BENNINGER NURSERY,

SEED

AND

STOCK FARM,

Holstein Friesian Cattle

Of all ages and sexes including many Prize Winners.

Nursery Stock of all Kinds.

EARLY SWEEDISH OATS

I am the Introducer of several new and excellent varieties of Potatoes, including the Early New Zealand and Diehl's Eureka, both of which are giving remarkable results.

Special Discounts to Clubs and Organizations.

Write for Circulars and Price Lists.

W. M. BENNINGER.

Northampton Co. Walnutport, Pa.

SALZER'S NORTHERN GROWN SEEDS

THE GOVERNOR RUSK POTATO.

This grand potato named in honor of the great Farmer Governor of Wisconsin, should be planted on evey farm in America. It is a potato that will sweep the country in yields, and take first prize on beauty and form of tubers and good quality everywhere. See my catalogue, it will tell you all about it.

REMEMBER

That we grow and carry continually in stock the most complete line of Farm Seeds, as Wheat, Oats, Barley, Corn, Rye, Potatoes, Grass and Clover Seeds, together with hundreds varieties of Flower and Vegetable seeds, which we will sell at very low prices.

Pamphlet on grass culture free. Catalogue free. Write now.

JNO. A. SALZER, La Crosse, Wis.

Sunny Side Swine and Dairy Farm,

A. SELLE, Proprietor.

BREEDER OF POLAND CHINAS.

All Breeders Recorded in O. P. C. R.

ALSO GROWER OF THE WONDERFUL PROBSTEIR BLUE RYE. SEND FOR PRICES WHICH YOU WILL FIND LOWER THAN ANYWHERE ELSE,

Very truly yours,

A. SELLE.

SPRING CREEK STOCK FARM.

WAKEM & STONE, Proprietors, Madison, Wis.

Breeders of Short Horn Cattle, Roadster Horses, Cotswold Sheep, Poland China and Berkshire Swine. Prince Consort 5165 at the head of our flock of Cotswold Sheep, 20 young bucks, also a few choice young ewes and ewe lambs for sale cheap. Prince Consort was not beaten this year having won three first prizes, one diploma, and sweepstakes for best Long Wool Buck at La Crosse fair 1891.

POLAND CHINA. Hamlet 2nd 13313 at the head of Poland China Swine, was a prize winner every time shown, Lady Princess 43634, won grand sweepstakes over all breeds at La Crosse, 1891. We are breeding long, broad, deep, low, down hogs.

BERKSHIRES. Royalty, 24543 in use on a choice lot of sows—Our aim is to breed a smooth hog showing plenty of quality and an even distribution of fat and lean, Royalty and his get won at State Fair, 1891, first for Boar under six months, first for Sow Pig under six months, sweepstakes Boar Pig and first for Boar and his get, showing a very even breeder. We have Boars and Sows of each breed for sale, registered or eligible to registration.

Special attention given to orders by mail and satisfaction guaranteed. Write for prices.

Correspondence Promptly Answered by Addressing

Wakem & Stone,

MADISON, WIS.

Spring Creek Stock Farm.

WAKEM & STONE Proprietors, Madison, Wis.

BREEDERS OF

Short Horn Cattle, Roadster Horses,

COTSWOLD SHEEP,

Poland China and Berkshire Swine.

SIR MOSS COOT 100869 at the Head of Herd of Short Hons.

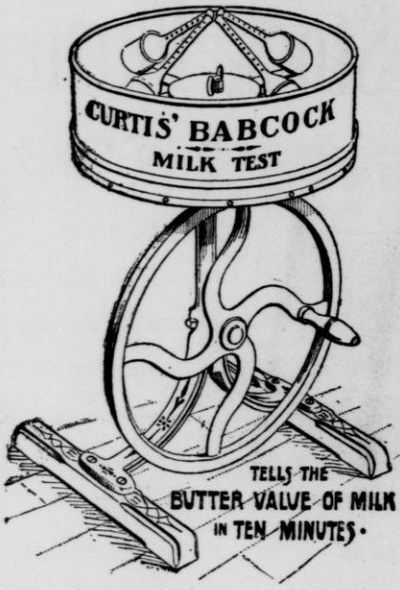
Individual merit our Standard of Excellence.

Our herd contains representatives of the following families: Princess, Roan Duchess, Adeliza, Young Mary, Nelly Bly, Desdemonia, Profitable and other useful families. Special attention given to the milking qualities in all purchases made for this herd. A small selection from our herd won nearly $700 at three fairs in 1891, including three grand sweepstakes and three diplomas. We have always for sale from 10 to 20 young bulls, at prices where the purchaser will receive good value for his money. Every male animal sold, guaranteed a breeder. Ample time given to responsible purchasers.

Send for Catalogue of Bulls, and come and see us and Receive a Square Deal.

WAKEM & STONE,

MADISON, WIS.



Every Farmer

Should have this machine, as it is intended especially for farm use, with a view to assist in weeding out the poor cows.

Every Dairyman

Who keeps a half dozen cows ought to provide himself with one of our Babcock Testers, if he cares a snap of his finger to know whether he has a cow in his herd that is worth keeping. More than one cow "eats her head off" every year she is kept.

How Many Cows do You Keep?

Are they three per cent. cows, or 5 per cent. cows? Figure the difference between the cow that gives an average of 20 lbs. of milk daily for 275 days, testing 4 per cent., and one giving the same amount testing 3 per cent.

275 x 20=5,500 x 4.44=244.20 lbs. butter, at 25 cts. per lb., is $61.05
275 x 20=5,500 x 3.72=179.85 lbs. butter, at 25 cts. per lb., is $44.96

Difference - 64.35 lbs. $16.09

These are not extreme figures. There is not a dairy in the land that will not show wider extremes. One per cent. variation is a moderate yield for a single season, yet it means $16.09 in cash per cow.

Can you afford to keep cows and not have one of our Babcock Testers.

Send for circulars.

CORNISH, CURTIS & GREENE,
Fort Atkinson, Wis.

☞One of these machines will be used at every Farmers' Institute this winter.

A Chance to Make $25.00 in Five Minutes!

——A GRAND OFFER TO OUR READERS BY——

Dr. Valerius & Co.,

——IMPORTERS AND BREEDERS OF——

Clydesdale, English Shire and Percheron Norman Stallions.

Please write in the blank below the names of any stallion men that you know of, and especially anybody that you think wants to buy, cut the blank so filled up out of the Bulletin and mail it to us, after writing your name and address at the bottom in the space provided for that purpose. We will then write to the parties whose names you send, and try to sell them a stallion. If we sell one stallion to any one of them we will pay you twenty-five dollars for your trouble as soon as the sale is made. And for additional stallions sold to the same party, or others on the blank you send, we will pay you twenty-five dollars more for each Stallion sold.

Your name will not be mentioned unless you request it. If you are not satisfied that we will do as we say, you can write to the Wisconsin National Bank, of Watertown, Wis., for information. If it should so happen that the same name be received from more than one person, and a sale is made, then the prize will go to the one whose blank is received first. It is therefore best to fill up your blank and mail it promptly.

Our correspondents sometimes wonder how we can make this liberal offer and yet sell better horses and cheaper than our competitors. Our answer is that we simply spend the money this way instead of paying tens of thousands of dollars every year for newspaper advertising.

Address:

DR. VALERIUS & CO., Watertown, Wis.

NAME.	POST OFFICE.	COUNTY.	STATE.

Sent by..... Post Office.....

County..... State.....

1876 1891

LARGE ENGLISH BERKSHIRES AND SHORT-HORN CATTLE.

A. J. LOVEJOY & SON,

RIVERSIDE FARM, Roscoe, Illinois.

We have been breeding Berkshires for fifteen years, and ship from one hundred to two hundred every year. Our hogs are large and handsome, have good bone, very short heads, and are uniform in markings and general make up.

WE MAKE A SPECIALTY OF FURNISHING FOUNDATION HERDS—One Male and four Females — but furnish smaller numbers if desired.

We register every animal and send certificate of registry to purchaser.

ANY ANIMAL NOT AS REPRESENTED CAN BE RETURNED TO US, AND MONEY WILL BE REFUNDED.

We also breed Short-horn cattle, of the milking strains, and can furnish first-class bulls or heifers at reasonable prices.

We use a Cruickshank sire, thus combining beef and milk qualities.

Come to the farm and see our stock; if you cannot come, **place your order with full confidence. We will please you.**

A. J. LOVEJOY & SON,
Roscoe, Illinois.

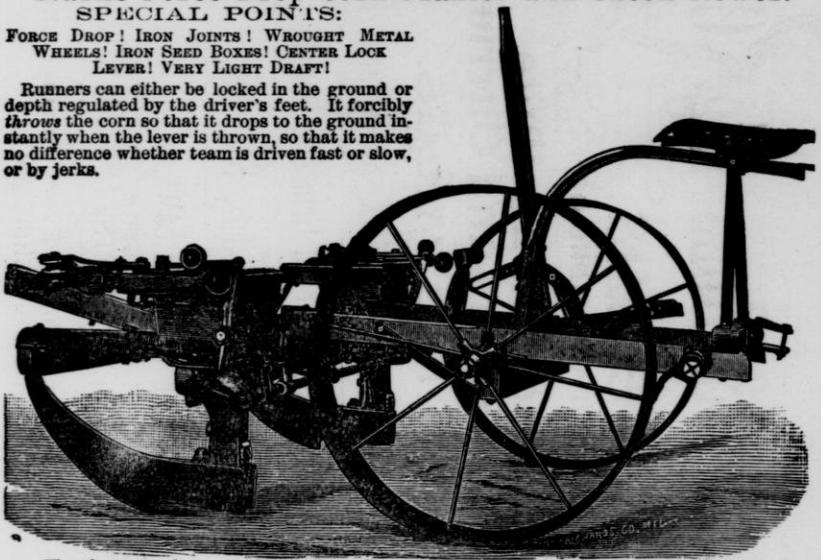
Roscoe is 6 miles south of Beloit, Wis., on C. & N. W. and C., M. & St. Paul R. R. Parties met at trains, if notified.

Starks Force Drop Corn Planter and Check Rower.

SPECIAL POINTS:

FORCE DROP! IRON JOINTS! WROUGHT METAL WHEELS! IRON SEED BOXES! CENTER LOCK LEVER! VERY LIGHT DRAFT!

Runners can either be locked in the ground or depth regulated by the driver's feet. It forcibly *throws* the corn so that it drops to the ground instantly when the lever is thrown, so that it makes no difference whether team is driven fast or slow, or by jerks.



The above cut shows our Starks Force Drop Corn Planter with Improved Check Rower.

Will plant corn in straight rows both ways, whether team goes fast or slow. This alone will **save** the price of planter for every 100 acres of corn planted, by not having corn destroyed in cultivating.

When raised out of the ground it is self-locking, thus avoiding the use of latches.

It has glass at the heel of the drop so that the driver can at all times see the corn dropping.

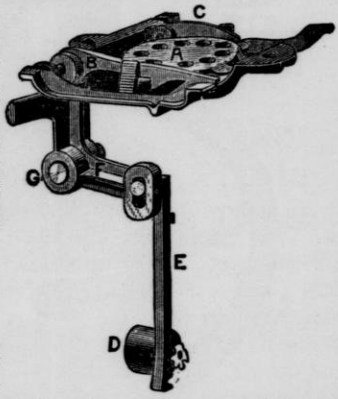
The lock being in the center, the runners go a uniform depth. Planters that lock at the side run deeper on one side than the other, when the planter is locked in the ground.

The runner can can be detached in a few moments by taking out two bolts, and can thus be readily sharpened.

In the joints on the frame is an iron plate with flanges which makes the frame perfectly rigid and exceedingly strong, and the water does not settle in the joint to rot the frame.

WE WILL, ON APPLICATION, send by mail a MODEL of the force drop, free of charge, to any person who contemplates buying a planter, so he can see just how the corn is dropped.

The accompanying cut shows the working parts of the Rotary Force Drop. The seed plate A is revolved by the pawl B and is locked by the latch C. The roller D receives the corn and is operated by the lever E, causing it to revolve and forcibly discharge the corn into the ground, overcoming any tendency of the corn to scatter as it drops, for the more rapidly the team moves, the more quickly corn is precipitated. The pawl A and the lever E are attached to the bell crank F, which oscillates on the pivot G and operates them both, and the noticeable feature in this device is the small number of working parts involved, which in consequence makes the force drop the most simple, durable, effective and complete dropping arrangement in the market. The corn is always dropped in check regardless of the speed of the team.

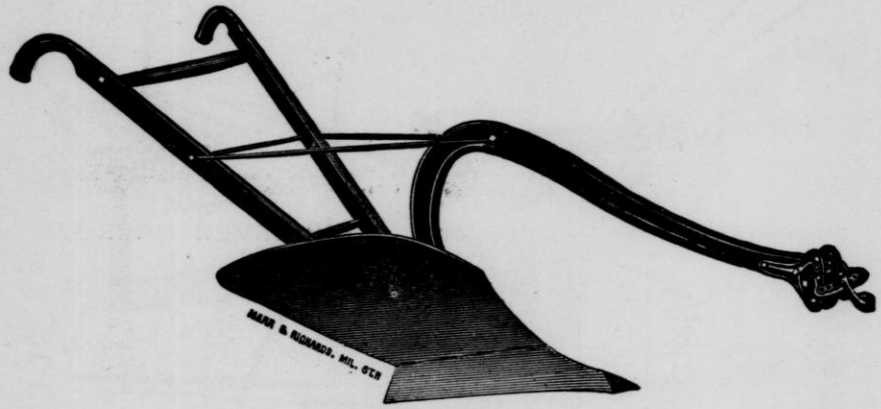


CHECK ROWER.

SPECIAL POINTS.—Made entirely of Iron and Steel. No Wood Frame Across Planter. Great Strength, Easy Movement. Has Fewer Working Pieces than any other.

DRILL ATTACHMENT.—An attachment is used for planting the corn in drills, and when it is to be planted for ensilage, making it a perfect drill for this kind of work. Drop a postal for our calendar and account book.

FULLER & JOHNSON MFG CO., Madison, Wis.

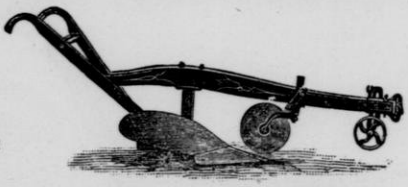


Mouldboard View.

Scotlander, Steel Beam Plow.

Our Scotlander is a Turf and Stubble plow. The mouldboard is long and sloping making it well caculated for turning tame sod, also making it a very popular stubble plow. It is made with patent frog mouldboard and braces. Made with either wood or steal beams.

Perfect Work.



Always Satisfies.

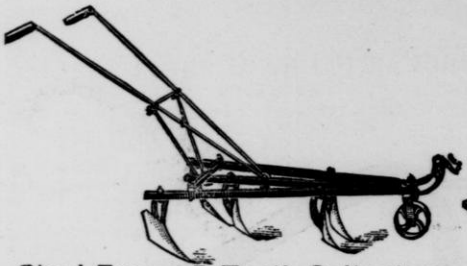
SOD PLOW.

Our Sod Plow is especially Adapted for turning tame sod.

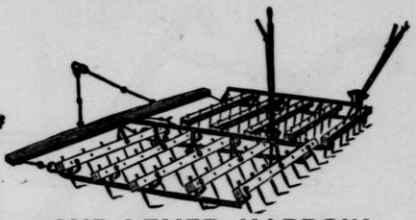
In addition to the illustrations shown herein we manufacture a very large variety pf plows from the small garden plow to the heavy twenty inch Grub Breaker. We can supply the farmers in the timbered sections of Wisconsin with plows made with either fin cutters, reversible cutters, standing cutters hanging cutters, or the regular rolling coulter commonly used in the West Write us at the factory, if your dealer does not handle our line of manufacture, and we will gladly send you our illustrated catalogue and give you any information we can in reference to what would be the best for your work.

FULLER & JOHNSON Manufacturing Co.,
MADISON, WIS.

THE BEST HARROW IN THE WORLD!

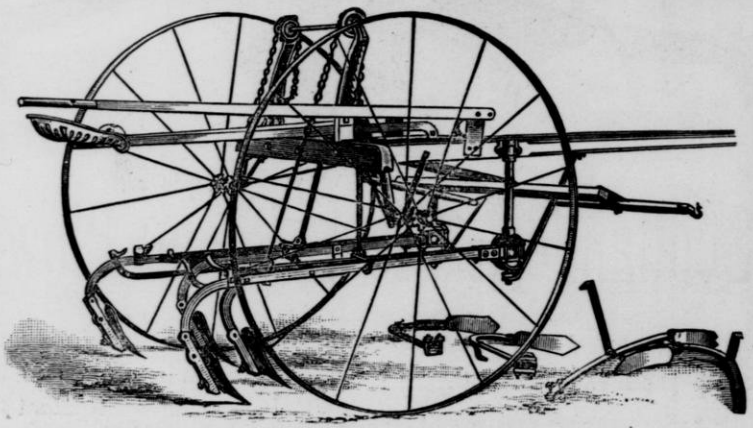


Steel Frame 5-Tooth Cultvator.



OUR LEVER HARROW

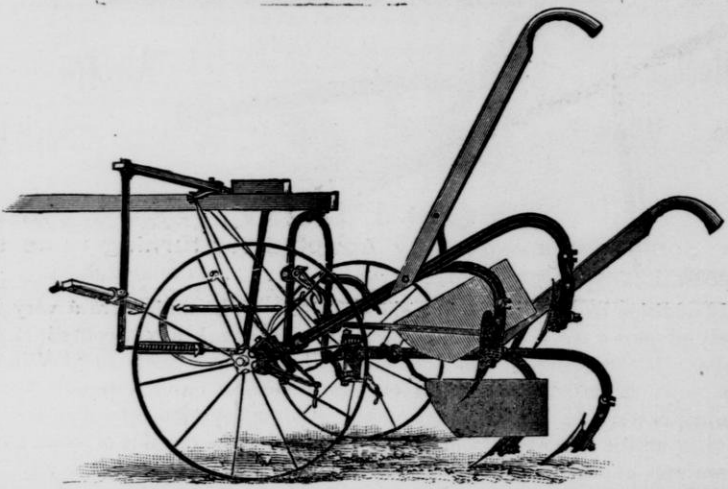
BONANZA RIDING



CULTIVATOR,

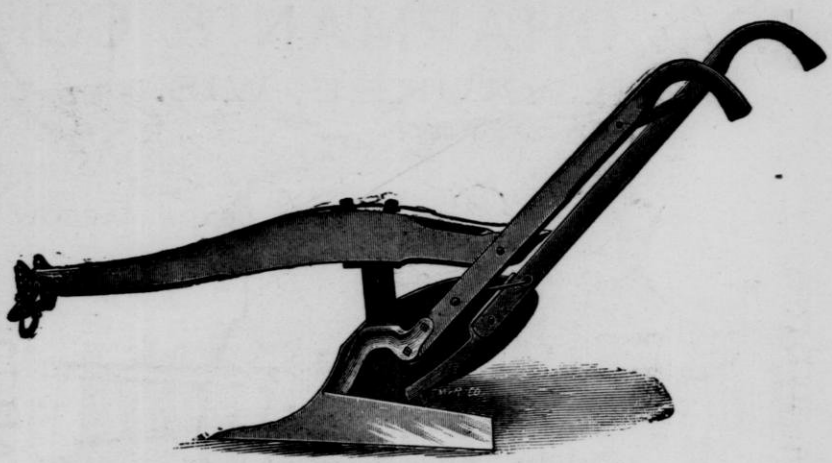
Made for Either Four or Six Shovels.

WINNER



CULTIVATOR.

Send to the manufacturers for illustrated catologue and circulars fully discribing the above machines and also their full line of farm implements consisting of Mowers, Rakes, Corn Planters, Cultivators, Harrows, Disc Harrows, Plows, etc. **FULLER & JOHNSON MFG. CO., Madison, Wis.**



Landside View, Showing Handle Brace.

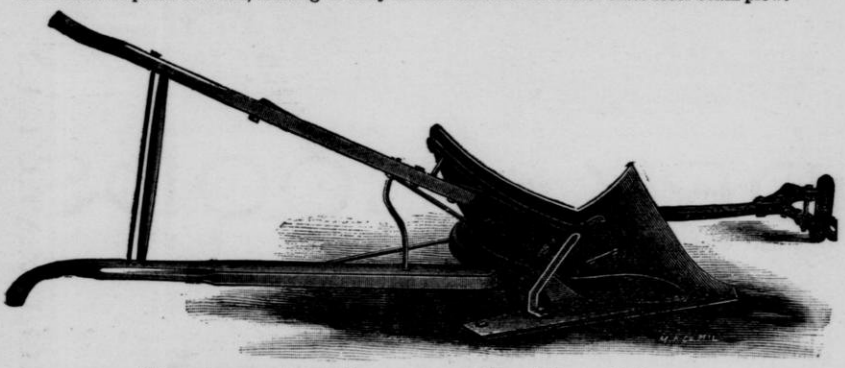
SATER WOOD BEAM PLOW

Soft Back Mouldboard; All Steel on the Front.

Above illustration shows "Sater" wood beam plow--landside view, showing handle braces. These braces enable us to detach handles without removing bolts in mouldboard.

SATER STEEL BEAM PLOW

The steel beam "Sater" has the same advantages of bracing for plow and handles possessed by the wood beam, the same shape mouldboard, in fact it is the same plow except that it has the steel beam in place of wood, making it fully fill the demand for a first-class steel beam plow.



Showing patent Frame and Mouldboard Brace.

The above cut shows the Patent Frog and Mouldboard Bracing used on our "Sater."

Patent Frame.—The Sater plow, as well as wheel plows, covered by patents, is made on a frame, consisting of malleable iron frog, steel landside, malleable mouldboard brace and landside brace. These are formed in a die, and are always the same form, and the mouldboard and share fitted on, so that the plows are as nearly uniform in shape as it is posssble to make them, besides this frame makes the plow exceedingly strong.

The Shin.—No other plow manufacturers even pretend to shin the soft back mouldboards on the front. Ours are shinned on both front and back, thus making a genuine triple shin, and will much better than any other.

All our stubble plows have the soft back mouldboard unless otherwise ordered.

Every walking 14-inch plow and all larger sizes is furnished with 3-horse clevis, so that either two or three horses can be used.

Manufactured by the FULLER & JOHNSON MFG. CO., Madison, Wis.

Send for illustrated Catologue of their full line of machinery consisting of Mowers, Rakes, Corn Planters, Cultivators, Harrows, Plows. etc., etc.

T. A. CHAPMAN & CO.

MILWAUKEE, WIS.

We are now showing a larger and finer assortment of

DRY GOODS

than ever before. All departments are completely filled with goods pertaining to them, and "ORDERS BY MAIL," for either goods or samples, will receive prompt attention.

BELOW WE GIVE DIRECTIONS FOR ORDERING:

1st—Write name and address distinctly. 2d—State quality and measurements clearly. 3rd—Say how you want goods shipped. 4th—Put in samples when possible. 5th—Enclose Bank Draft, Express Order, P. O. Order, or send currency by Express or in a Registered Letter. 6th—Goods will be sent C. O. D. when desired, but by remitting with order Collection Charges will be saved.

Small parcels weighing 4 Pounds or less can be sent by mail at the rate of 16 cents per pound the purchaser taking the risk of loss.

In ordering from samples, please make a second choice, in case the first choice should in the meantime be sold.

When ordering samples of Silks, Dress Goods, etc., state prices and colors wanted and also what kind of goods.

T. A. CHAPMAN & CO.,

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