

Wisconsin Farmers' Institutes : a hand-book of agriculture. Bulletin No. 7 1893

Wisconsin Farmers' Institutes Madison, WI: Democrat Printing Co., Printers and Stereotypers, 1893

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The science of agriculture is in a great degree founded on experience. It is, therefore, of consequence that every farmer should know what has been done and what is doing by others engaged in the same occupation, and that he should impart to others the fruits of his own experiments and observations.

-New England Farmer.



Hiram Smith Hall, Dairy School Building, University of Wisconsin

WISCONSIN

FARMERS' INSTITUTES.

A Hand-Book of Agriculture.

BULLETIN NO. 7.

1893.

"There is no reason why the farmer should not be the most thoughtfal and intelligent in our land; he is surrounded by nature's laws, the fountain of all knowledge, has time for reflection, and should be the leader in all great questions, political and commercial. In view of the great responsibility resting on the farmer, it is time he should think for himself and be the leader for his country's prosperity and for the welfare of mankind."—Samuel W. Allerton, Ch'n Agr'l Congress at World's Fair.

Edited by W. H. MORRISON, Superintendent.



FORTY THOUSAND COPIES ISSUED.

Illustrated by Binner Engraving Co., Milwaukee, Wis.

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W. A. HENRY,

Dean of the College of Agriculture, University of Wisconsin Director Wisconsin Agricultural Experiment Station

LETTER OF TRANSMITTAL.

HON. WM. P. BARTLETT,

President of Board of Regents, University of Wisconsin: SIR:—I have the honor herewith of presenting to you Bulletin No. 7, Wisconsin Farmers' Institute.

Respectfully yours,

W. H. MORRISON,

MADISON, WIS., Nov. 6, 1893.

Superintendent.



S. M. BABCOCK, PH. D., Chief Chemist Wisconsin Agricultural Experiment Station. Inventor of the Babcock Milk Test

THE BABCOCK MILK TEST.

Testimonials of Some of the Dairy Scientists as to its Value.

"I know of no greater boon for dairymen, in the way of a milk testing apparatus, than the 'Babcock." It provides a simple, cheap, accurate and reliable method for determining the quantity of fat in milk. We owe it to the ability, patient research and generosity of Dr. S. M. Babcock, the distinguished chemist of Wisconsin, who, with unselfish public spirit has given his invention free to the community."—PROFESSOR JAS. W. ROBERTSON, Dairy Commissioner of the Dominion of Canada, Ottawa.

"I recognize the Babcock Test as the best of the various systems with which I am acquainted. It is so simple, rapid, accurate and cheap, that it is now within the capacity of any intelligent farmer to test the butter value of every cow in his herd as often as he chooses. I cannot speak too highly of Dr. Babcock's work, which I have followed and described for years, and now that I know the man I like his work all the better."—PROF. JAS. LONG, Late Professor of Practical Dairying and Dairy Farming in Royal Agricultural College Cirencester, Hampshire, England.

"The Babcock Milk Test has done, and will do more for the improvement of dairy cattle in the United States than all other efforts combined." —I. P. ROBERTS, Professor of Agriculture and Director of the Experiment Station, Cornell University, Ithaca, N. Y.

"I am convinced from personal observation, that the Babcock Milk Test is revolutionizing the American dairy industry, and feel confident that its adoption in European countries will lead to equally grand results as regards both cattle breeding and management of butter and cheese factories."—DR. EMIL HOLM, Ass't Chemist, Royal Agr'l Experiment Station, Copenhagen, Denmark.

"The Babcock Test is a reliable, accurate, simple and rapid method for the determination of fat in milk. Any one can soon learn to use it, and the results at the World's Fair show that every one who is interested in dairying should use it."—PROF. M. A. SCOVELL, *Director Exp. Station*, *Lexington*, Ky.



JAS. W. ROBERTSON. I. P. ROBERTS. EMIL HOLM. JAMES LONG. M. A. SCOVELL.

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FARMERS' INSTITUTES.

W. H. MORRISON, - - - - - SUPERINTENDENT. MISS HARRIET V. STOUT. - - - CLERK AND STENOGRAPHER.

Office and Laboratories in Agricultural Hall, University Grounds. Experiment Farm, with buildings, joins the college grounds on the west. Telephone connection.



F. A. HUEBNER,

M. T. Allen.

COLLEGES.

College of Letters and Science, College of Agriculture,

College of Mechanics and Engineering,

College of Law,

School of Pharmacy

COURSES.

Long Agricultural Course, Short Agricultural Course, Mechanical Engineering Course, Civil Engineering Course,

Mining and Metallurgical Engineering Courses,

Railroad Engineering Course, Electrical Engineering Course, Law Course,

Pharmacy Course,

Ancient Classical Course,

Modern Classical Course,

General Science Course,

English Course,

Civic Historical Course, antecedent to Law and Journalism, Special Science Course, antecedent to Medicine,

Special Courses for Norma'. School Graduates.

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: Ten languages are taught, viz: Greek. Latin, Hebrew, German, Norse, French, Italian, Spanish, Anglo-Saxon and English. In Mathematics there are thirteen 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, seven; in Economics, ten; in Mental Sciences there are fourteen, embracing P-ychology, Ethics, Aesthetics and Logic. There are five courses in Pedagogics and courses in Military Drill, Hygiene, Sanitation and Music.



A.O. Fox. ROBERT MILLER. J. S. WOODWARD. Dr. C. D. SMEAD. GEO. MCKERROW.

WISCONSIN STATE UNIVERSITY.

- In Mechanics and Engineering:-Elementary Mechanics, Mechanics of Material, Mechanics of Machinery, Theory of Construction, Thermodynamics, Elementary Surveying, Railroad and Topographic Surveying, Geodesy, Sanitary, Hydraulic, Railroad, Electrical, Steam Engineering, Hydraulic Motors, Hoisting Machinery, Theory and Construction of Locomotives, Railway Lo omotives, Railway Location, Railway Equipment, Construction and Maintenance of Way, Railroad Field Work.
- In Electricity:-Electrical Testing, Electrical Plants, Electrical Construction, and various forms of drawing are given; also shop work in wood, iron, brass, both hand work and machine work, machine designing, construction and testing machines.
- In Agriculture:--Various courses are given in agriculture. Animal Husbandry, Farm Management, Agricultural Chemistry, Veterinary Science, Agricultural Physics, Horticulture and Economic Entomology, etc.
- In Law:—Courses in Equity, Jurisprudence, Real Property, Constitutional Laws, 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 upward of 113 instructors. The laboratories are new, extensive and well equipped; embracing the Chemical, Physical, Metallurgical, Minerological, Geological, Zoological, Botanical, Civil and Mechanical Engineering, Agricultural and Pharmaceutical Laboratories. Seminars are held for advanced study in History, Language, Literature, Mathematics, and other branches.

The libraries accessible to students embrace that of the University, 29,000 volumes; of the State Historical Society, 146,000 volumes; of the State Law Department, 23,000 volumes; of the city, 12,000 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.







AGRICULTURAL EDUCATION AT THE UNIVER-SITY OF WISCONSIN.

A Chapter in the Institute Bulletin Which Should be Read by Every Young Farmer in the State.

Farmers' Institute Bulletin No. 7 will find its way into nearly 40,000 farmers' homes the coming winter, where it will be read by thousands of young men, each ambitious to make the most possible out of life. Many of these young men have a real liking for agriculture and will gladly remain on the farm if only they can find enough in farming to call out the best that is in them and give **a** just reward for the intelligence and labor they bring to their chosen calling.

No one of intelligence and observation longer doubts the value of agricultural education; knowledge pays on the farm as it pays elsewhere in life, and, other things being equal, that young man who is best equipped by suitable training will make the best farmer.

The courses of instruction in the College of Agriculture of the University embrace the following: A Graduate Course; a Long Course requiring four years for its completion and leading to a diploma; a Dairy Course which fits young men for operating a creamery and cheese factory, and lastly, a Short Course in Agriculture designed especially to meet the wants of young men who are about to take up farming as a life work, but feel the need of some special training for which they can give but a limited time for study. Circulars and catalogues describing all of the courses will be gladly sent on application.

FACILITIES AND EQUIPMENT.

Of the thirteen buildings on the college grounds three are wholly devoted to agriculture, and agricultural students make use of many of the others in common with the university students.



Short Course Students judging Cotswold Sheep at University Farm-Drilling for Ogilvie Medal Contest.

Agricultural Hali is a stone structure 42x120 feet, four stories in height. It contains several lecture rooms, the agricultural library, reading room, etc.

The agricultural library now contains 3500 bound volumes and in the reading room are 75 of the leading agricultural papers.

Hiram Smith Hall, the new dairy school building, represents an outlay of \$40,000 for the building and equipment. It is arranged for the accommodation of 100 students, and so great has been the demand for instruction that for three years we have been obliged to turn applicants away for lack of room. The new horticultural building with its green houses and equipment, represents an outlay of \$24,000.

At the Experiment Station Farm are a considerable number of registered animals for use in experiments and study by the students. Our equipment in sheep husbandry is perhaps the most marked feature in this line.

THE SHORT COURSE IN AGRICULTURE.

Believing that the general interest will center in the Short Course in Agriculture, the space allotted us in the Bulletin will be given over mainly to a discussion of that course. Every young farmer into whose hands this bulletin falls is asked to read over the discussion here given of the Short Course and see if it does not meet a want which he keenly feels. This course is called the Short Course because it requires but a limited time for completion. It is given in the winter of each year, beginning always the first week in January and continuing twelve weeks. The young farmer may leave home the first Monday in January, secure room and board and get comfortably settled by Wednesday morning when the recitations promptly begin, continuing well into March. Arriving at Madison the student finds himself in a university town where some 1,300 students are gathered for self improvement; to teach these requires over one hundred university professors and instructors.

THE LINES OF STUDY PURSUED.

The studies of the Short Course are arranged to be of the most helpful nature possible to the young man who is about to engage in farming and needs all of the aid we can give. Text books are used in some small measure, but much of the instruction is through lec-





tures, conversations, and best of all, demonstrations in stock yard, stable and laboratory. Let us examine the leading subjects taught in this course.

ANIMAL HUSBANDRY. - BREEDS AND BREEDING.

The rearing of live stock forms the keystone of Wisconsin's agriculture, and consequently great attention is paid to this subject. The first division of the work falls to Prof. John A. Craig, who gives some thirty lectures treating of the breeds of live stock, their characteristics and general management. To aid in the study of pedigrees Prof. Craig makes use of our choice library of over 450 volumes of herd, stud and flock books, from which the student is taught to extend pedigrees and trace the breeding of noted animals. In addition to this, sections of the class each afternoon visit some livery stable or farm where living animals are scored and studied. The object of this work is to familiarize the student with the characteristics of the several breeds of live stock, and of the strong and weak points in our domestic animals.

THE OGILVIE MEDAL.

A gold medal is given annually by Mr. R. B. Ogilvie of Madison, to that short course student who shows superior ability in judging the merits of draft horses and the mutton breeds of sheep. This exquisitely wrought medal is worth fully \$75. The first one was given in 1892, and was won by Mr. A. L. Hough, of Winchester, Wis. In 1893 the second medal was won by Mr. J. J. Tschudy of Monroe, Wis. In March next some young man will secure the third medal. Those who have studied faithfully under Prof. Craig will have laid the foundation for that skill which will prepare them to make judges of stock in the show ring of our state and county fairs.

FEEDS AND FEEDING.

This division of the work falls to Prof. W. A. Henry, who explains the chemical composition and characteristics of the leading kinds of feed. Thorough drill is given in the feeding standards laid down by the Germans which furnishes help of the highest value to farmers handling stock. The results of feeding experiments at our American Experiment Stations are carefully studied in the numer-



Short Course Students Testing Strength of Small Timbers, Preparatory to a Study of Farm Buildings.

ous reports found in the library, which not only contains the reports from all the Stations in America, but hundreds of volumes of investigations from the old world.

VETERINARY SCIENCE.

A third instructor drills the class in matters relating to diseases and help to our farm animals. Dr. W. G. Clark, a former Short Course student, will meet the class for daily lecture and demonstrations, his aim being to instruct the pupils in locating and detecting the common ailments of our farm animals and giving instructions in prevention and cure of diseases. To help in this work there is provided an Auzoux life size model of the Arab horse, made of papier This model is dissectable and presents over 3,000 named mache'. parts, nerves, blood vessels, bones, etc. It cost the university \$1,000 in the city of Paris. In addition there are many hundred dollars worth of skeletons and models of different parts of the horse and cow. Each afternoon a section of the class will visit farms or livery stables to study the conformation of the horse, especially for the detection of faults, blemishes and unsoundness. At least one horse will be dissected by the class during the term.

Thus it will be seen that the Short Course students come to three instructors for help in the care and management of farm animals.

FARM DAIRYING.

Dairying will be taught in the farm dairy room of the dairy school building the coming winter by Dr. S. M. Babcock and Mr. E. J. Bennett. Mr. Bennett was assistant buttermaker in the great dairy test conducted at the Chicago Exposition last summer. In the dairy room will be found all of the leading forms of hand and small power separators. Not only will there be separators run by hand, but others driven by a small tread power and by a small steam engine designed especially for the purpose. Several kinds of churns will be in use. Private dairymen are learning that butter for private customers should be put up in attractive form to bring the highest price, and much care and drill will be given in the printing and packing of butter. Thorough drill will be given in the use of the Babcock milk test. Many a farmer who sells \$500 worth of butter in a year loses enough through imperfect separation of the fat, faulty manufacture and improper packing to



Scene in Dairy School—Short Course Student Skimming Milk with Small Power Separator.

pay the whole cost of his son taking the Short Course in Agriculture. Here a young man has the opportunity to learn how to prevent these losses and make a superior product.

AGRICULTURAL CHEMISTRY.

Every farmer should know something about the soil and plants. Agricultural chemistry will be taught by Dr. S. M. Babcock, who will give three lectures a week, treating of how the plant grows, feeds and matures, and the animal food products it yields; of the composition and fertility of the soil; of farm manures; of commercial fertilizers; the rotation of crops; tillage, etc.

AGRICULTURAL PHYSICS AND MECHANICS.

This division of the work falls to Prof. F. H. King, and covers a most important line of instruction for young farmers, since it deals with such leading questions as the tillage of the soil, including a study of plows, cultivators, harrows, etc. Tile draining receives much attention. The water supply for stock and farm buildings is considered. Many pieces of apparatus are used in the physical laboratory and the drill obtained here is of the highest importance in grounding young farmers in the principles which underlie so many features of their vocation.

HORTICULTURE AND ENTOMOLOGY.

Horticulture and economic entomology are important subjects for every one tilling the soil, whether he be gardener or farmer. **Prof.** Goff with assistant will this winter occupy the new building devoted entirely to horticultural teaching and investigation. In the large laboratory the students will learn to graft, bud, make spraying mixtures for killing insects, fungi, etc. One of the green houses is arranged as a garden, having an area 22x75 feet. Here seeds will be put into the ground, cuttings, vines and trees planted, hot beds made, and many operations conducted as though it were springtime instead of midwinter. By the use of this garden many practical lessons will be taught. Adjoining this winter garden is a green house of equal size where are the benches. Each student will have a space of his own with pots and soil to study the growth and management of young plants.



;

Dairy School-View in Cheese Room-Students Making Cheese.

BACTERIOLOGY.

All fermentations and decay as well as many diseases are due to minute organisms known as bacteria. We have added instruction in bacteriology to the Short Course. Prof. Russell will explain the relations of bacteria to agriculture, and give the class many facts and illustrations which will prove of great value to the young farmer.

THE ECONOMICS OF AGRICULTURE.

Every thoughtful citizen believes that the stability of our American republic rests largely with the farming population. This great responsibility can only be properly met by a people possessing high mental ability supplemented by proper training. Prof. Wm. A. Scott of the School of Economics, will give twelve lectures to the agricultural students treating on such topics as the mutual relations of agriculture to the other industries; systems of land tenure; money, its functions and varieties; banks and their functions, etc. Following each lecture an hour will be devoted to questions and answers.

CARPENTRY AND BLACKSMITHING.

Those students who desire can spend two hours each afternoon in the university carpenter and blacksmith shop. In the former each is assigned to a bench where there are carpenters' tools as well as a turning lathe. The instruction in blacksmithing includes training sufficient to enable the student to make many of the common iron tools. This is a favorite course of study with many of our students, quite a number of whom have built blacksmith shops on their farms after returning, where all their common farm blacksmithing is done.

FARM BOOK-KEEPING AND BUSINESS ACCOUNTS.

The farmer should understand business forms and keep his accounts in a business like manner. Recognizing this the Regents of the University have directed that a course in farm book-keeping and business accounts be hereafter given each winter.

THE SHORT COURSE LITERARY SOCIETY.

Every farmer should be able to express himself clearly and forcibly by pen and voice. Each year our Short Course students organ-



The rows in the left hand part of the picture were sprayed three times with Fordeaux mixture and molasses-yield 254 bushels per acre; those at the right were sp ayed three times with amm piacal carbonate of copper, which did no cood-yield 105 bushels per acre. Difference due to Bordeaux mixture, 249 bushels per acre.



The rows in the right hand part of the picture were sprayed three times with Bordeaux mix ture—yield 322 bushels per acre; those at the left were not sprayed—yield 102 bushels per acre. Difference due to spraying, 220 busnels per acre.

ize a literary society in which the members take a deep interest. A great deal of time is spent in parliamentary drill, Roberts' Rules of Order being the guide. This with debating, essay writing and declamation has proved a most helpful as well as pleasant feature of the agricultural course.

REQUIREMENTS FOR THE SHORT COURSE.

The student should be at least 16 years of age and have a common school education. No entrance examinations are required.

EXPENSES.

The expenses of a Short Course student may be put down as fol-

Room rent, 12 weeks, at \$1.25	\$15	00
Board, 12 weeks, at \$3	36	00
Incidental fee		00
Books		00
Expense of visiting stock farms	3	00
	\$66	00

Non-residents will pay \$6 in addition to the above sum If the course in practical mechanics is taken, add \$5 to the above; if dairying, add \$1.

Some of our students spend a smaller sum than is above noted.

DATE OF OPENING.

Recitations for the next term begin Wednesday, Jan. 3, 1894, the term closing March 22.

In general it may be understood, unless other notice is given, that recitations in the Short Course and the Dairy Course always begin the first Wednesday in January of each year, the terms lasting twelve weeks. Generally a student can leave home Monday and reach Madison in ample time to secure room and board and settle down for work by Wednesday morning.

An illustrated circular describing the Short Course at greater length will be sent on application. All students intending to take the Short Course should send in their names as soon as the decision is made. To all such an additional circular relative to rooms, board. etc., will be sent a couple of weeks before the term opens.



FATHER TAUGHER. REV. HOLBROOK. Officiating Clergymen at Closing Farmers' Institute.

THE DAIRY COURSE.

Although farm dairying is taught in the Short Course, another course is devoted wholly to dairying, its aim being to prepare the student to operate a creamery or cheese factory. The students of this course take all their instruction in the Hiram Smith Dairy Hall. This course begins and closes at the same time as the Short Course. An illustrated circular describing the Dairy Course will be sent on application.

THE LONG COURSE IN AGRICULTURE.

There are young farmers who desire to secure a thorough collegiate training; to meet the wants of these a Long Course in Agriculture has been established which leads to the degree Bachelor of Science in Agriculture. Those interested in this course should write for the university catalogue, which gives in detail an account of the course.

GRADUATE COURSE IN AGRICULTURE.

Each year a number of young men who have graduated at cur own or other institutions pursue advanced lines of agricultural study with us. Our facilities in several directions are now ample for most helpful instruction to this class of students.

AGRICULTURAL EDUCATION WITHIN THE REACH OF ALL.

There is not a young man in the state that cannot take an agricultural course, long or short, at the university, provided he only makes up his mind to that end. It may take years to accomplish the result, but in this country everything is possible in the way of securing an education. Any bright young farmer can settle the question of how he shall obtain the necessary funds to pay his expenses while at Madison.

ATTENDANCE AT UNIVERSITY 1892-93.

Total students in Short Course	68
Total students in College of Agriculture	175
Total students in College of Agriculture	1987
Total students in University	1201
Total instructors in College of Agriculture	14
Total instructors in University	113

For illustrated circulars describing the agricultural courses, address Prof. W. A. HENRY, Madison, Wis.

For information regarding all the other university courses, address President C. K. ADAMS, Madison, Wis.
PROCEEDINGS

OF THE

Closing Farmers' Institute,

HELD AT

FOND DU LAC, WISCONSIN, MARCH 1, 2 and 3, 1893.

POTATO DAY.

Morning Session --- Supt. Morrison in the Chair.

Prayer-By Rev. Father Taugher. We come to Thee, Oh Lord, before we commence this undertaking, to consecrate to Thy great honor and glory the work that shall here be done, and to implore Thee to send down upon Thy humble servants Thy grace, that it may be directed according to Thy Holy Will and to the best interests of Thy creatures, who, by Thy decree, must earn their bread by the sweat of their brows; and that all the deliberations here be conducted in a manner most agreeable to Thee. We know. Oh Lord, that we can do nothing without Thee, but with Thy help we can accomplish Thy Holy Will. Conduct this Institute by Thy wisdom, bring down Thy blessing upon this undertaking, and may the deliberations here have happy issue, and those that take part in them come to Thy eternal peace hereafter in Heaven forever. Amen.

Supt. Morrison-This is our seventh closing Institute. It was a happy thought to bring together all our workers after the winter's work and have what we have called a Closing Institute, to save some of the good things that have been said, and have them upon record for future use. We have already issued of the six bulletins 193, 000 copies and if some of you gentlemen could see the stack of letters that we have received in the last five or six weeks, in reference to the Wiscon- of Clover as a Fertilizer.

sin Farm Institute Bulletin, from every state and every territory, and every country upon this continent, you would be more proud of Wisconsin than you are already.

this morning We commence our Seventh Annual Closing. We hope to issue 50,000 copies of the report of this three day's meeting. I will now call to the Chair Mr. George McKerrow, who will conduct the exercises this morning.

Mr. McKerrow-Mr. Chairman, Ladies and Gentlemen :-- In opening this institute for active work, let me urge upon every one to take an active part in it, to feel perfectly at home;--to feel that this is your meeting and not ours. Superintendent Morrison has gone to the trouble and expense of bringing to you some of the very best talent to be found in the United States and Canada, to take part in this closing institute, and it should be our duty to take advantage of this opportunity to draw out such information as will be of value.

We have with us a gentleman who has a reputation not limited by the lines of this country, a reputation made as an Ohio farmer, and it gives me great pleasure to introduce to you Mr. T. B. Terry, of Hudson, Ohio, who will give us a short talk on the subject

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WISCONSIN FARMERS' INSTITUTE.

CLOVER AS A FERTILIZER.

T. B. TERRY, Hudson, Ohio.

I suppose I am to talk about clover as a fertilizer for potatoes, as this can get about three tons dry weight, is potato day.

In order to grow a large crop of potatoes and make money out of it, we must have plenty of available fertility. I can get on my farm in the rotation We can get this in several different ways. My friend, Mr. Smith, can get it by buying the manure in the city, and drawing it to his farm;-probably that is the most practical way for him to get it. Some of you have dairies, perhaps, and can buy the food and feed it out on your farm and get fertility in this way to grow a large paying crop.

Value of Clover.

Some of you may be situated as I am, and can get it best by growing clover. It is to discuss this point,how we are to get it best by growing clover,-that I am before you this morning. By the charts on the wall we see that the amount of fertility in a ton of timothy hay is worth \$4.70, and in a ton of clover hay \$7.62. In the regular rotation of clover, potatoes and wheat, as I grow them on my farm, I can grow about five tons of clover hay per acre, not in one cutting, but during the rotation. We feed out two tons of it, three tons go back to the soil. You will notice that there are two values given to the clover,-\$7.62 where it is not fed out, and \$5.08 where it is fed out. The animal takes that difference from it. Suppose I feed out three tons, and let the other go back to the soil as I do, I would have from the two tons fed out, \$10.16 worth of fertility and from the three tons not fed out, we would have \$22.86 worth of fertility, which gives us \$33.02.

But, in the roots of the clover, we and they are worth \$7.62, which would give \$22.86 more, which makes altogether, \$55.88 worth of fertility, that of growing clover for my potatoes where I feed out two tons of hay.

Compare it With Timothy.

Now, suppose I grew timothy in place of this clover hay. I could grow about two tons per acre, and if I fed it out it would be worth \$3.13 a ton or \$6.26. Supposing the root crop to be equal to the top, I would get \$12.62 worth of fertility as against \$55.88 in growing clover, or if I feed all the clover out, \$48.26 which is four times as much. Now, scientifically and theoretically, this is correct. We can get three or four times as much fertility by growing the clover in the regular rotation as we can by growing timothy to feed our potato crop. I have done just this thing on my farm for years,-got the fertility for the potatoes in just this way, letting the clover go back to the land after we take the wheat off in the fall, mowing it off and letting it go back one and one-half or two tons to the acre, cutting the first crop the next year for hay, and letting the second crop stand and go back to plow under for potatoes,-that is in three crops, cutting about five tons,-never less than that.

Clover Gathers Fertility and Produces a Better Product.

I don't know of any better fertility for potatoes than clover; it makes the finest quality of potatoes and they are less liable to scab. I have customers, who, if they were given po-

tatoes grown from fresh manure, would | the whole crop off, and it is poorer know it in a moment, and demand after growing timothy, because timothy potatoes grown on clover. Again, I feeds on the soil directly. can use my manure to better advantage to grow this clover crop, for if I get a large crop of clover on my land, I have plenty of fertility to grow the roots out as well as the crop, what potatoes. In a ton of potatoes we have \$1.74 worth of fertility. In six tons, or 200 bushels, we would have \$10.44 worth of fertility. That much is needed to grow 200 bushels of potatoes per acre, and if we can get \$55.88 tility until the roots decay? by growing a heavy crop of clover, we have abundant to grow the pota- a little fertility gathered by the shadtoes and to grow a large crop of wheat ing of the land. Clover shades the afterwards, and I do not know of land all the time during its growth, any other practical way that we can but I consider the pumping up of ferget fertility so cheaply for growing tility as one of the most important potatoes. Of course the question arises points. There is another farm down right here, where does the clover get below the one that you are dealing this excess of fertility over what timo- principally with, and there is a large thy gets? If it gets it from the soil amount of fertility there that you directly, why then we will not be the must bring to the surface. Of course gainers in the end, we will be simply there is a time when the mineral matexhausting our land. But we know ter will all give out, but I have been very well that it does not get its fer- growing potatoes nearly a quarter of tility from the soil directly. It gets a century and the time has not come a portion of its nutrition from the air, when it shows on my farm. Whenwhich costs nothing, and it gets its ever the mineral matter does give out, mineral matters from the subsoil, deep- we will have to supply it. I think the er down than our surface plants can go. It gathers its fertility by growing clover, and that is the indown there and pumps it up to the sur- gredient that costs the most. Did you face, and leaves it in the soil for the ever hear the farmer say after a dry crops that follow. Notice how admir- spell, "Now, we will have a good crop ably nature has constructed the clover as a result of this drought?" There plant to do just this work for us farm- is a reason for that. The constant teners;-the large tap-root goes down dency of fertility is to leach downthrough the soil. The clover sod is ward with the water from heavy rains. not tough like blue grass or timothy A dry spell comes, no heavy rain, and sod;--it sends down its little fibrous the tendency is upwards again,--it roots, it goes through the soil, send- comes up by capilliary attraction. You ing its roots down sometimes eight have heard it said that water won't feet, to gather up the fertility that run up hill. It does run up hill or we is lying there dormant and useless like couldn't do anything with our farms. coal in a mine, until man goes to work In a dry fall water works up in the and brings it to the surface by grow- soil, and brings the mineral matter ing clover. In these two ways clover nearer the surface. By growing clover gathers that excess of fertility, thirty you bring this matter up from below, or forty dollars' worth on the acre just when you want it, once in three beyond timothy. The land is richer or five years, you haven't got to wait

Discussion.

J. M. Smith-Suppose you take the then?

Mr. Terry-Of course then it leaves the soil poorer, because the bulk of the fertility is stored in the roots.

Mr. Smith-Does it throw off any fer-

Mr. Terry-No. Of course there is feeding matter of supplying nitrogen, is solved for the growing of clover if you take for the dry time. When the Lord crehe gave hin. dominion, and if he don't take it, it is his own fault. In my farm we have a three years' rotation for gathering this fertility, viz., potatoes, wheat and clover. We are working to get potatoes, not attempting to make money out of stock. If I were keeping a dairy I think I should follow a four year rotation, and grow clover, corn, potatoes and wheat;--that is if I wanted to grow potatoes and get the fertility. Then I would put all the manure from the dairy on the corn, follow the corn by potatoes and fertilize my potatoes in that way. There have been numerous changes in our treatment of clover, but we always have that one end in view,-we are growing it as a fertilizer for the potatoes. We take better care of it than is your land any better or any worse we did at first; no animal ever puts a foot on our clover any more than on our wheat and potatoes. We must keep the ground loose and give the clover every chance or we shall not get that \$55 worth of fertility out of it.

Mr. Faville-When do you sow your clover seed?

with our Mr. Terry-Very early, winter wheat.

Mr. Faville-What would you do in a country where they didn't raise winter wheat but depend entirely upon spring grain?

Mr. Terry-You will have to do the best you can and sow the clover with the spring grain. It would not be as safe a practice with us.

The Chairman-Do you use plaster on your clover?

Mr. Terry-I have done so, but it does not show any beneficial results on our farm. Any fertilizer that I put there is of no use. With this \$55 worth of fertility, from the clover, any more is a superfluity. Our land is a prairie soil, the subsoil is mostly heavy.

Question-What kind of clover do you sow?

Mr. Terry-I sow the medium red, because I want the first crop for hay. gross feeder and will do best on ma-

ated man and put him in this world | I cover the seed as little as possible. On real mellow land, if the seed could be sown just before a rain, the rain would cover the seed sufficiently. I sow about six quarts to the acre.

The Chairman-If you were sowing for fertility alone, would you still sow the medium?

Mr. Terry-No, I would use Mammeth.

Question-At what stage do you plow under?

Mr. Terry-Not until spring, when the ground gets so that it will crumble nicely. We plow under and plant the potatoes as quick as we can.

Mr. Faville-You intimated that the time might come when clover would fail to produce such favorable results as you speak of. In your own case after using clover?

Mr. Terry-It is vastly better than it was at first, but no better than it was ten years ago. Still I do not see but we are growing as large crops of clover as we ever did. I think our wheat has not yielded as well on the average for the last five or six years; the potatoes have yielded as well when the season has been favorable.

Mr. Everett-Mr. Terry has talked about plowing in clover as a fertilizer for potatoes, but in Wisconsin WP dairymen and stockmen believe that it is better to cut the second crop and get the feeding value out of it, and put it back on the land in the shape of manure.

Mr. Terry-If keeping a dairy was my leading industry I should certainly cut it and feed it out, but after all you cannot grow as many potatoes to the acre in that way, in my estimation, as you can to plow under the second crop. There is a great benefit in having a little vegetable matter to turn under with every square foot of soil you turn over in the spring.

Mr. Olds-Why would you plant corn and then potatoes and then clover?

Mr. Terry-Because the corn is a

section where neither spring nor winter wheat was a success. What would action to prevent it? you use for the third crop? Would oats be satisfactory?

Mr. Terry-It would not suit me as well because I would want to get something in the fall, just as soon as the potatoes were taken off, to supply the lost fertility. I would sow rye or something in the fall, even if I had to plow again in the spring.

Mr. Martin-What has been your average yield in potatoes, for say five years?

Mr. Terry-I think our average yield for all the time we have been growing would not be far from 200 bushels per acre; of coure we get up to 300 sometimes, and some poor years we fall down to 125 or 150.

Mr. Thayer-Is there any danger of using too much clover-what is called clover-sickness?

Mr. Terry-Yes, just as much danger as there is in growing spring wheat right along. We don't call our land wheat sick, but it is the same thing. The land gets tired growing one thing continuously. I am not certain that we are not overdoing the clover question a little in our three years' rotation. I think four years would be safer. You see our land is growing clover two years out of three, one year with wheat and one year alone, and that is running it pretty hard.

The Chairman-I judge from your answers that you believe in having a green growing crop on your soil all the time if possible.

Mr. Terry-Yes, it is just as bad for land to be idle as for men to be. It saves the leaching of fertility downward, which you have grown the clover to bring up and get to the surface. If you don't turn it into money it will get away from you.

Smith-You spoke of clover Mr. . bringing up the fertility, and also of raise clover I would not let it lie idle. its coming up in dry weather and be-

aure; then the fertility will have be | ing held in the top of the soil. Isn't come in better shape for the potatoes. it a fact that very often the nitrogen Mr. Angell-Suppose you lived in a comes up in such cases and passes off into the air, unless there is some

> Mr. Terry-I think not. I don't think that we can evaporate nitrogen any more than we can potash.

> Mr. Smith-Our scientific men tell us that it evaporates and passes off from our manure piles when they are laid out and exposed.

> The Chairman-That is in a case where they are heated.

> Mr. Terry-There is another form of nitrogen there, it has been changed into a volatile gas, ammonia, which will escape very rapidly.

> The Chairman-Some late experiments have been made where it is reported that the soluble nitrogen in manure has actually increased about 33 1-3 per cent. The manure heap having been worked over, and kept from heating all winter, an examination in the spring showed that there was that much increase.

Mr. Terry-The heating must have been very moderate and the pile sufficiently wet to absorb the ammonia.

Mr. Thayer-In what portion of the clover plant do we find the most fertility, if there is any difference;- in the tops, near the ground or deep down?

Mr. Terry-I cannot answer that.

Mr. Thaver-I believe that there is a theory that most of the fertility or nitrogen is stored near the top of the root, that the nitrogen increases from the top down to the root and from the bottom of the root to the top of the root.

Mrs. Smith-Mr. Terry, if it is not good for the land to rest, what do you do with the old law, given to Israel, that every seventh year they should let the land rest?

Mr. Terry-We let our land rest once in three years, but if we are going to

Question-What will you do with

winter wheat?

Mr. Terry-I haven't solved that problem as yet. One thing you must remember, your winters are not as open as ours.

Mr. Arnold-Is clover sickness caused by the exhaustion of phosphates and potash, or what?

Mr. Terry-It may be from lack of mineral matter and it may be from the reason that the land gets tired of growing any crop. Potash is the first mineral that gives out.

Mr. Cole-Do you have any trouble with the clover midge, which in so many places renders it impossible to raise clover seed?

Mr. Terry-By mowing the clover after the 10th of May and leaving it on top, and letting another crop come on, we can get a crop of seed in spite of the midge. There are two breeds of the midge; by bringing the clover in bloom between the time that the two breeds come, you can get your crop. I don't know but the midge will catch onto this after a while.

Mr. Noves-What time does clover blossom with you?

Mr. Terry-The first blossoms come about the first of June.

The Chairman-With us in Wisconsin it is about the middle of June, though I have noticed in southern Wisconsin that it is about the first.

Mr. Steele-When you speak of the land getting tired, do we understand that that simply means that the property is exhausted, which is required to produce a given crop?

Mr. Terry-Some one of the ingredients is probably exhausted, that is, the available form of it. The land may be abundantly rich, and still the material not be in shape to produce that crop. Land that is ordinarily good cannot be exhausted in ten years or a hundred or two hundred.

Mr. Martin-You recommend sowing six quarts of seed to the acre. At the State Convention at Madison a few days ago we were told by Mr. Hall

people who don't know enough to raise that two pounds were sufficient,-that he had calculated the number of seed in a pound of clover, and that that gave about 12 seeds to the square inch. At the present price of clover seed, this is quite a consideration.

> Mr. Terry-I speak not from theory but from actual sowing of clover seed. I have sowed as little as three or four quarts, and I do not feel safe without putting on about six quarts. I sow right on the surface when the surface is honey-combed on a frosty night, as soon as the snow is off. We sow it in the morning before it thaws, broadcast with a seeder and let the freezing and thawing cover, it. I have not sowed on the snow because we can do it better right on the bare ground; then it is fastened right in the mud when it thaws. There is an advantage you can see in sowing on the wheat; we sow in the drill row of the wheat. I use a seeder that goes with a crank. I think that is the best kind; it gives the most uniform row of seeds.

> The Chairman-If you were sowing clover on spring grain, would you want to cover it any depth?

> Mr. Terry-It might be slightly covered. If I could sow just before a heavy rain I would like to do it in my latitude. A light, smoothing harrow would cover the seed perfectly.

> excessive Convey-With an Mr. growth of your clover, and a heavy snow fall during the winter, isn't there some danger of its being smothered out?

Mr. Terry-I would not let such a heavy growth stand during the fall. We mow ours twice during the year, then there is no danger of smothering. You go on my clover patch as soon as the snow gets off, and you can't see the soil, it is all covered with vegetable matter. Those two mowings have gone back and decayed and formed a sort of vegetable mold all over the surface, and that tends to increase the fertility beyond all question.

Mr. Faville-I think there is another

advantage in mowing,-if there are any weeds, you cut them off and prevent their seeding.

that, because we have got beyond the weeds.

Mr. Faville-Up here once in a while we see a weed. I want to know how deep you plow.

Mr. Terry-I plow pretty deep on my land. When the crop needs fertility most, is just when it is coming to maturity. That clover begins to decay after being cut and plowed in, about two weeks before my potatoes mature; it begins to be available then, and it means fifty bushels more to the acre.

Mr. Noves-Is there anything in the idea that clover seeding the first year injures the root?

Mr. Terry-It will injure it. Of course, if you allow the plant to go to seed, its purpose in life has been attained. and it will not do as well. I never allow the clover to go to seed until I through using it. Practically we am try to prevent its going to seed at all in our land. The second crop we break down with the harrow to prevent its ripening, as soon as it gets about knee high. If I would let it run riot in the natural way, it would get all brown, too ripe by the 10th of September in our latitude, perhaps by the middle of August. When it is about coming into bloom, I take the smoothing harrow and break it right flat down, in lands the way I want to plow the next spring. The ends the clover, and let the land lie, you turn and grow up again and they try turn that immense amount of fertility to produce a plant, and in that way I into timothy, which brings you but litkeep the clover growing till winter, and get a larger percentage to plow under in that way. A man that isn't a pretty moral sort of a man who attempts to plow under a heavy crop of clover, lying every way, I think, will bring more money than timothy. break one of the commandments,-but just harrow it down, and unless it is if you fed your second crop of clover very wet, you can turn it under all hay to stock and applied its feeding right. I use a hand plow.

Mr. Convey-I infer you prefer spring plowing of clover sod for grain.

Mr. Terry-I would where I live. Mr. Terry-Yes, I forgot all about I don't know about it up here. When the ground is frozen there is no loss of fertility. As we have numerous showers, there is a loss of fertility from having the land bare.

> Question-Would you prefer early plowing in the fall, before the clover gets woody?

> Mr. Terry-No, sir, I would not, if we were not going to plow until next spring, I would let the clover grow. I don't care how woody it is.

> Mr. Fox-Did you ever miss getting a good catch of clover when you sowed on fall grain?

> Mr. Terry-I have not had a failure in twenty-three years. Where there was timothy sown the fall before and then clover seed sown in the spring, I have known many failures, and there have been failures from waiting two or three weeks for fear the clover will be injured by freezing; then the seed does not get covered by the freezing and thawing, and the frost comes and catches it on the surface and kills it. Let the seeds get into the cracks of the ground and be covered and it will go through practically anything we have in the way of frost after that. The Chairman-If you were sowing

for timothy, would it be better to sow before or after the clover?

Mr. Terry-Better sow with clover unless you sow in the spring; that clover gathers up a large amount of fertility. If you sow the timothy with tle per acre, and the rest of the fertility goes back into insoluble compounds and you lose it. Turn it into money, fifty or a hundred dollars an acre, into corn or something that will

Mr. Woodward-Don't you think that value to the land in the shape of some

commercial fertilizers that it would be feeding value of clover hav is \$15. If better for the man who owned the I get two tons of clover hav, which

cialty of the dairy or early lambs, land, I wouldn't grow any potatoes, or something of that sort, feed it out, but if I put half of that, or less, then as you think best, but when you come I get a good crop of potatoes. I think to make your money out of a little bit the Lord has blessed Mr. Terry in givof farm, growing potatoes, you won't ing him the soil that he has -he has do that way,-you will find it will not done better by him than by me. pay as well. You want all the vegetable matter you can get into the believes that the Lord helps him who ground for the potatoes.

Mr. Woodward-Don't you think that with that in view. there is enough vegetable matter in a large amount of clover roots?

Mr. Terry-That will do, perhaps, for the potatoes alone, but we have a three years' rotation.

value of the clover back on the land well as you think. in the form of some commercial fertilizer. I think it is better to take off the Mr. Terry has said ,and from this disclover and use it some other way.

wouldn't dare say it was for me. The us that it is worth nearly \$50 an acre trouble is these fertilizers dont al- to him, that he feeds his clover with ways do their work, and the clover manure, and then feeds the potatoes does every time. I have put on fer- with the clover;-that he gets a bettilizers at the rate of a thousand ter crop, less rot and less scab than pounds to the acre and you could not where he has had no clover. He has see where they were put.

ver hay on your farm you would pre- he has also intimated that he wants sumably get \$5 a ton feeding value, his soil mulched or covered with a but you can expend its feeding value in growing crop to save the fertility and commercial manure, and at the same keep it drawing from below all the time, it is said, get 80 per cent of the time. Let us take home all these ideas. clover back in manure.

Mr. Woodward-In my country the upon them if we can.

land than to plow down the clover? I do frequently, that leaves me \$30. Mr. Terry-Where you make a spe- If I put \$30 worth of fertilizers on my

> The Chairman-Probably Mr. Terry helps himself, and selected that farm

Mr. Terry-I selected the farm because it was the poorest in our country. A man bought this farm for his son, and the son wouldn't take it as a gift, it was so exhausted and run Mr. Woodward-If I put the feeding down. I am not situated naturally as

The Chairman-You see from what cussion that clover manure is a good Mr. Terry-It may be for you. I thing in growing potatoes. He tells given us a good idea how the clover The Chairman-If you feed that clo- brings up the fertility from below:use them as best we can, and improve



CLOVER AS A FEBTILIZER.

HENRY WALLACE. Editor Homestead, Iowa.

gage the attention of the farmers of means more than merely present monthe West than the conservation and in- ey making. It means social position crease of the fertility of their lands. for the family; it means self-respect, "Rich land, rich farmers: poor land, culture and education for the children: poor farmers," has passed into a pro- it means every material thing which verb. Hugh marks that when a young man, he was can citizen. These good people whom clerk in a bank in Scotland, and could I have mentioned, for they were good not fail to notice that if a farmer had people, were called "Hottentots" simrich land, no matter how high the rent, ply because their fathers had made a he had good credit at the bank, while selection of land which did not conif he had poor land, no matter how tain the primary ingredients which enlow the rent, his paper was not wanted.

Rich Lano, Rich Farmers

I remember a church in Pennsylvania whose membership nearly all lived on the carboniferous soils of the coal measures. In one neighborhood, however, the carboniferous rocks had been farther to state briefly what are the thrown out by an upheaval. These lands in their native condition were apparently equally good. When the timber had been cleared away and the virgin fertility exhausted, as it is in almost every country, the farmers in this upheaved section began to fall back, while those on the naturally rich lands made steady progress. Accordingly, on the principle I suppose, that misery loves company, they and their children grouped themselves together in seats in one corner of the church. The difference between them and their fellow worshipers in point of dress, culture, and intelligence became so pronounced that one Sabbath during the interval some wag wrote on the wall in their section, "Hottentot Corner." They at once left the church in a body, and thereafter worshiped with the poorer people in a neighboring village. The maintenance and in- only one we shall discuss to-day, is

No more important question can en-| crease of soil fertility, therefore Miller somewhere re- is desirable on the part of the Ameriable a skillful farmer to restore and maintain soil fertility. That was all. It was not their fault, but their great misfortune.

Essential Elements of Fertility.

It might be well before proceeding essential elements of fertility in all soils. There are few soils indeed that do not contain an inexhaustible abundance of all the materials needed for the growth of the grains and grasses, except three, viz., potash, phosphoric acid and nitrogen. The first two are inorganic, and are rendered available for plant use, from the primary rock of which all soils are composed, by the slow processes of nature. If this primary rock does not contain sufficient quantities of these elements in an available form, then the land will soon become barren. A farm where these are deficient is simply a spot of earth on which the owner has an exclusive right to make a farm by the use of commercial fertilizers. Wisconsin farmers cannot afford to accept a spot of this kind as a gift. The third essential element of fertility, and the

nitrogen in its various compounds. | gen can be supplied profitably except Agricultural chemists have racked by the growth of the legumes, hence their brains for a hundred years to clover in some of its varieties as a ferfind out whence the nitrogen in soils tilizer has always been the main stay originally comes, and so far as I can discover, they concluded that ultimately it is the accumulation of nitric acid caused by the lightning's flash, thence finding its way into the soil, then into plants and animals, and finally deposited in large quantities in the sedimentary rocks, whence comes the nitrogen of commerce. A more rational conclusion and one that we believe will be accepted in the near future is this. that it is accumulated from the free nitrogen of the atmosphere of which it composes 79-100, by the action of the badteria in the tubercles on the roots of the legumes. This is a simple, rational, demonstrated source, and whether or not nitric acid can be formed by electrical action in the atmosphere, it satisfactorily accounts for the enormous supply needed for the support of life on the planet.

The Source of Nitrogen.

Ever since the time of Virgil, and I know not how long before, observant farmers have noticed that all plants do well after the legumes, and that all animals do well when fed on them. The history of livestock improvement shows that it is contemporaneous with great extent from its long tap-root, and the introduction of the legumes into that it does not obtain it from the crop rotations. The history of American agriculture shows that lands constantly become poorer after cultivation, whether East or West, no matter what their original fertility, until they reach the nodule or tubercle on the roots of the point when farmers are compelled the legumes is not a parasite of the to grow the legumes and especially the clovers. Prior to this, there is seldom but an example of symbiosis or asany improvement in livestock and sociated life, and that the germ of this scarcely any attempt at dairying, at associated plant is as important in a the growth of mutton sheep, improved clover growing soil as is the clover sheep or improved horses. The simple seed itself. They have grown clover reason has been that the nitrogen of in pure sand, sifted, washed and boiled the virgin soil wasted rapidly, both in acid, supplied with the inorganic through crop exhaustion, soil-washing elements of clover with no nitrogen and the leaching by the rains. There as successfully as when the nitrogen

of the American farmer when he becomes converted from a soil robber into a genuine farmer.

The Power of Legumes.

It may be well at this point to state as briefly and as distinctly as possible. what has been demonstrated by scientists during the last ten years as to the power of the legumes in which the clovers are included, to supply themselves with this essential element of fertility from the free nitrogen of the atmosphere. From the earliest times clover growers have known that this plant is able from some source, to derive an astonishing amount of fertility of some kind. What it was, and where it obtained it have been the mystery of centuries. Messrs. Helreigel and Wilfarth of Germany, and Prof. Atwater of America, have in the last ten years demonstrated that the elements of fertility which the clovers and legumes obtain from some hidden source is altogether nitrogen, and that they do not obtain it to any very great extent, from the ammonia of the atmosphere. They have also demonstrated that clover does not obtain it to any free nitrogen of the atmosphere, -but by means of bacteria in the nodules or tubercules on its roots.

They have further demonstrated that plant nor indeed a part of the plant, is no known source from which nitro- is supplied. This, however, they have

was wet with water that had passed in a few weeks, leaving only scattered through soils in which the legumes grew. This supplied the germ, or to use the German expression, "leaven," to the soil.

A Valuable Discovery.

This discovery explains many things which have puzzled thoughtful clover growers for years. It explains why a crop of timothy when grown with clover often yields as large a crop in addition to the clover as is obtained when timothy is sown by itself. In other words, timothy which is dependent altogether upon soil nitrogen for its supply is fed by the clover which draws for its supply on the winds of on what is commonly called, though heaven. It explains why, when clover predominates in a mixed meadow one year and disappears largely the second, the crop of timothy folowing surpasses all previous expectations. The timothy is simply feeding on the nitrogen supplied by the clover roots of the year before. It explains the fact that large crops of clover can be grown on comparatively poor land, as for example, on subsoil from which the surface has been removed, in washes by the road sides and on very sandy land. Under these circumstances the clover only possible to grow a profitable crop having the inorganic elements in abundance in these soils draws altogether for its nitrogen upon the atmosphere. It shows why clover is not benefited by nitrogenous fertilizers. Sir John B. Lawes called my attention a year or two since to a large number of plots of the different clovers, peas, beans, vetches, lupines and other legumes, each alternate one of which was fertilized with nitrates, and asked me to point out the fertilized plot. I could not do it in a single case. The legumes seem to prefer, where other conditions are right, to supply themselves with atmospheric rather than soil nitrogen.

This experiment also explains the singular fact that when clovers are sown on new prairie lands and a fair stand

been able to do only when this sand is obtained, the stand often disappears stalks and bunches in different portions of the field, while in some parts of the field the stand is complete. The explanation is that these soils have not been "leavened" with the germ of the tubercle. The explanation is rendered more complete from the fact that if this scattering stand is allowed to seed, it very soon becomes general. The only known source of the leaven is that of the wild legumes and I think it will be found that on prairie lands where wild legumes are abundant, there is little difficulty in securing a good stand from the first.

> This experiment throws much light erroneously, "clover sickness:" that is, the refusal of lands which formerly grew clover to grow it now. The explanation is that clover has been grown on these lands until, by the clover itself and cereals that follow in the rotation, one or the other or both of the inorganic elements have been reduced below the point where profitable crops of any kind can be grown. In England, Scotland, Ireland, and Belgium it is not possible as a rule to grow two crops of clover in succession, and in about six or eight years' rotation. We might draw other lessons from this experiment, but time will not permit.

Sow Clover Seed Every Year.

It remains now only to make the practical application to the agriculture of Wisconsin. Where Wisconsin soils have not been depleted of their potash and phosphoric acid, the nitrogen supply can be increased to any desired extent by using the clovers. These should form the arch of the rotation. They should be sown with or without a nurse crop as circumstances seem to require. If sown with winter wheat or rye, the sowing should be done as soon as the snow leaves the ground and before alternate thawing and freezing have commenced. If the soil is of

such a nature, as for instance, very | two crops of corn have been taken, a sandy, so that there is little expan- crop of oats should follow, or in winsion or contraction during this period, they should be harrowed in with a light smoothng harrow drawn in the clover sowing. same direction with the wheat drills. If sown on oats, barley or spring wheat, they should be covered in all cases, the depth of the covering depending upon the lightness or heaviness of the soil, but to a depth of onehalf inch to two inches. The subsequent hay crop should be cut not later than the 1st of July in this latitude, when with a favorable season a seed crop may be reasonably expected, provided the clover seed midge and other clover insect enemies are absent. Where these are known to be lying in wait for the clover blossom, the mammoth variety should be used, pasture off closely the second season until from the 1st to the 15th of June, according to latitude, and then a seed crop taken, which under these conditions, is about as certain as any other crop and as profitable at present prices. The clover then should in all cases be turned under, the maximum of fertility having been secured, but should not be plowed until late in the fall for the reason that nitrogen is very easily washed out of the soil by rains, and therefore the soil should be kept at all times as full of living roots as possible. I believe it will pay Wisconsin farmers to sow clover seed with small grain every year, even where it is intended to plow the ground in the fall for a crop of cereals the year following. I have on my own farm made experiments for a number of years to ascertain in bushels of corn the value of the clover roots of a crop yielding on an average two and a half tons per acre. I find that it varies from fifteen to thirty bushels, the that in a state so varied in its soil as comparisons being made with soils Wisconsin, there are townships and adjoining, equally good, from which counties supposed to be barren wastes two or three corn crops had been taken. The increased yield the second elements, and can be made productive year is somewhat less, probably from farms by the intelligent use of the clo-

ter wheat sections a crop of winter wheat, in either case to be followed by

Clover With Live Stock

It will be objected that this process continued from year to year will in the end deplete the soil, and even the subsoil, of its inorganic elements, potash and phosphoric acid, and eventually render it absolutely barren. This is true. The remedy is diversified farming, in which feeding cattle, sheep or hogs from the products of the farm, and better still, dairying, supplies manure by which these inorganic elements can be replaced. The man who by wise and intelligent clover growing supplies his soil with nitrogen, grows large crops and either sells them in a crude form to a distant market or feeds them and allows the manure to leach into the nearest stream, is a man who is a soil robber by instinct and profession and has yet to learn the first principles of advanced husbandry. Clover is in one sense only an instrument for drawing on the winds of heaven for fertility, which in the form of commercial fertilizers costs from sixteen to eighteen cents per pound. In doing so the farmer draws largely on his soil for potash and phosphoric acid, worth from five to eight cents per pound. If he uses this instrument wisely, it will enrich him and his, give his wife a comfortable home and happy surroundings, clothe and educate his children and place them in advanced positions in life. If he uses it unwisely, it makes him only the more effectually a soil robber, a waster of the bounties of nature, and a foe to advanced agriculture. It is quite likely which have sufficient of the inorganic ten to twenty bushels per acre. After vers. It is quite probable that there

are other sections, probably pine lands, | in which these elements may be defi- cumstances. On new prairie land I cient, but these can easily be sup- sow ten pounds; on land that has been plied in the form of wood ashes. I once sown with clover, eight are have no question but that there are abundant. On my own lands it is not fortunes to be made in Wisconsin by material, whether I sow any or not. the purchase of these cheap lands and After I have taken the seed crop, I their conversion into valuable farm turn the sod under and plant it to lands by the application of the princi- corn, and then grow winter wheat. ples discovered by modern scientists. Under those circumstances I would

it may be well to make another sug-pounds. There is enough seed in the gestion. Permanent pastures made up ground to make up the stand. As a entirely of the true grasses do not rule a man ought to sow plenty of increase the fertility of the soil, and seed. The depth in sowing is also if the pasture is continually fed away another question that depends on cirand no legumes are sown, utterly cumstances. On light soils clover refuse to grow anything but the ought to be covered two inches. I coarser grasses and weeds. Our New England friends call these "cowed-out" nastures.

The remedy lies in the use of the clovers, and preferably the much abused and despised white clover, whose province it is to supply blue grass, red top and such like grasses returns at having time; that which with nitrogen for which they are as hungry as a hard working farm boy seventeen or eighteen years old is for beefsteak and apple pie.

In conclusion, gentlemen, the clovers deep on clay and lime soils miss it. are the most wonderful plants, especially in their relation to fertility, that grow out of the ground. I have not spoken of their indispensable place in the crop rotation nor have I referred to their inestimable value in the feeding ration, this being outside of the subject assigned me. It is enough to say that the growing demand of the entire West is for more albuminous, home grown food with which to balance up our too highly carbonaceous rations, and especially when they are to be fed to the dairy cow and to the mutton and wool sheep. another This, however, belongs to branch of a very great subject.

Discussion.

Mr. McKerrow-How should clover seed be sown for the best results?

Mr. Wallace-That depends on cir-At the risk of wearying your patience not sow more than two or three asked the Experimental Station at Ames, Ia., to make experiments this year by sowing from a quarter of an inch to three inches deep. That which was sown one inch deep came up the quickest apparently. That which was sown two inches deep made the best was sown four inches deep, was in the best condition after quite a period of drought last fall. The soil was light and sandy, but men who cover

> Mr. Hayes-I have always put about six pounds to the acre, sowing with wheat. Is there any way to preserve the clover and keep it more than one year?

Mr. Wallace-Clover is a biennial as a rule: by pasturing it is made a shortlived perennial, but if you want continuous clover sowing sow your crop say in 1893 a full stand and only about two-thirds of that will grow under the best conditions this year. You know you can't make locust grow the first year unless you sprout it by hot water; if your conditions are not right it will lie there two or three vears. Calculate on two-thirds of it coming up, put a half a stand on the next year, do not cut your crop for seed. After that you can grow numerous crops. I have got my eleventh crop this year.

Mr. Hayes-I have clover on my of symbiosis or associated life. When

that it is the root of the clover that or microbes. extracts this nitrogen from the air and holds it in the soil for the benefit of the following crop? Or, has the clever itself any power to do that?

Mr. Wallace-The clover itself has no power to do it. It is the microbes in the tubercles on the roots. If you will take up the report of Helreigel on that subject, you will find that he proved after many experiments, almost by mathematical demonstration, that where there were no tubercles there was no healthy growth, no nitrogen,-where there were plenty of tubercles, there was plenty of growth and plenty of nitrogen. Hence, you can take poor land and grow clover on it, provided you will wet it with water, the washings of which have grown clover. If you will take up in the spring of the year or during any time before the seed ripens, a healthy clover plant and examine it, you will find there are little wart-like excresences which some call nodules, and some tubercles, on those roots. You will find that their number corresponds to the size and healthiness of the plant. You will find no clover plant without them. Fifteen years ago a farmer told me that that was the clover seed, and when the clover died, that it came up the next year from that seed on the root. Now, examination shows that that is no part with a disc harrow or cutter. That of the root, but that it is a plant that won't hurt your permanent pasture is married to the clover,-it is a case and it will help it.

land that has been there, I don't know you come to cut these tubercles you how many years, mixed with timothy. will find they are swarming with min-Mr. Blackstock-Do I understand ute organisms, which we call bacilli I advise every one of you to pull up some clover roots and examine those tubercles. They are nice, fresh, plump, healthy looking fellows in the spring, but when the clover seed ripens, they begin to wrinkle and lose color, and apparently die. The next year a fresh lot starts up, if the plants live.

> Mr. Convey-Do you think Alsike clover is as beneficial to the land as the other kind?

Mr. Wallace-It depends upon what kind of land you have. If you have bettom land that is liable to overflow there is no grass that grows out of the ground that is the equal of the Alsike,-but when you come to put it on what we call dry corn land, Alsike will grow, though it will not yield the bulk of food that the red clover will, and hence I do not regard it as valuable as the other on dry land, except when the midge is about. Then I will take the Alsike. It is a perennial, there is no danger of your ever losing your seed. Its place is first on wet lands, second as a substitute for clover, and third as a mixture in making sheep pastures.

Question-Is it possible to seed down land permanently to grass with Alsike clover without breaking it up?

Mr. Wallace-I would run over it



SOIL PREPARATION AND PLANTING OF PO-TATOES.

J. M. SMITH, Green Bay, Wis.

The subject assigned to me is ap-|them. What I consider my best poparently a very unimportant one, and tato soil is a black, sandy loam, with a one that is easily disposed of;-yet it yellow, sandy subsoil. It was naturalis in reality a very important one, and ly a fairly good soil, and has been one to which good care and attention heavily manured every year until it should be given if good results can is now very rich;-so rich, in fact, that reasonably be expected.

Preparation of Seed .bed.

heavy clay soil, or a stiff heavy soil a satisfactory yield of potatoes. I have of any kind, I should prefer a clover produced this result more than once, sod, plowed late in the fall, and early but at the same time will say to my in the spring harrow it with a cut-a- farmer friends that it requires very way harrow until it was in fine con- rich land to do it, and upon even good dition. If I had manure to put on I land, they need not fear any bad reshould spread it upon the ground after sults from putting on from 15 to 20 plowing, but before any harrowing good-sized two-horse loads of manure was done. After finishing with a cut- per acre, and may expect good results away, I would put on the Meeker roll- from it, er or smoothing harrow, which would pointed. perfect its condition, and make the soil in first rate order for either potatoes, corn or other kind of farm seeds. Unless the land had pefect natural times with commercial fertilizers of drainage I should take measures to different kinds, but am sorry to say make it as perfect as possible. Too that upon my soil the results have much water is almost certain to dam- been far from satisfactory. In fact, age potatoes, both in quantity and I do not think that in a single case I quality; and I should prefer too little have ever had the cost of the fertilizer water rather than too much, and then returned to me. I rely upon my comdepend upon extra cultivation to help post heap manure, unless I can get me through the season;-although the wood ashes, which I like very much real facts are, that well tile-drained for the crop we are preparing for. land will stand drouth much better After a number of experiments in than the same land will, if left un- fall plowing for potatoes upon my drained.

say that I am not strictly speaking as vantage is that it is so much work a farmer, and that is true, but I grow done, and out of the way in the spring, a number of acres of potatoes each when we are always so driven that year and always try to have large we hardly know which to do first. crops, and generally succeed in getting I have also experimented with my

I do not dare to manure heavily where I intend planting potatoes, for fear of overdoing the matter, and getting a If I were upon a farm and had a tremendous growth of vines, but not and will rarely be disap-

Commercial Fertilizer.

I have experimented a number of

soil, I cannot see that the crop is im-But, genltemen, some of you may proved by it. The only apparent ad-

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manure sometimes putting it all on | for a lady's flower bed," and was in and plowing it under, at others put- fact as nice as my wife's flower beds ting on about half the amount designed are made every spring. for a piece, and plowing it under and was 1736 bushels of as beautiful Early the balance upon the ground after Ohio potatoes as any you ever saw. plowing and harrowing it in, and if The year following the crop was about put upon the stand under oath, I should hardly dare to say which has been the best, still long experience has told me that, as a general rule, it is did not do as well, and I can hardly better to put the manure upon the tell why. The yield was just about an top of the ground after plowing, and then harrow it in, and be sure to do only large, smooth, potatoes for plantit thoroughly.

Over 400 Bushels to the Acre.

We plow from eight to nine inches deep. I would not plow to this depth except upon very rich land. If planting upon a soil only four inches deep, I should plow but very little if any deeper than four inches, unless I have plenty of manure ready for use, and then perhaps an inch or a little more of the subsoil might not be objectionable; but as a general rule turn up but little of the subsoil at a time, either for potatoes or other crops. My land is thoroughly surface, as well as undrained, and in preparing it for planting potatoes it is put in just about as fine condition as we know how to put it. Let me illustrate this by a little incident that occurred a few years ago. A lady friend who had spent most of her life in cities was visting us during the spring planting time. While we were walking over the garden we came to where we were just ready to plant some potatoes. I said to her, "Here is a four acre plat just ready to plant with potatoes." She looked over the plat and then said to me, "I did not know that it was necessary to prepare land like that for potatoes. Is it really necessary? That land is nice enough for any lady's flower bed." I told her that I was very much in favor of very latge crops, and prepared my land for izers have you used? The them as well as I knew how. above plat was an exact four acres. Bowker's for potatoes, and for straw-

The result as large although they were not weighed out as exact as was the four acre plat. Last year my potato ground even 300 bushels per acre. I select ing, and cut them toward the stem end, and in such a way as to leave one good and strong eye upon each piece. They are planted in drills, and with an Aspinwall planter. The rows are from 30 to 32 inches apart, and the pieces are dropped as nearly 12 inches apart as the planter will drop them. We cover them not less than three inches, nor more than four inches deep.

Such Mr. Chairman, and Gentlemen, has been my system of soil preparation and potato planting, for I do not know just how many years past. It has been at least reasonably successful and I attribute very much of the success such as it has been, to the thorough preparation of the soil, selection of seed, and care in planting the same. Others are to follow me in this discussion and I will close for fear of intruding upon the limits assigned to them.

Discussion.

Mr. Cole-If you fall plow your land, would you apply your manure in the fall or the spring following?

Mr. Smith-I have a number of acres now on which I plowed under some manure last fall, about half of what I intended to use, and I have put the rest right on the snow this winter without composting it.

Mr. Woodward-What sort of fertil-

Mr. Smith-I have used Mapes' & It was, as the lady said, "nice enough berries we consider ashes very good.

Mr. Woodward-Did you ever try the muriate of potash and sulphate of fact. potash, instead of ashes?

of soda on some six or seven acres man having a large experience in the that we had rented, and we had plowed it very carefully and when it was planted we put the fertilizers on each by simply planting whole potatoes; alternate bed, so that we could know exactly what the fertilizer was doing. I did not know myself which rows it was on, I was sick when it was planted. Along late in the summer I began to see that there was a little difference, but when we came to dig the potatoes, it was so little that it was practically nothing.

Mr. Woodward-Don't you think that the application of stable manure tends to increase the blight that strikes the crop and decreases the yield?

Mr. Smith-I don't think that it does. I seldom put fresh manure on my potatoes; generally we have used wood ashes.

Mr. Woodward-We dare not use stable manure in any form with potatoes with us, or we would be troubled with the blight. We put our manure on the clover and grow corn, then put on the fertilizers and grow wheat. I can't afford to sacrifice the feeding value.

Mr. Noyes-Is fresh manure likely to produce scab?

Mr. Woodward-The worst scab that I have had for twenty years was last summer upon a piece of land entirely new. Most of it was manured with fresh manure, but I left a piece of it without any at all.

Question-Wasn't that filled with decaving wood?

Mr. Woodward-It was ordinary pine forest, and I didn't think it was very rich but the seab and blight almost ruined the crop.

Mr. Allen-I have heard it said by men that they believed that the scab increased by leaving the potatoes in the ground after they were thoroughly ripe.

Mr. Martin-I know that that is a

Mr. Steel-I noticed in a periodical Mr. Smith-No, I put a lot of nitrate two or three days ago that a gentlecultivation of potatoes says that he gets about four tons more to the acre that a portion of the eyes in the butt of the potatoes never produce a stem, and if so, it is a weak one, and that if the potato is cut, it should always be cut the longest way, never cross wise, and that a large portion of the advantage gained by it is from what is termed the seed end, while in other cases I am told that we get the largest potatoes from the eyes of the other end of the potato, and we should never plant the seed end.

> Mr. Smith-We cut our potatoes so as to be sure to have one good strong eye upon each piece. We cut them toward the stem end, because as our scientists tell us, the sap runs toward the seed end. We plant in drills about 30 to 32 inches apart, and 12 inches apart in the row. We have experimented some with potatoes, with large potatoes and with small. We experimented last year with a lot of small potatoes, really not the smallest, but one size too small for the market, and then we put in large potatoes, cut as I have spoken of, and the difference in the yield was about 25 bushels to the acre. We cut the small ones too: we put in some of the very largest that we could get, and the yield of those was still larger, showing that the largest potatoes cut down to one eye did the best, and that has been my experience for a good many years. The Early Ohios that I got very soon after they came out, did very nicely with me, and we have been sorting them every year, picking out our best ones, and using them for seed. The result is, that we think, and in fact we are sure that we have a finer strain of Early Ohio potatoes now than when we first got them.

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Prof. Goff-The idea suggested by Mr. pieces in that potato you have cut. Smith, that the eves of the potato are connected as branches to a live portion running through the center of the tuber is erroneous. The potato tuber is a modified stem, and as in other stems of its class, the vital part is confined to the cambium and the buds. The central part of the potato tuber is no more alive than the heart of a tree. It is not important whether we make the cut toward the stem end or toward the other end. This has been fully proven by experiment.

Mr. Thayer-Will it do any harm to leave two or three eyes on a piece?

Mr. Smith-If the eves are not nice and strong we leave two eves, and sometimes at the bloom end we would leave two or three eyes. We plant them just as they go. I have tried planting them in different ways, but I can't see that it makes any difference.

Mr. Collins-In cutting potatoes, when you come to one end you have four or five eyes in a very small piece of potato; would you prefer to cut them off or not?

Mr. Smith-In planting so ' many eyes, my experiment shows we get about as large a crop of potatoes, but a much larger proportion of small ones, and the eyes on the blossom end being closer together, we have to cut them small. We sometimes see them coming up, three or four eyes have started and we pull off the weak ones.

Mr. Thayer-Please cut that potato you have in your hand just as you would for planting.

Mr. Smith-I commence to cut with the stem end; I cut with the grain. At home we have knives on purpose. with a little hollow in them.

Mr. Perkins-In what form do you apply ashes to your potatoes and strawberries?

Mr. Smith-Sometimes we put it on the ground after plowing, and harrow it in, and sometimes put it in the rows planted.

Mr. Martin-I see there are thirteen

With seed at 75 cents and a dollar a bushel, isn't one of those pieces worth just as much as the whole potato?

Mr. Smith-I would rather have one of those pieces than to have a whole potato.

Mr. Steele-If you were to divide that potato in two equal parts, and cut out all the eyes except one in onehalf of it, and then cut the other up into six parts, would the growth in the vitality of the small piece equal that from the half?

Mr. Smith-I have never tried that particular form of experiment. My impression would be that the half potato with all the eves cut out, except one, would do the best, but I am not positive.

Mr. Steele-I have always thought there was a great advantage in planting a larger proportion of the seed because there is a large amount of nourishment to the new plant.

Supt. Morrison-It always seems to me that the man who wants to plant a whole potato does not half prepare seed-bed. If you prepare your his seed-bed as Mr. Smith does, you will get just as good results from a single eye, but if you do it as a great many farmers do, merely drag it over, and have it all lumps and clods, I would by all means advise you to put in a whole potato, and a big one at that.

Mr. Allen-Isn't it a fact that in the whole potato there is only about so many eyes that will germinate? Now, I think that as a rule 75 per cent. of the farmers cut two eves to the piece.

Mr. Smith-The young sprout of the potato needs food enough from its parent to protect it and give it growth until it can get roots of its own. If there is one good strong eve. that piece will protect and give it food until the root grows. It is possible that a large potato would give it a little more food and a little longer, but whether it will give it so much more as to make it a paying thing, I have my doubts.

The crop that I spoke of, that yielded 436 bushels to the acre had the seed cut in this way.

Mr. Collins—In our part of the country we have some weeds to contend with, and we plant our potatoes incheeks. Would you advise us to plant only one eye and only one piece in a cheek?

Mr. Smith—No, I would not. I wouldn't plant them that way; I would plant them in rows and drills.

Mr. Collins—Most of our people have had good results from planting in checks.

Mr. Smith—What would you call good results?

Mr. Collins-Two hundred bushels.

Mr. Smith—I cannot afford to raise potatoes that way; my land is too valuable.

Question-Do you drag your potatoes after they are up?

Mr. Smith—Yes, just as soon as we can see them. We go over them once and sometimes twice. We put in the cultivator as soon as the plants are large enough so we can see the rows nicely.

Mr. Thayer—Do you plant your potatoes as soon as they are cut?

Mr. Smith-Yes.

Question-About how many stalks would you have in a hill?

Mr. Smith—In my system of planting we don't want but one stalk. Where three or four come up, we sometimes pull them up and leave one stalk.

Mr. Cole—Don't you want to plant so as to avoid dropping your pieces of potato into a hot, dry soil?

Mr. Smith—We plant them before the soil becomes dry and hot, with an Aspinwall planter, which drops them into a fresh made hole. I would not leave them out in the sun. Our experience is entirely in favor of planting as soon as they are cut.

Mr. Merchant—Did you ever use anything after cutting to keep the seed from bleeding? Mr. Smith-We have tried to but we have not noticed any effect.

Mr. Allen—With the majority of farmers, down our way, they use land plaster on the cut seed to keep it from bleeding.

Mr. Munger—Mr. Smith, I heard your address two years ago at Waupaca, and I went home and fixed up an acre as good as I could and planted part of them about fifteen inches apart in drills three feet apart, and part of it two feet apart, and I harvested 50 bushels more to the acre where I planted two feet apart.

Mr. Smith—What variety of potatoes? Mr. Munger—The Peerless, the same amount of seed and cut the seed the same.

Mr. Smith—That has not been my experience. The Peerless I would not plant farther apart than I would the early Ohio. The Burbank seedling, of which you raise so many at Waupaca, I would plant farther apart.

Mr. Woodward-I want to endorse what Supt. Morrison said. It is merely a choice with the planter whether he will manure his future crop with the amount of seed he puts in the ground or something else. The yield of potatoes does not depend so much on what you put in with the seed, as what you put under the seed. I remember when the early Rose came around years ago. I paid five dollars for five pounds, and I was offered twenty dollars for the five pounds before I planted them. I cut those to single eves and then divided the eyes, sometimes into as many as six pieces and planted them. and the result was that I got over twenty bushels from the five pounds planted. It was not the question of how much seed I put in, but the stuff to make potatoes get up and grow.

Mr. Culbertson—What did you put in to make the potatoes get up and grow?

Mr. Woodward—Anything that I thought they would eat. I made a compost of stable manure, potash and phosphoric acid. It was in very light, sandy soil. I dug big holes and put, menting in the amount of potatoes. in plenty of the fertilizer.

Supt. Morrison-You must have been working for a prize.

Mr. Woodward-I was working for potatoes worth twenty dollars for five pounds. I put in just one piece in a hill. I took a very thin knife, and wherever I could divide the little incipient eve I did it. I put them into the compost in a spent hot-bed. I used a gentle heat, and if there were two plants came from one part I divided them when they were about two or three inches high. I made the ground very rich and took care of them, and there were some hills that yielded a half bushel of potatoes.

Mr. Morrison-I am a little sorry that this discussion has taken this turn, because I dont think that it is practical. Mr. Woodward is giving you the experience of men something like fifteen or sixteen years ago, when B. K. Bliss first introduced the Early Rose potato. I remember giving a dollar a pound for several pounds of those potatoes. Mr. Bliss had bought up the entire product of the Early Rose potatoes from Mr. Breese of Vermont, who was the originator, get it, you will produce a crop. and there was a great deal of experi-

that could be raised from one pound of seed, and prizes were offered. The man who produced the most, I think got something like 40 bushels, that he produced from one pound, but he did it by putting it into a hot-bed, dividing it up, etc. Of course that is not practical for the ordinary farmer, but the experiments made at that time were of great benefit to the potato world. It showed some of the possibilities that lay in the potato and the great cropsthat could be produced if you only gave them the proper kind of attention.

Mr. Woodward-I wouldn't recommend it for the ordinary potato grower, but the shrewd potato grower is the man who is always looking after novelties.

The Chairman-You see from what Mr. Smith has said that he prepares. his soil by the use of his compost heap and ashes, rich fertilizers, etc., and makes it all rich to feed this seed potato that he puts in. A good point is made in that respect. Evidently nature p. ovides for that eye in a good sized potato, and if the fertility is there where your roots can reach out and

SELECTION OF SEED AND CULTIVATION OF THE POTATO.

GEO. MARTIN, Hudson, Wis.

Potatoes for seed should be of one kind,-mixed potatoes never command best prices. They should be well preserved and not allowed to heat or sprout. Select one or two fashionalbe varieties such as are in demand in leading markets and that command the greatest price. The Hebron and Burbank, being in demand, command the best prices at the present time.

Size and Cutting of Seed.

Much has been said as to size and cutting of seed. All potatoes for seed should be cut to one or two eyes, not too small, and never allowed to stand in sacks or piles any length of timeafter cutting. Much good seed is spoiled when cut, and then piled or sacked. Potatoes stored in cold storage are not safe to plant. Potatocs-

SELECTION OF SEED AND CULTIVATION OF THE POTATO. 53

kept too warm, thereby wilting and nearly as possible to its first Godsprouting lose much strength and turning the seed vigor. Moving or notatoes occasionally with the temperature of the store room about 35 degrees will keep them in good condition.

When cutting diseard all doubtful seed, and never allow a piece to go into the ground that has not a perfect eye.

Fertilization.

The second part of my topic, though not second in importance, is fertilization. On our much exhausted farms fertilizers must be used liberally to grow a good crop of potatoes or any other crop. The average yield of potatoes on our worn out land is 70 bushels. while on land well fertilized 250 and .300 bushels per acre are grown as a field crop, and 400, 500 or 600 bushels are grown for premium crops. The increase from the former to the latter is largely due to fertilization

In 1850 to 1860 when land was low in Wisconsin large and profitable crops were easily obtained. I remember my father planting prairie land,-dropping the seed into the edge of the furrow and covering with the next furrow,in the fall back-setting the furrows and harvesting 150 bushels per acre of choice tubers. I also well remember assisting to fit brush land, planting it to potatoes and harvesting 350 bushels per acre. The first was in what is now the city of Beloit, and the latter at Hudson, my present home. Now on the same land without fertilization, 70 bushels is an average yield. Does this not give us a practical lesson? Does it not show the complete work of the soil robber? Does it not tell us that our new soil was rich in potash, obtained from numberless years of burned prairie grass and brush. Then we could and did grow not only 300 to 400 bushels of choice potatoes, but 40 bushels of wheat per acre, No. 1 hard, against 10 bushels at the present time fit only for chicken feed.

How can you help yourself? By returning your much exhausted soil, as 200 to 300 bushels per

given state, as the brain and muscle of man will permit. Fertilizers in abundance exist. both commercial and domestic,-a proper application of which will solve the problem. I have had no experience with commercial manure, but believe it has been and can be used with good results.

An Experiment.

A writer from Rensselaer Co..N. Y.. says :- "I had a piece of sandy loam. containing 175 rods, that had been mowed several years without manure. I plowed, sowed broadcast, and dragged in 836 pounds of potato fertilizer. containing 4 per cent. ammonia, 4 per cent phosphoric acid and potash 8 per cent. I planted to potatoes, one eve to a piece, 18 inches apart in the drill. and dug 170 bushels choice potatoes, the cost of fertilizer being \$13.70. That on two rods of ground where no fertilizer was used was not one-half 99 another piece. good." On "one-half acre" he sowed 400 pounds of another kind of potato fertilizer, and harvested 105 bushels from the half acre. He also planted several acres fertilized with stable manure, but did not get half as many per acre. This surely shows a strong argument in favor of the commercial fertilizer. I do not believe that the results above given would have been the same had the stable manure been well handled and applied.

Farm Composts.

My experience has been confined to clover, barnyard manure, and hard wood ashes. Of these I know something, and I think that no farmer can afford to farm without them. These all work well with the potato crop. My best results have come from well rotted barnyard manure applied in early fall, through the winter, spring, and late as July 1st.,-the earlier the application the better the result. Our stubble land without the clover in several seasons has produced from acre. Land

handled in this manner will show pro- I make in behalf of economy,-in befitable returns for the next five years.

I do not know of any crop that fits land for future crops as well as potatoes. Hence use more domestic fertilizers and grow more potatoes. Barnyard manure and ashes are lasting. more practicable and more liable to be used by the majority of farmers. Make all the manure you can on the farm. Haul all you can get within five miles of your farm, and car it 30 to 50 miles, which at fertilizer rates is not expensive. Ashes in many cases can be had at a nominal cost in this way.

I live at North Wisconsin Junction station, three miles from Hudson, 22 miles from Union Stock yards, St. Paul, 30 miles from a large belt of .hard wood timber, and say to you that I have been getting fertilizers from all these sources several years. I am increasing the fertilizers and acres of hoed crops from year to year, as high as eighty acres per year I have handled in this manner, and would not know how to farm any other way. Those that have not manure should buy it, apply it to potato land, and double and treble your crop the first season.

Cows, Manure, Rich Land, More Potatoes

The farmer who has not been fertilizing can put 50 cows on his farm and if properly fed the fertilizer produced from the 50 cows applied to the pctato crop, will pay for feed of the cows. Here is a direct income to be had by the farmer who now is eking out a scanty existence. Cows, manure, potatoes. money. Stock, more stock can be grown on the farm with profit. Manure, more manure, more potatoes. Increase by fertilization and cultivation, your income from a smaller acreage. Should all tillable land in the State of Wisconsin be divided into farms of 100 acres the income from agricultural pursuits would be double, and your farms would sell for twice and three times as much as you could realize

half of fertilization and cultivation. which is economy.

Thoro gh Preparation.

Preparation is cultivation. Webster says. "to till .- to prepare for crops .to manure,-to plow,-etc." Cultivation for the potato crop then, should be begun a year at least before planting, by sowing clover on land intended for potatoes,-then manured at your convenience. As before stated, during fall and winter, plowed in this case late as possible to allow a good growth of clover, you now have your land in a tillable condition. After planting roll to firm the dirt, not only to benefit the potato, but to sprout the weed seeds. Harrow and cross-harrow, continue harrowing, or weed killing, if you please, as that is my object in harrowing, as well as to complete the seed bed and prevent washing on rolling land. When the plants are coming through the ground, turn the soil to and onto them carefully, cross harrow and you have a clean start for a crop. Several years ago I harrowed and crossharrowed a 32 acre field when the plants were six inches high with good success. I now do all harrowing by the time the plants are well above ground.

Surface Cultivation.

Cultivation after the rows are plain to be seen, should be done with small weth or small harrows. Thoroughly stir the soil to a depth of two inches.

In this manner repeat your work until the tuber begins to form. Do not stir the soil after the potato begins to set. Hand hoe or pull all remaining weeds. thereby giving all strength to your crops, lessening the cost of harvesting and fitting your lands for future crops. Therefore,-plant pure seed, fertilize heavily, cultivate thoroughly, and harvest abundantly.

Clover Seed and Barnyard Manure.

Necessary to the production of a payfrom them now. All these statements ing crop of potatoes or any other crop

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is a thorough and energetic application of good common sense. There is no crop grown in Wisconsin that is paying any better, nor I think as well as potatoes, with perhaps the exception of onions, cabbage and small fruits.

Necessary to the production of a good potato crop is good soil, good seed, good cultivation and good protection from bugs. I know of no crop that answers quicker to the application of fertilizers than the potato crop. Clover sod is good, clover sod and barnvard manure are better. Ashes are better than any other fertilizer that I know of for any root crop.

Land handled in this way will yield an abundant crop for the next five years. It is better to follow the potato crop with corn, as straw crops do not stand up after manure and potatoes. Therefore I say, in order to grow a paying crop of potatoes we must use a liberal amount of fertilizer, and barnvard manure is the most feasible, and to get enough manure we must keep more stock on the farm. All the coarse grain, hay, stalks and straw should be fed on the farm. Manure we must have for potatoes or any other paying crop. Barnvard manure should be the aim first, last and all the time of the successful farmer.

The order of value of different kinds of manure is, first poultry, second hog, third cow or cattle and fourth horse. I prefer to pile and rot before spreading.

Destroy the Bugs and Weeds.

The potato crop must be free from bugs. I use a six barrel tank, which sprinkles two rows at a time, two pounds of Paris green to the 6 barrels of water. Potatoes should be free from weeds, but not be disturbed after the tubers begin to form. I plant with the Aspinwall planter in drills, 30 inches apart, 10 to 12 inches apart in drills. 5 inches deep. Keep the weeds down by repeated harrowing, correspondents from many states askuntil the plant appears. I cultivate ing for prices and invariably they ask

hoe or pull all remaining weeds, which costs me about \$1.25 per acre.

I cut the seed to one or more eves. but not too sn all. Potatoes for seed should not be allowed to sprout. Move or turn them, which will prevent heating and sprouting. Cut the seed a day or two only before planting, as much seed fails by being cut, piled or sacked. Keep a thermometer in your cellar. The temperature for all vegetables should be from 32 to 35 degrees.

I dig with the Hoover and Prout digger. which leaves the potatoes in rows on top of the ground ready for the pickers. Do not plant until the ground is warm, that the plant may grow vigorously and strong. It is the small and slow of growth plant that is easily destroyed by bugs. Dig when ripe and not until ripe. Our prices are lowered every year by the green stuff sent to market.

Select one Variety.

Farmers marketing at a station should agree upon the one or two best varieties. No community can command best prices if there are as many kinds as loads. If of the same kind and well assorted, your buyer can and will pay you a good price for your good goods. It is better to assort when picking from the ground. Several years' experience permits of my saving that about 1-5 should be culled, and that 4-5 will bring five cents per bushel more and have the 1-5 left for feed and seed. We often hear it remarked that should we all grow potatoes that we would glut the market and ruin prices. Not so. Should all that are situated to grow potatoes, grow good varieties, our goods would be sought for, and at remunerative prices.

Grow Big Crops.

Wisconsin is fast coming to the front as a potato producing state, and prices for Wisconsin potatoes are the highest in leading markets. I have thoroughly and level, and finally hand for Hebron and Burbanks. Therefore

grow Hebron and Burbanks. Cater to | ron, and I think the Hebron is fully the demand. It is dollars that we want,-it is dollars per acre,-the most dollars per acre that we must strive for. It costs no more to grow 300 bushels per acre than 100 bushels. It costs no more to dig a bushel of potatoes than to thresh a bushel of wheat. With a large yield of potatoes, even at a low price, you can get pay for your labor.

I want to urge further the great necessity of better farming,-more brain work. How much money can we get from an acre? How much labor can we profitably employ? Reduce your number of acres and increase your income from the lesser acres. Keep more stock, make more manure. There is money in well fed stock, horses, hogs, sheep, cattle and poultry, and they can all be kept with profit.

Discussion.

Mr. Smith-What kind of soil have you?

Mr. Martin-I have a black, sandy loam, with clayey subsoil,-a good soil for potatoes.

Question-How deep do you plant?

Mr. Martin-As deep as I can get them in with the Aspinwall planter. I should judge about four inches. I would put them in five inches if I could. I use smaller potatoes than Mr. Smith.

The Chairman--You would be apt to have more eyes then?

Mr. Martin-No, excepting in very small potatoes. Occasionally I plant whole potatoes, and from that I get my theory that cne or two shoots will come only from the whole potato.

Mr. Beck-How late do you recommend planting?

Mr. Martin-For a field crop I have had the best results with the Hebron and Early Rose in planting as late as from the 15th to the 20th of June; of course, in planting late crops you would have to use all early potatoes. I as good and a better yielder.

Mr. Hutchins-How many loads of manure do you consider enough for your land?

Mr. Martin-Twenty good sized loads of well rotted manure per acre.

Mr. Olds-In planting your seed, do you consider the size of the pieces of more important than the number of eyes?

Mr. Martin-I do.

Question-Did you ever use a potato cutting machine?

Mr. Martin-No, but I have used a planter that cut the potatoes, and with very good results.

Mr. Hayes-Wouldn't you prefer to prepare your manure on the ground, and save this piling,-feed it to the clover?

Mr. Martin-I am inclined to think that well rotted manure if you have time to spread it, and cultivate it in, would be all right, but I am running a small farm of 600 acres, and I haven't time to do things just for pastime. I am not in clover raising as a crop. I believe in it as a fertilizer.

Mr. Noyes-Is there any other reason why you rot the manure?

Mr. Martin-I think the rotted manure is less liable to scab the potatoes and the rotting kills weed seeds, etc.

Mr. Goodrich-Do you practice absolute level culture, or do you believe it is better to hill some? I heard a man talking about it and I tried absolute level culture and I had a great many sunburned potatoes. Since then I have covered them up from the sun.

Mr. Martin-If you would plow your land six inches deep, and put the potatoes in the ground five or six inches, you would have no sunburned potatoes, and you would get a quarter more yield than you will to plant them in hills.

Mr. Goodrich-I wouldn't want to dig out potatoes from six inches.

Mr. Martin-The best crop I ever planted in St. Croix county, which was have used the Early Ohio and the Heb- on pasture, I plowed and attempted

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to fit for onions, but found I could not to whom I have recommended level do it. I made the drills with a twohorse plow and I got them six inches deep. I dropped the potatoes by hand and covered them about two inches, and I dug 425 bushels to the acre off that piece of ground, and I have always felt that the depth had a good deal to do with it. Another thing, I have a theory that a well fertilized piece of land will throw a foliage that will keep your potatoes from sunburning.

Mr. Goodrich-Potatoes grow deep in the ground because they are planted deep, but there is a difference in the variety. I had a variety that I planted deep down, and they grew on the stalk six inches above the ground.

Mr. Allen-I think Mr. Goodrich is right in hilling slightly. His soil is different from Mr. Martin's,-more liable to crack.

Mr. Smith-There is a point here that we have not touched. On my ground which we keep very mellow, we different soils. pursue level culture. A friend of mine

culture, and whom I had furnished some seed, planted on a very heavy, stiff clay and his potatoes grew out of the ground, and they were badly damaged by being sunburned, and experience has told me that if I were planting upon heavy clay soil, I would hill some, while I do not hill at all myself.

Mr. Martin-That is right. Another thing. On level clay, in a wet season, I believe they do better slightly hilled than level, but on what I consider good potato soil, I prefer the level cultivation.

The Chairman-You have seen that Mr. Martin, like the rest, recommends fertilization, feeding the land that the land may feed the potato. He advocates the cutting the seed as much as Mr. Smith does, and he advocates thorough cultivation on his soil with level culture, although we see we must use our best judgment in following out these suggestions, as we deal with

The institute adjourned to 1:30 P. M.



WISCONSIN FARMERS' INSTITUTE.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. Mr. Favill in the Chair.

Music. Singing by Mrs. Bishop.

HARVESTING, MARKETING AND STORING POTATOES.

By M. T. ALLEN, Waupaca, Wis.

In as much as we have prepared the ground, selected our seed, planted and cultivated the potato thoroughly from start to finish, it is high time that we begin to harvest the crop, providing it is ripe. The potato harvest should never begin until the tubers are thoroughly ripened. Early frosts quite often catch the whole or a portion of our crop, before it is matured, and upon examination of the tubers we find the skin will slip easily, hence the necessity of letting the crop remain in the ground until the potatoes get well hardened, and the skin is solid and firm,-then we can begin the harvest with safety. Potatoes removed from the ground while green, will shrink much more, and faster than when ripe besides do not attract the eye of the buyer as we would like. If we are to dig by hand, we should use the six tined fork, being careful not to stab the potatoes with the fork. Tubers that have been forked while digging, unless marketed at once, are permanently spoiled, for the market. We have seen men who would ruin potatoes to the value of their wages every day. Such help should be allowed to At this particular time, we would adtramp.

Digging.

We are supposed to be digging with the soil not too wet, and would have the pickers follow the diggers, in from thirty minutes to an hour after digging was begun, providing we have a breezy sunshine. If we are digging by hand, each man digs two rows, going backward as he digs, depositing the potatoes of both rows, in a row between the rows dug. Now we begin picking, using boxes or crates like this. Having brought and scattered what we wish to use in the field, conveniently close to our work, now take the family horse, hitch it to the stoneboat, remembering to cover the horse with a sheet or light blanket, to protect him from the flies that seem to be on the verge of starvation at this particular time.

With six or eight boxes upon your stone-boat, start your horse between two rows of dug potatoes, picking from either side into the boxes, and when your boxes are full, set them off together, filling your boat again with empty boxes, and proceed as before.

vise sorting, leaving all small, sunburnt, scabby, infected and unmerchantable stock upon the ground until the salable portion of the crop is secured, then take care of the culls. If you have a starch factory reasonably near, you can get for good sound culls fifteen cents per bushel, which is more than you can realize from them by feeding.

Moving the potatoes from the field to the cellar should be done as fast as there is enough picked up for a load. A wagon without a box, using a plank instead, is generally used, setting the filled boxes upon the plank, and if your boxes are not too full they can be piled two or three deep, making a load of nearly two tons in weight. We have drawn seventy well filled boxes at a load. Many growers have low wheels. with four or six inch tires, made to use in place of the high wheels during the potato harvest. If you have a low wheeled wagon you can make a wide platform to draw on. Avoid piling the boxes, which makes it much easier at both ends of the route.

If Prices Suit, Market from the Field.

If you are near a potato market, and the price is up to a paying basis, we would advise marketing a goodly portion of the crop, if not all we had to spare, directly from the field,for there is certainly a great amount saved which would be lost by shrinkage, while lying in store. The marketing from the field is generally made with the potatoes in bulk, and the man who goes upon the market with bright, clean stock, and all alike, from top to bottom, will not have to go bezging for a buyer. If the price year after year would be as uniferm as it has been the present year, no potato grower would be reckless enough to hold his crop through the winter months, for he would be sure to save 25 per cent. by marketing early, which would be lost by shrinkage, etc. If. however, a grower lives too far away to make it pay to market while harvesting, he can resort to storing the crop,

vise sorting, leaving all small, sunburnt, which is a very particular job, if carscabby, infected and unmerchantable ried out successfully.

Suggestions about Storing.

To store potatoes successfully, requires skill and considerable brains, to avoid the losses that are met with upon every hand. We would prefer a deep cellar to a shallow one. Deep cellars are warmer in cold weather, and cooler in warm weather, consequently can be kept at a more even temperature. We would aim to keep the thermometer between 35 degrees and 40 degrees, if possible. I think the depth of a cellar should be ten feet in the clear. then do not fill deeper than seven feet. leaving three feet between the potatoes and ceiling. Three feet is ample space to get about over the different bins, noting the condition of the crop in store. As to the size of the bins, 500 bushels capacity is plenty large, and I prefer a smaller, say 300 bushels capacity. Partitions between bins should be constructed with an air space between, which is a very essential point, and not to be forgotten in the make-up of a good storage. These partitions should be made in the following manner:-Take 2x6 inch studding set up flat ways for your posts, using 1x6 inch boards upon either side, leaving an inch space between the boards. Potatoes stored in bins built in this manner will dry out nicely, even if they are put in wet, which we are compelled to do sometimes. They can be harvested and put directly into the cellar if thoroughly ripe, in very warm weather, if they have proper ventilation, after being placed in store, and great care should be exercised to avoid all infected stock, which, if allowed to go into the cellar, will decay more rapidly by being set going by the sweating process, which always takes place soon after being placed in store. Another point of very great importance, should not be lost sight of,- and that is,keep your cellars well darkened, for the light will surely get the potatoes exposed to it, off in color, and strong

in flavor. For seed I would not care stays are broken, they can't be mended. if they were green, really I believe it and you can use them up very quickly. an improvement.

Advice to Purchasers,

'In drawing my paper to a close I wish to say that if every hotel landlord in the good state of Wisconsin were present, it would give me pleasure to give them all advice well worth heeding, and that is .- when you purchase potatoes for your table do not accept those from a light cellar or warehouse, and after getting them under your own care, keep them dark and cool, thereby retaining their good quality, and avoid remarks of guests, one of whom we heard say to a companion at the table, "that was a good potato once but it had gotten bravely over it. It has been kept where it was light and warm giving it the strong flavor it now has." This is the reason for the poor quality of the potatoes we so often get when away from home.

Discussion.

Mr. McKerrow-How do you ventilate your potato cellars?

Mr. Allen-There are three ventilators in the partition, taking off the moisture and odor from the stored stock.

Mr. Thayer-Isn't it more difficult to preserve your potatoes in a cellar than in a regular warehouse?

Mr. Allen-I think not the season through. I think they need more ventilation than they generally get. I keep my cellar between 35 and 40 degrees.

Question-Will you describe your potato box?

My boxes are twelve inches in height, twelve in width and twenty in length on the inside, and they hold a good strong bushel when not filled so full but what you can set one box on another without bruising the potatoes-2.880 cubic inches, I think the box contains. Our planing mill at Waupaca keeps these heads in stock just as much as it does doors and windows. The baskets can be had from 15 to 18 cents

Mr. Culbertson-What do these boxes cost?

Mr. Allen-To make them at home.' they will cost about six cents apiece, and we buy them for twenty cents.

Mr. McKerrow-How do you keep your seed potatoes from starting?

Mr. Allen-I keep them at a low temperature and if it was getting along towards spring I move them about.

Mr. Martin-We pick our potatoes in baskets, and we use centals, one hundred pounds to a cental. Our centals are good for that crop or any other, crop,-and it seems to me that in handling large crops it is much more practicable than these boxes.

Mr Stevenson-How do you get your potatoes down cellar?

Mr. Allen-Pour them down through a spout. I have plenty of windows -a. window for each bin, and that is good also for the ventilation. To answer Mr. Martin, I don't see why you can't avoid bruising and thumping about in the box just as well as in the basket. where you pour them into sacks and throw your sacks upon one another.

Mr. Smith-What is the percentage of shrinkage between fall and spring?

Mr. Allen-I can't answer that question fairly. There are various opinions in regard to that. We can market potatces which have been kept in store through the winter and marketed in April, that will be shrunk so much they were hardly marketable. They will accept smaller potatoes in the fall than in the spring.

Prof. Goff-When I was connected with the New York Experiment Station we made an experiment to find out how much potatoes lose by storing in in the cellar. I can't give the exact figures, but it was very close to 12 percent. Our cellar was dark and the walls were very damp. Undoubtedly in a warehouse it would be more than this.

Mr. Allen-In marketing potatoes diapiece by the hundred, but when their rectly from the field, small and spotted

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HARVESTING, MARKETING AND STORING POTATOES.

potatoes are seldom noticed; they can pick the potatoes, sort them, and I get go in with the rest, but when you leave a pretty clean, sound, straight potato them in the cellar till the month of to put into my cellar. I believe it is March they become mouldy and black a strong point to pick all potatoes and in spots, you can't do anything with let them cure, before putting them into them, and the same potatoes will be a warehouse. Of course, you have to refused

Mr. Goodrich-I understand Mr. Allen to advise the farmers to market their potatoes in the fall. At the same time I understand you can keep your potatoes with less shrinking in the celiar than in the warehouse, so that the dealer is going to lose, isn't he?

Mr. Allen-There are tricks in all trades, and the farmers, as well as other people are obliged to save themselves.

Mr. Convey-Suppose I were as lazy as our friend Martin, here and didn't plant my potatoes till about the 15th of sprout starting on them, and I cannot June, how could I keep them without sprouting until that time?

the cellar and along in February, when they begin to show signs of sprouting. I keep my temperature five degrees lower than he does, and watch it every day, if I am lazy. Then I turn them and keep turning them until I dare take them out, and then I take them out and store them in sheds.

Mr. Hayes-Couldn't you put potatoes in a pit out of doors, cover them with dirt well, and let it freeze. Then cover with straw, wouldn't they keep better without sprouting?

Mr. Martin-That would have to be in the season when there was no rot. or infection of any kind. I have seen them this last season where one-half of them went right down inside of two weeks after they were put in the pit, and they had ventilation, but evidently not sufficient ventilation.

Mr. Hayes-When they are put into the pit after the frost comes, I never knew them to rot.

Mr. Martin-This was in the very latter part of October. I pit all my potatoes that I want to winter and let them lay there till it freezes quite thoroughly handle them that much extra.

Mr. Terry-My practice is to put them in the cellar when I dig them, because the cellar is cooler than the earth, and I keep them there until the earth is cooler than the cellar, about the first of November, when I pit them out doors. Then when the ground is frozen solidly. I cover the pile all over. two or three feet, with straw. I keep that ground frozen until the 10th of April, with us a month later than the frost is out of the ground. I will keep them until the first of May without a do that in the cellar.

Mr. Martin-I don't believe that is Mr. Martin-I keep my potatoes in practicable in our Northern latitudes.

Mr. Hayes-I don't live very far from here and I have done it: and it is no trouble at all. If you are afraid of the frost, sink them a little deeper, and potatoes kept that way are a good deal better to eat.

Mr. Terry-We cover them so that they are perfectly safe under any circumstance. We put on first a laver or straw, and then about four or five inches, of earth, and we leave that earth until we have had quite a cold snap and it freezes. Then we put on another foot of straw and 18 inches of earth on top of that, and with the two air spaces of straw they are absolutely safe, and there is no change of temperature. We get the ground nearly to the freezing point before we put them out. We put them in the cellar and get them ventilated first, and get them into a dry place and cover them all up.

Mr. Hatch-How are you going to get the second laver of dirt when the ground is frozen six inches deep?

Mr. Terry-We haul the straw out there and when we put the first earth Then when I get a comfortable day I on, spread it all around; that will keep the frost off from the earth that we in any man putting them in a pile want to throw on later.

Mr. Woodward-I have a way of keeping potatoes for seed purposes, when I have new varieties that I am choice abcut, but it requires a knoll where there is no danger of water. I dig a hole six or seven feet deep, and I take my potatoes when they are thoroughly dried, and put them into that pit and do not have them so that the top of them comes nearer than three or three and a half feet from the surface of the bushels to start with, then put the rest ground. I fill in with a small layer of though the window. Of course the straw and cover with soil, and pile a big amount of soil on top. When the ground is thoroughly frozen I cover boxes down on the chute? that with straw or manure, and I have taken potatoes out of those places in do that. July that no one could tell whether A Member-How many men does it they came fresh from the hill, or take out in the field to bury them. I whether they had been kept over. I should think it would take the price of have also kept my seed in the same the potatoes at 50 cents a bushel to way, and it will keep through July pay for that. without a sprout.

Mr. Allen-I do not criticise any of about keeping for seed. these methods, but the point is where there are so many farmers as there are fore they are fairly ripe so that the in our country, who have from three to skins slips off, are they as good for seven thousand bushels of potatoes, seed? the idea of their going to work and digging a hole and putting them all in, about digging immediately after the when they can hitch up and carry them frost strikes them. Let them lay in to market, seems absurd.

Mr. Martin-I want to see what my potato. seed potatoes are doing. I don't believe

where he don't know what is happening to them from fall to spring; put them in your cellar, put a thermometer in your cellar and watch them. I believe that is profitable business for the farmer

A Member-I would like to know how Mr. Allen gets his potatoes down at the bottom of a ten foot cellar without bruising them.

Mr. Allen-We carry down a few spout must be set at the proper pitch.

Question-Why don't you slide your

Mr. Allen-It takes another man to

Mr. Martin-We are only talking

Mr. Collins-If potatoes are dug be-

Mr. Allen-No. We are not particular the ground until the skin is firm on the

HOW TO GROW THE CHEAPEST BUSHEL OF POTATOES.

Mr. T. B. TERRY, Hudson, Ohio.

the cost of production. There are two fertilizer for potatoes, was in this first ways of doing this, one is to grow direction of growing more potatoes to more per acre, the other is to reduce the acre. That is going to help us the cost of the crop by better methods make more money just as much as all along the line. Our talk this morn- these better methods.

I suppose that means how to reduce | ing in the line of growing clover as a

HOW TO GROW THE CHEAPEST BUSHEL OF POTATOES.

More Bushels to the Acre.

In order to grow more bushels to the acre we ought to have our land well drained and suitable for growing potatoes: if it is not well drained naturally. it ought to be tile-drained, and the soil ought to be suitable. Perhaps you can grow potatoes on heavy clay soil, but I don't think you can make much money out of it. The matter of fertility comes in next to the soil and draining. Get fertility enough to grow a good large crop, and get the right variety for your soil. The early Ohio is the best variety for my friend Mr. Smith with his excessively cultivated soil: it is not all right on my soil. I have had new seedings right side by side with some older variety, produce 100 bushels to the acre more potatoes with exactly the same conditions. I would plow the clover sod for the potatoes deep, not all at once, if I had not been in the habit of plowing more than six inches deep, I would increase it but very little at once.

Increase the Depth of Seed Bed.

To accomplish this I have gradually increased the depth of plowing on my farm from four to eight and ten inches. I would like for potatoes a deep soil, fully fertilized, where the potatoes will like it best. Potatoes are not a surface feeding plant like corn: they like to have their roots down. where it is cool and moist. I should work my land until I got it as deep as I could turn it over with the plow and I use the largest plow made. I would have a joint on the plow so as to turn all the clover and the sod under, clean out of the way to get the fertility down in the soil, and the crop can make very good use of it. Have a perfectly clean, mellow soil on the surface when you get through plowing. Of course you want the wheel along with your jointer to regulate the depth.

Plant in Drills.

ing more per acre. I would plant in drills, for I can get better results in drills than I can in hills, and I have been growing potatoes for twenty-three years and have tried all these points year after year, so that I feel that I know what I am talking about for my farm at least. There has been a good deal said about planting whole potatoes or pieces with several eyes here. Suppose you put three or four eyes in a hill three feet apart. Divide them up, make three one-eyes pieces, scatter them along the row, you will have three or four pieces with one eve and they will not crack the ground so much and you can raise a better quality. The tendency is to set too many tubers, if there are many eves, and they are small if they are planted too close together. Late potatoes I would put farther apart than the early ones. I would put the early Ohio perhaps eight or nine inches apart on my farm. The Empire State I would put sixteen inches, perhaps. I would practice nearly level culture in the same line of growing more per acre, scattering the potatoes along in the drill, and I can get more per acre, and they will run a more uniform size. The rainfall is not let off from the land by making little ditches between the rows. If your land is a little rolling and your potatoes are hilled up, the water runs rapidly off the high places, and they are thirsty, while the low places get too much. It is a good thing to have the water soak right down where it falls. and that is the reason for level culture. Another reason is that every summer shower brings more or less of ammonia, which you want to save very carefully. On clay land, of course, you would do better to hill up, or probably not to grow potatoes largely at all.

I do not believe in perfectly level culture. Practically when we drill, the rows are two or three inches higher than between the rows. About the time the tubers begin to crack the ground, Right in this same direction of grow- we throw a little earth on the row.

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Clean Culture.

Of course we would not have any weeds, if we want to grow as many as we can per acre. The weeds use up the fertility and the moisture, those two things that we are trying to save by level culture. There is only a certain amount of fertility available in your soil, and if the weeds get in there will be that much less for the potatoes. Then the weeds pump up a vast amount of moisture. If you knew how much moisture goes out of the leaves of the weeds you would be astonished, and your potatoes cannot spare it.

Right in this same line I would have the surface of the soil very fine at all times, not merely broken up with the cultivator, but fine as dust, if you can get it, and this is particularly true with land not so rich as Mr. Smth's for instance. Never let a weed see the daylight.

Cultivate Often.

I would go on the land and break the surface of the ground just as soon as it is dry enough after a shower, no matter if I cultivated the day before; after that it may rain again, and you will lose your time, and it may not rain again for months, but I consider it very important to break up that surface at the right time. About once in three or four years you make a big profit that pays. I have sold potatoes where the net profit paid for the land. That comes from checking the evaporation at the right time, and it needs extra care. I would have the cultivation shallow. If we get any deeper than an inch and a half, we will destroy the roots and injure the plant some. I would rather have my potatoes busy forming tubers than making over roots that I had carelessly torn off by deep cultivation. Potato roots occupy the whole ground between the rows before they are six inches high on the soil. After the first cultivation I do not want any work done on my soil more than an inch and a half deep. Keep Smith is perfectly safe in planting one

tion and keep down the weeds and then let the potatoes grow.

Reduce the Cost by Better Methods.

Now, I will speak along the line of reducing the cost by better methods all along the line. My friend Mr. Smith told you about preparing the ground thoroughly before planting. I used to do that years ago, but practically on my farm now, I think better not to do a great deal of work before planting. We harrow once on our clover sod with a smoothing harrow, then go over it with a roller. That saves much tramping over the soil with the horses, and we plant with as little cultivation as possible. Then we harrow about once in five or six days after that. With the implements we have now, we can keep out the weeds without any trouble. We use Breed's weeder, and then cultivate, and go over our six acres in the morning, and that keeps the weeds down.

Long, Straight Drills,

Straight rows help in the reduction of the cost of production. We cultivate the field with once passing over and do it with less than half the work that we used to, because we can go the long way of the field. I can cultivate ten acres when the rows are eighty rods long in considerable less time than where they are forty rods long, on account of the time wasted in turning around. The rows should be straight. We make money by cutting our potatoes to one eye; we save money to start with and I can grow just as many dollars per acre from one eye seed as you can grow from any quantity of seed you could put on my land. If the land is poor, coarse and cloddy, and the farmer is somewhat like the land, he had better plant whole potatoes, or halves or quarters, or one eye pieces, just in proportion as these conditions are present or absent. Mr. the surface stirred to check evapora- eye pieces on his land, a record of four

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or five hundred bushels per acre is high enough.

Possibilities.

a barrel of the Freeman potato in the spring, and told, "I want you to grow for me as many bushels as you can from that barrel, at \$1 a bushel." I cut the potatoes first into one eye pieces, and then I took a thin knife and split the one eye pieces right through the eyes. I planted those thirty-two inches apart each way. That was too far for the greatest yield per acre, but I was after the bushels and the dollars and I got 188 bushels per acre. If I had put them sixteen inches apart, I think I would have had 250 bushels per acre. If any of you want to pay me a thousand dollars for doing it I will guarantee to grow 1,000 bushels from a barrel of potatoes. I know it can be done. The first year that we got the early Rose at one dollar a pound, I cut them up in that way, and I was so taken with the results that I have continued that pratice from that time, and we have got as high as 200 bushels in this way in a single season. I would rather have a moderate sized potato to cut up for seed. The parties that I sell to prefer that the potato shall not be to large. I cut one into one-eye pieces and have ten pieces all about one size. I think you will find that the eye in the stem end is pretty feeble, so I leave two eyes on that first piece.

Seed End, Small Potatoes.

I find in digging hills of potatoes every little while, there are thirty, forty or fifty little ones, and I have looked into that, and found out that it was where the seed end was planted with three or four little sprouts. Now I take the knife and cut off that little cluster of eyes on top. There is one good eye left on each side, and we simply cut that piece in two and have two good one eye pieces. If you can save five or six bushels in cutting to

the acre, it is quite a saving with potatoes at a dollar a bushel, but do not expect it unless you have rich soil, fine culture and good, sound seed. It is all A year ago last summer I was sent right saving your potatoes in the cellar if your latitude is right so you can keep the temperature down below 35 degrees so they won't sprout. As long as they don't freeze they won't hurt. If your land is light and sandy and especially if it is dry, you can use the planter with the best results, but if your land is a little heavy or wet, then you cannot get the best results from the use of the planter. I know what I am talking about, because I have made experiments on this line for years. I can plow out the furrow with an old-fashioned plow, and drop the seed in, and grow from twenty to forty bushels more per acre than to plant with the planter. You are sure to pack the ground if it is a little moist and it injures the crop. There is no implement that I know of today that will put the ground in so good shape for planting as the plow.

Rural New Yorker's Trench System.

Doubtless a good many of you have noticed the Rural New Yorker's trench system of planting. It is simply the old fashion plowing out of the furrow. I used the single plow for some years, and then I attached two plows under the sulky, one a right-hand plow the other a left-hand, and it worked first rate, and it is a good deal easier. I always like to ride, I don't want to get so tired I can't think;-it is the thinking farmer who gets ahead. When we come to haul in the potatoes, we have a twelve foot wagon box that we can put twenty boxes on the bottom. We have a tight box so we can leave them out in the field and they are not exposed to the light, and they are not so high but what a man can take a bushel box and empty it without trouble. The small wagon holds sixty-six bushels in bulk, and the larger eighty, and this is the way we fix them to draw to market. In drawing to the cellar

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we draw in the boxes and empty them, | but for market, we dig every other row. My men will pick up the potatoes with each hand as they go between the rows. After they have a load picked. I go to the barn and get a load of boxes and scatter them along where they want to use them, then I turn around and drive back slowly. Those two men will set the boxes into the back end of the wagon as fast as I can set them up, and in ten or fifteen minutes we will have fifty bushels on there and drive to the barn.

A Good Potato Digger.

I used to think we never would have a digger that was practical, but the elevator diggers that are made to raise the diggers that are made to raise the potatoes right up in the air on an endless chain are reasonably successful on moderately level ground, and that not too heavy. On the side hill, or rough, stony land. I would not advise them, but with four horses on my digger, I can dig every single potato in my ground and not cut them, and leave them all nice and clean on top of the ground, so you can pick up after it much better than you can by hand digging. You have got to get power enough on the head of the machine, so as to get way under all of them, and if the ground is good it will work splendidly. Sitting on that digger I can do the work of twenty men.

Discussion.

Mr. Smith-Can't you reduce that last assertion of yours a little bit?

Mr. Martin-He don't have to take a bit off it: he can do it.

Mr. Terry-I mean common men, such as you employ. I want a long field. and you bring on your twenty ordinary men and if I don't dig as fast as they can. I will give up.

Mr. Martin-The gentleman's assertion is not too high. He can dig them as fast as twenty men, and when he has them dug they are not cut or speared.

good crop. How much will it cost per bushel to dig them and put them into your sacks and load them in the wagons?

Mr. Terry-I have not kept track of it in that way. All it costs me with the digger is simply nothing, because if I did not use the horses they would be standing in the barn, while I hired somebody to do the forking. Of course, if I had to hire the team there wouldn't be so much difference. I used to pay out a good deal of money to dig potatoes, and now I don't pay out a cent, and it is a nice easy job.

Mr. Martin-I have had them dug. a whole crop, and sorted and put in the car for four cents a bushel, with the digger, and I charged a reasonable price for the team.

Mr. Smith .- I have had my potatoes. dug repeatedly with six tine manure forks: when I have counted up the potatoes at night, and figured all the expenses that I could possibly think of, the cost has been three cents per bushel. Of course, this is where we had a big crop and large potatoes.

Mr. Terry-Last fall, when ve were digging, we watched my next neighbor. who grows potatoes, but not largely enough so that he can afford a digger. He hired two men from town who were not experts, and had to pay them at least ten shillings a day and their board. We were digging the potatoes right side by side, with only a fence between us. I said to my son, "let us keep watch how many times faster we dig than these men do," and I know I dug thirty bushels in the same time those men did one.

make Mr. Hayes-Don't you 8 practice in selecting your seed, of its being a uniform quality of potato?

Mr. Terry-We have done that for years, and it is the proper way to do. When we dug by hand I always followed the diggers and selected the seed.

Mr. Goodrich-How do you destroy the potato bug?

Mr. Terry-We pick them by hand. When we get a can full we pour in a Mr. Smith-Suppose you have a real lot of boiling water and put on the

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cover. We don't use Paris green; I you take it in our state, the beetles are can't afford to do that. I am perfectly sure that we cannot use Paris Green without some injury to the vines. We pick the beetles just as we do strawberries

Mr. Miller-How often ought potatoes to be cultivated after being planted-Is every day too much?

Mr. Terry-It wouldn't hurt them. but it will cost too much to do it. It would be necessary, I think once in three, four or five days, especially in a dry time.

Mr. McMaster-How many acres of beetles can a man pick in a day?

Mr. Terry-That all depends upon how thick the bugs are. The point is in picking by hand, you must pick the beetles as soon as they come. In large patch it pays, but it would not in a small patch. The thing is to catch them when they first come and prevent their laving eggs.

Mr. Allen-We take Paris Green and a man goes over the ground as fast as he can walk.

Mr. Olds-Do you do all your work with the fourteen-toothed cultivator?

Mr. Terry-We use the Planet Junior cultivator also?

Mr. Martin-It seems to me that Mr. Terry is a litle bit behind in this potato bug business. Maybe he has the bugs fixed down in his country, but

numerous, and I don't believe it is practicable for a man to pick twenty or thirty bushels of potato bugs. I sprinkle my potatoes with Paris green from a cart, two rows at a time With a cart that will hold seven or eight barrels of water and about two pounds of Paris green to the barrel, I can get over about fifteen acres a day, and it finishes them every time.

Mr Terry-I have asked a good many professors of agricultural colleges whether they did not agree with me that there was injury enough to the vine to more than pay to pick them off. and they said there was.

Mr. Goodrich-Mr. J. M. Smith used Paris green at the time he raised 1,700 bushels and over on four acres.

Question-What do you do to prevent scab on potatoes?

Mr. Terry-I will tell you one thing. We can control scab as far as the seed is concerned. If the germs are on the seed, we can destroy those by soaking the seed in a solution of corrosive sublimate, a one-thousandth solution, and soak them an hour and a half. If you treat the seed with this corrosive sublimate and plant on clean land, you will have clean potatoes. You use two ounces of corrosive sublimate to fifteen gallons of water.

HOW TO GROW POTATOES OF SUPERIOR QUALITY.

F. A. HUEBNER, Manitowoc, Wis.

It has afforded me much pleasure to | and last, how to do all this at the least listen to the able discussions on potato possible cost. What is desired now, is growing. I am very much pleased with to procure a potato crop of superior the methods presented,-preparation of quality, and I am here to tell you how the soil, mode of planting, cultivation I grow them. I will do so on condition

of the crop, harvesting and storing,- that Secretary Rusk will furnish us

moist weather, and not too much rain, and my second request is that Professor Goff will keep away every particle of blight from our potato patch.

Plant Pure Seed. 4

To grow a superior quality potato crop we must have a superior quality seed stock, to begin with. We must have pure seed and not a mixed lot of varieties. We should not different plant a rose-colored seed stock in which Early Rose, Early Maine, Clark's No. 1, Pearl of Savoy, Everett, Summit, Watson Seedling and many more rosecolored potatoes are represented, but have been housed and stored together. and come all from one bin or pile, and then expect to grow a superior quality potato for the next crop in 1893. Such a mixture is often carried to the potato patch at planting time for seed stock, and by well-to-do farmers at that, who claim they have pure stock because they bought the seed of one of the most noted seed houses in America, and is represented to be pure. That may be so, but if the seed is mixed, containing different sorts to be cooked in one pot or baked in one oven, we cannot expect a dish of superior quality potato, because some sorts cook quicker, others fall to pieces quicker after they are cooked, and some need three or four minutes more time to be done for the table. Any one of the rose-colored varieties I mentioned is superior quality when used alone, but not when mixed. I will advise you to resort to the same practice that has done me more good than any thing else to build up a reputation for good quality potatoes, and that is to start seed stock from a single tuber for one kind, and keep very close watch over it. In this way I have been able to serve my customers with a pure and superior quality potato.

Shall We Buy Novelties ?

The question arises,—shall we get all the novelties advertised in the various seed catalogues of 1893—the World's Fair potato, the Freeman, or

Burpee's Superior? These three sorts. are worth a trial, as they are handsome and all have all the bearings of good quality potatoes, and it is a stepwith the stride of progress to procurenovelties and give each a patch of land and proper care. It was through a spirit of experiment and devotion to novelties that our old Early Rose and Early Ohio found their way intoall the different states of the Union and nearly every part of Europe. The Early Onio is to-day the leading potatofor early market. But is it necessary to plant 1 1-2 to 2 pounds of tubers, or such samples as we exhibit at county and state fairs to procure superior quality seed, or must they be transferred from North to South, or from one climate to another? I say, No Sir .that is not the secret. My experiencehas been that novelties prove worthless 90 times out of a hundred. Your basket of exhibitors' potatoes gave you more miss hills than your plain homegrown stock:--vour two pound tuber has at least 30 per cent. dormant eyes; -your imported potato from distant states suffered in transportation and gave you weak plants to start;-your Scotland imported potatoes from proved worthless along side of the-American stock. My experience has taught me that an over-grown specimen of vegetable or animal is not to be preferred for reproduction, and its progeny is not of superior quality.

The Ideal Seed Potato.

My ideal seed is a smooth, shapely tuber, free from prongs, knobs or scab, and perfectly sound throughout, neither soft nor wilted, and it should be fully ripe. Select tubers with few and strong eyes. Tubers for seed should range from 3 to 12 ounces in size, and I would rather plant a 2 ounce than a 2 pound tuber. Plant a special tract of land for seed only, the first week in May. Select a clover sod, or better, new timber land, and dig the crop not sooner than October 15. I use the utmost care to keep off the bugs, and 1 have a preparation which it seems to
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the blight. This is common sulphur, 10 pounds, and sulphate of iron or conneras one pound, boiled in a large kettle containing two pails of water in order to mix the sulphur with the water, as it is hard to dissolve without boiling. This is enough for a barrel of 50 gallons of water, which I spray on the potato tons in hot weather, and I consider it a means through which I have saved small fields of valuable seedlings in bad years of blight.

Superior Varieties.

Thorburn, Sunlit Star, Lee's Favorite, Hampden Beauty, Summit, and Ohio Jr., are all superior quality potatoes, and satisfy a wide range of customers, besides containing the most popular flavors. Sunlit Star is the earliest potato I know of and cooks quicker than any other. The Thorburn is heavy, firm, crisp, and remarkably fine flavored for cooking and baking, and my most critical customers pronounced it O. K. The Ohio Jr. is the best keeper late in spring. But let me impress on your mind that I have tried nearly all the varieties the country has introduced in the last 20 years, besides several hundred seedlings that I propagate yearly, but the varieties I have named I selected for friends and customers, and they gave such general satisfaction that I recommend them to you to plant.

Care of Seed Potatoes.

Seed potatoes when dug should be taken to the cellar at once, with as little air and sunshine as possible. The less chance they get to dry the better they will keep. Dig in dry weather, and let the tubers retain all the ground that may adhere to them, and house them with this ground. This is natural for a potato and just the thing to preserve vitality and hardiness. I have provided for my household and seed potatoes a vault or out of door cellar, built in a hillside. This vault is 24x44 feet, 10 feet high inside, set out with cedar

me has done something in keeping off posts and a brick front made of a socalled hollow wall. It has a plank ceiling covered with 4 inches of sawdust to keep out frost in extreme cold weather. Over this ceiling is a shingled roof. This cellar the boys call "Huebner's potato magazine." It is a good building in which to store seed potatoes. We bring our seed here direct from the field and pile up in 20 or 25 bushel piles, giving each pile a good dusting of land plaster, charcoal and some cement mixed, and put on sheets or burlap. Then cover at once with three to four inches of moist sand right out of the cellar floor. This has been my practice for seven years, and the quality comes out from May to June without any damage of sprouting, molding or shrinking. These potatoes are not disturbed from October to May or June, and they are just as hard when taken out as when they were dug in October.

A Superior Table Potato.

I have thus far explained and described my ideal seed of superior quality, and would like to say a word regarding my superior table potato, the so-called good cooker. The description I gave in size, shape and way of housing of my seed is such that what is good for seed would be my choice for eating. But I have treated the good-cooker differently in so far that I do not allow my household potatoes to get fully ripe, but harvest them earlier. A good eating potato should be dug just as soon as the foliage turns yellow,-before the stalks are dead, for as soon as the stalks die down the roots will die also, and this decay has a tendency to impart a decaving odor to the tuber which decreases the fine flavor of the good cooker. I will call your attention to one fact, and that is that in a season free from blight a potato tastes best in the month of September. I think the potato flavor is prime just when the foliage begins to turn yellow and this fact led me to dig some early and some late. The testing later on prov-

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ed that those dug the earlier had the superior quality.

The Soil and Preparation.

To have a superior quality cooker we must have a superior soil to grow it in, and such a soil must be well prepared. A sandy mellow loam is good, but a clayey subsoil beneath it is better to retain the manure and moisture. To obtain a clean, sound, smooth well-shaped tuber we must have a new piece of clover sod, well enriched in the fall or early spring. Two, three or more showers drench the soil with dissolved manure. Before the WO plant the seed or prepare for planting, I like to haul the manure on well-worked land broadcast, and incorporate it with the soil by means of a disc harrow. I do not like fresh manure just at planting time. I find that it imparts to the skin of the potato a thin, brown scab, and reduces the quality to some extent. To insure superior quality we need a superior shape for our tuber. A prongy or disfigured twin-shaped, crooked potato is never a good cooker, because the hired girl will surely remove all prongs and knobs with her peeling knife, to impart shape to her job, at the expense of the best part of the potato, which lies right below the skin, and has removed the starchy part to the garbage pail, and the rest is left for the family to eat.

Prevent Prongs and Knobs.

To prevent prongs, knobs and deformities we must work our land deep. Plow deep, and replow deeper. Pulverize thoroughly, and plant deep, so we can expect our tubers to have a chance to grow in any direction they please without being interferred with by clods or hard pan bottom. It is the shallow working of land, the shallow planting, and the hilling up culture that brings on prongs, knobs, deformities, green tips, bad flavors, low prices and discomfort all around.

Deep and level culture is on the program of the progressive potato farmagain.

ers, but with the average farmer not one out of 200 will accept this theory, or admit that it is possible to raise a good crop of potatoes without hilling them in the old style, as high as he can get ground in three feet wide rows, while 150 out of 200 I would not advise to resort to level culture because they have not the tools nor the soil, nor do they feel inclined to work the land right, to insure successful level culture.

Brains and a Teachable Spirit

To raise a superior crop of superior quality potatoes for the seed trade, the commission market, or our household, we need a superior brain and a disposition to learn. We must be open to conviction and willing to accept advice and the theory of others who are blessed with brains. We must study nature by experimenting. We must work with note-book and pencil, to gather superior knowledge direct from our own practice in the field. We must thus store up facts which will enable us to propagate, grow, cultivate, harvest, store and market a superior quality crop of potatoes to advantage and at a superior paying price.

Discussion.

Question-When did you plow up your ground, in the fall or in the spring?

Mr Huebner—I start the plow as soon as the hay is taken off from the meadow, and keep on plowing whenever it is necessary until late, and then I distribute this manure broadcast and work in the manure with a disc harrow three or four inches, I plow three or four times. We take only one crop of hay.

Mr. Cole—Will the different varieties planted side by side in the same field mix?

Mr Huebner—No, you can plant them in the same row and you can't mix them. There is a great deal of talk about grafting potatoes, but that can't be done. I have tried it over and over again.

MY EXPERIENCE WITH POTATOES.

L. SPAULDING, River Falls, Wis.

since the potato was first introduced into England by Sir Walter Raleigh, who took it from Virginia. But it has been fertilized and hybridized so much since, that I suppose it would be as hard to find the original potato as it is to find some of our good old-fashioned roses that have been crowded out of existence by the florist.

The potato is a native of most of the warmer portions of the world, especially the tropics. When raised from the seed no permanency in form, color, general characteristics or qualities can be anticipated. A good variety having been originated it can only be secured by propagation in some other way. Instances are on record where, out of several hundred seedlings not one was like the parent, and only three or four worth perpetuation.

Potato Seed,

In order to procure the seed for sowing, the seed ball should be gathered when it is quite ripe and dried, and the seeds rubbed out with the hands. They should be kept in some dry place until the next spring, then sown in shallow boxes of well pulverized earth. When the plants are four or five inches high they should be transplanted into well prepared beds, allowing about six inches space between the plants. Keep the beds free of weeds and give give them good culture, and in the fall you will find at the ends of the roots These want to be kept small tubers. until the next spring and planted. At the end of the second year some idea husbandry, little thinking that one of their value can be obtained. This good hill of potatoes was worth several is the way new varieties are obtained, spears of corn. I am glad to say that

It has been three hundred years to pay such high prices for a good new variety, as there are so many that are worthless which took just as much time and care as the good variety did. Therefore don't complain if you do have to pay a high price for a good thing. For good seed is what you must have if you expect to be successful in raising any kind of grain or vegetable; a few extra cents paid for good seed is well expended.

> The potato is a heavy and dirty article to handle, and the farmer who wishes to be successful must not be afraid of soiling his hands with mother earth. Take the best of care of her, keep her well clothed and fed, for on her condition depends our success.

The Importance of the Potato Crop.

The potato, until within the last few years has been a very much abused vegetable, considering its value, in our State. Only think what a poor chance the average farmer has given it. If there was some out of the way place, or a three cornered piece of land that could not be cultivated to advantage with any other crop, there was where he stuck in a few potatoes, thinking that would raise all the potatoes he wanted, and nine cases out of ten he would have to run his mower over the ground before he could dig what few summered through. Some thought they gave it an exalted position when they allowed it a narrow space around their corn fields for the horse to tread down when they were cultivating their corn. Perhaps this was their idea of mixed and you can readily see why we have within the last few years the farmers

are giving the potatoes a chance with | mer to keep the weeds down, and just their other crops which it should have, for it forms a very important factor in our agricultural products, as a few figures will illustrate. It is estimated that the yield of potatoes in the United States in 1892 was 150,000,000 bushels, with an average price of 67.3 cents per bushel. There were imported from foreign markets from Oct. 1 to Dec. 10, 1892, 130,000 bushels. It is one of the best paying crops that we raise. Only see how remunerative it has been to farmers who gave it thorough culture the past season. I can name several farmers in St. Croix county even, who raised 300 and 400 bushels pcr acre, and others that raised 200 to 250 per acre that sold their merchantable potatoes from 40 to 50 cents per bushel drawn right from their fields to market, and realized from 18 to 25 cents per bushel for their culls at the starch factory. I will admit that we received exceptionally high prices this year, but they have been a paying crop when rightly handled for several years.

The Seed.

The question now is, how shall we raise them. First of all, be sure of having seed that you know will grow. Seed potatoes should be kept in a dark, cool place to prevent sprouting. We hear that the very best results with seed potatoes are obtained where the seed is carried over in cold storage from fall until planting time, for there is less loss of seed and it germinates better after planting. Potatoes kept in cold storage are also far better for family use.

Soil and Preparation.

Wat kind of ground produces the best potatoes? formly obtained both in quality and you on this point for there are a great quantity from well drained, deeply | many different opinions as to the best plowed land. The potato likes a sandy | way. I cut my seed into chunky pieces, loam. I consider a clover sod best, plow- without regard to the number of eyes, ed just after the clover gets a good start aiming to have one or two in each after mowing in the last of June. piece I want them large enough to

as soon as it is in good condition to work in the following spring, I work it up thoroughly, for the potato is not an exception to any other crop, and you want a good seed bed, clear of lumps. Do not think that you must have just such land or you cannot raise potatoes. for a potato will grow on any land that will raise a good crop of grain, giving it the same chance you would give the grain in order to expect a good crop. If your land is a heavy clay plow under to prevent its baking, to a great extent. Don't be afraid of manuring your ground with any kind of rough, strawy barnyard manure,-old rotten straw,-for there is no crop that will respond more liberally to good treatment than the potato. Some will tell you that manure will make them scabby. It will if you use strong stable manure, but when you use the kind I have mentioned it never will. Ashes are a good fertilizer as Mr. Smith has proved to our satisfaction. In selecting your ground have the rows as long as you can, for you can work them so much better and faster, and at less expense. After you have your ground plowed and thoroughly pulverized start your planters and cutters. I plant from 30 to 33 inches apart between rows and from 13 to 16 inches apart in the row. The distance is regulated by the size of the top of the variety planted. My object is to have the tops cover the ground when they have acquired their growth, to form a mulch. The richer your ground the thicker you can plant them. I plant about 12 bushels per acre from 4 to 5 inches deep.

Preparation of Seed.

And now about preparing the seed. The best results are uni- I do not expect to agree with all of Harrow several times during the sum- contain nourishment for the sprout, be-

MY EXPERIENCE WITH POTATOES.

fore it takes its sustenance from the soil Don't cut your seed into thin slices, for if the weather is dry there is danger of drying up before it germinates. In the experiments at the Experiment Station with cut and uncut seed I will leave to Prof. Goff to explain. I have no doubt you may receive more pounds from whole seed, but you will not receive as many pounds of uniform salable potatoes as you will from potatoes cut as I have described. I like to to plant just as fast as I cut, but have had just as good results when they have been cut a day or two in advance. When you cut in advance sprinkle the run a plank or roller over them lengthpieces with land plaster. This takes up the moisture and thus prevents them heating and it is a good fertilizer help germination, and also to hold the also. The result of Indiana trials show that the number of eyes is of little consequence, but the weight of the piece is a very important factor. The indicated manner of cutting for planting, is to divide them into suitable weight and size, wthout regard to the dstribution of the eyes, instead of trying to have 1, 2, or 3 eyed pieces as terfere with the small roots. I believe the case may be. The approximation in level culture when my land is well should be 1, 2, or 3 oz. pieces or some drained. If inclined to be wet I hill. other defined weight. The larger the I hill slightly the last time I go through size the greater will be the proportional the potatoes that I have given level vield.

Pedigree Seed.

There is one kind of seed that I always like to plant, and that is pedigreed seed, as I believe in a good pedigree for a potato just as much as you who raise stock believe in the pedigree of a horse, cow, sheep or hog. If I hear of a new variety of potato that promises well, the first thing I do is to try and find out what it sprang from. I want to know whether either or both of its parents were good stock. I will name over a few varieties and tell you thier parents, which I think is a sufficient guarantee for their good qualities

Pearl of Savoy, Cross between Clark's No. 1 and Early Vermont, both parents good.

White Elephant, Garnet Chilli, fertilized with the White Peachblow, parents good.

Empire State, seedling of White Elephant, good.

White Star, cross between Excelsior and White Peachblow.

L. L. Olds Farly Wisconsin, cross between Early Ohio and Snowflake; the best of parentage, and it is bound to take a first place among our table potatoes.

Compacting the Soil.

After I have my potatoes planted I wise of the rows. I do this in order to press the earth around the seed to moisture. I harrow every few days until the potatoes appear above ground, harrowing both ways of the field, and as soon as I can see the rows I start the cultivator and keep it going as long as I can without injury to vines.

After these get 5 or 6 inches high, run your cultivator shallow so as not to inculture.

Fighting the Bugs.

Now that the potato is growing we make war on its greatest have to enemy, the Colorado potato bug. I have used Paris green with land plaster when the vines are small, using 1 pound of Paris green to 200 pounds of plaster, and putting a little on each hill. I like this the best for the plaster acts as a fertilizer, and the ranker your vines the less trouble with bugs. I have also used water, putting in onehalf pound of Paris green to one barrel of water. Then spray the vines with that. Either will do the work. You must keep the bugs off or your crop will be ruined. When you go to the field to see if there are any bugs don't look in the nearest corner and say there are none, and go back to the | remunerative prices, in order to save house happy, but go all over your field, for if you do not you may be suprised in a few days to find certain sections of your field devoured.

Harvesting

When your potatoes are ripe, dig them. I use the Hoover and Prout digger, and when I start the digger I start a man with potato sacks and have him drop them all along the field, and then I station my pickers the same way as I used to after the reaper. When a man has a bushel picked up he empties them into a bag, putting only one basketful in a bag, and after there is enough bags for a load, a man drives along and puts them into the wagon, and hauls them direct to market or place of storage. If I am selling merchantable potatoes the pickers pick up only that kind, and the culls are picked up afterwards and hauled to the starch factory. If I am obliged to aig before I sell, I pick up everything and put them in piles in the field, and sort them when I haul them off. I never put any in the cellar unless they are assorted. I believe in cussion. selling when I dig, if I can receive

handling them, for it costs every time, thereby cutting off the profits. Anyone who keeps his potatoes over until spring has to realize a great deal more for them in the spring in order to come out whole, for the shrinkage is large. Taking those that rot and are otherwise lost, together with the shrinkage in weight, there is but little doubt that between Oct. and June the loss to the holder is not much less than 33 per cent. on the basis of interest at 7 per cent.

Plant Early.

Always plant as early as possible after the ground is in good order to work. What varieties shall we plant? Every one must be his own judge. Always plant what your market calls for. and the ones that do the best on your soil. everything considered. Never plant mixed potatoes, for straight goods always bring the highest prices. I think I have said enough to bring this subject before the Institute and have occupied my share of the time, so I will leave it in other hands for dis-

THE BORDEAUX MIXTURE FOR POTATO BLIGHT.

Prof. E. S. GOFF, Experiment Station, Madison, Wis.

Important discoveries are sometimes, them. Finding moral suasion unavailthe result of accident. About the year ing, they went to work and mixed up 1883, some grape growers living near a mass of whitewash, which they colorthe city of Bordeaux in the south of ed blue with sulphate of copper. Their France, whose vineyards were by the idea was to put something on the vines side of a road, discovered that the that would scare the children off so boys and girls going to and from school that they would be afraid of being were accustomed to help themselves poisoned and so would let them alone. to the grapes. They didn't like that, They killed two birds with one stone.

so they tried to stop it by talking to The mixture frightened off the child-

ing the grapes on the vines that had it ments until about the middle of Auon from decaying, while the grapes on other vines were destroyed by rot. Of course, this fact was published through the French papers and our students at the Department of Agriculture at Washington, read of it, and in the year 1886 our Section of Vegetable Pathology commenced experimenting with this mixture. It was found very soon that it did protect the grapes from rot in this country as well as in France, and of course was announced as an important discovery.

An Experiment.

In 1889, Prof. Weed, of Ohio, who knew that our potato rot is a disease caused by a fungus of the same nature as that which affects the grape, asked himself whether this mixture might not also prevent the potato from rotting, and he made the experiment on a were plantation. His results small published, and he found that the potato rot was less where he used the mixture, and also that the yield of potatoes was larger independent of the rot. His experiments showed that the part that had been sprayed with the Bordeaux mixture yielded 67.2 bushels more per acre than the other part that had not been sprayed. He sprayed these potatoes three times during the season. This result, while it could not, of course, be considered conclusive, was regarded as very promising. In the same year I have understood that there was a small experiment performed in New Jersey with this same material, but the results were not published. The next year (1890) it was tested elsewhere, and among other Wisconsin, at our Experiplaces in ment Station. We made experiments on a half acre of potatoes, dividing this off into four parts by selecting five rows through the centre each way which we did not spray at all. That left four corner plats which we sprayed six times with the Bordeaux mixture. The potatoes were planted in

ren, but it also had the effect of keep- early in July and continued the treatgust, making six sprays in all. Soon after we had commenced to spray, it was observed that the sprayed potatoes retained their green color better than those that had not been sprayed.

A Complete Success.

This result became more conspicuous as the season advanced, and by the early days of September that field became an advertisement for the Bordeaux mixture, because wherever it could be seen by passers-by in the road, the influence of the spraying was very perceptible. When we came to dig the crop, which was on the 27th. of September, it appeared that the sprayed parts yielded 54 and a fraction bushels per acre more than the other part. In this case we had no rot. This introduced an interesting question which puzzled us; we had supposed that the potato blight was connected with the pctato rot, but these results seemed to indicate that there is more than one kind of blight that injures potatoes. In 1891 the experiment was made in other places, among them in Rhode Island, where five sprayings resulted in saving 53 and a fraction bushels per acre. In this year the trial was made in the old country also. In England the experiments were very carefully conducted by the same man on different plats, showing different degrees of benefits from the treatment, but the average of the whole was that the sprayed plants yielded 56.1 bushels per acre more than the balance that had not been sprayed.

This last season the experiment has been made in many sections and the results have been uniformly to the effect that the Bordeaux mixture has proved decidedly beneficial even in localities where no rot appeared. I have one report which shows that spraying three times caused a difference of 160 bushels per acre in favor of the sprayed portion. This experi-June, and we put on our first spray ment was made in Vermont, and the

WISCONSIN FARMERS' INSTITUTE.

plats were photographed, and through | over the leaves, as shown on the lower the kindness of my friend Mr. Jones, leaves in Fig. 1. These spots gradually who conducted the experiment, I have been presented with a photograph showing these two plats. The portion not sprayed yielded 97 bushels per acre; the portion that was sprayed three times yielded 257 bushels per acre. The sprayings were made on July 30, August 13, and August 25. A copy of this photograph is shown on a preceding page of this volume.

What is Blight?

Now, what do I mean by blight some of you are ready to ask. It is not necessarily the potato rot disease; as a matter of fact there are two diseases which have been confounded as blight. They both do blight the potato,-one of them causes the dreaded potato rot that we have read so much of in the old country. The other is a disease that does not appear to be in the least connected with the potato rot, but that nevertheless often causes the potato tops to die about mid-summer. You have all read of the symptoms of the blight that causes potato rot. It flourishes in hot, wet weather mainly, and it affects the foliage as well as the tubers, appearing on the foliage as black spots of a soft texture, and often emitting a bad odor, and around these spots there is a whitish ring. The other potato blight appears in dry weather, and it attacks the foliage mainly. It generally comes on in very hot, dry weather, succeeding a wet period.

I quote here a description of this kind of blight writen by Prof. L. R. Jones, of the Vermont Experiment Station, and published from that Station as "Newspaper Bulletin No. 9."

"As a result of its attack the field as a whole has a sickly yellowish tint instead of the rich, dark green of the healthy potato foliage. The general appearance of the affected leaves is shown in Fig. 1. In contrast with the single large spots of the late blight we have here many small spots scattered with these lines traced more clearly.

enlarge and merge together, as shown



FIG. I-THE EARLY BLIGHT OF POTATOES.

on the upper leaves. The tips and edges of the leaf are especially attacked.

"The progress of this disease is comparatively slow. Owing to this slow progress and to the drier weather the diseased portions of the leaf dry and become crisp as fast as they die, and the dead tips and edges of the leaves curl up, as shown in the upper leaves of Fig. 1. No such mildew as occurs on leaves suffering from the late blight is ever found about these dead spots, but a careful examination does show peculiar and very characteristic

marks. These are faint, thickened lines or rings in the dead spots, one ring outside the other, like the rings on a target board. In order to show this fact more clearly one of the lower right hand leaves from Fig. 1 is reproduced in Fig. 2 more enlarged and



FIG. II.

They are of course shown much more clearly here than they can be seen in the actual leaf.

"This early blight, like the other disease, is caused by the attack of a fungus, but one of quite different appearance and habits than that which causes the late blight. Another most important differene is that this early blight fungus does not attack the tubers. We have seen acres of potatoes where the vines were entirly killed by this disease and not a rotten tuber found in the field. The great injury results from the premature killing of the vines, leaving a small crop of immature tubers."

Fortunately the Bordeaux mixture appears to be a remedy for both these diseases.

Of course, the practical question whether or not the farmer should use Bordeaux mixture on his potatoes, hinges somewhat on the cost, hence I have gathered some figures on this point.

The recipe for Bordeaux mixture, which was given very fully in Bulletin No. 34, of our Experiment Station, is as follows:-

How Prepared.

To prepare this mixture, a barrel that will hold water and another wood vessel of at least five gallons capacity are needed. In the barrel dissolve 6 pounds sulphate of copper (blue vitriol) in 4 gallons of hot water. In the other vessel slack 4 pounds of fresh lime in 4 gallons of water. After the sulphate of copper is dissolved and the lime is slacked, and both have become | potato growers now have?

cool, stir up the lime and water and pour the mixture into the barrel. Then add 14 more gallons of water.

Care should be taken to procure fresh lime as that which is wholly or in part air-slacked will not answer so well. It is important also to use the mixture freshly made, as it soon loses much of its fungicidal properties on exposure to the air. When the mixture is applied with a spraying pump, it should be strained through two thicknesses of cheese cloth, to take out the coarser lime particles, which would otherwise cause trouble by clogging the spraying nozzle. The mixture will require occasional stirring during the spraying process to prevent the settling of the lime.

The Cost

In regard to the cost of this, the sulphate of copper costs in different drug stores all the way from six to twelve cents a pound. In round numbers, in four sprays, about 20 pounds of this mixture will be required for an acre. Fifty cents will pay for the lime; the labor has been variously estimated at from 25 cents to two dollars. In round numbers five dollars per acre would be a large estimate of the cost of protecting the plants from blight by this method, hence a gain of fifty bushels per acre at 10 cents a bushel will pay the cost. There is not the slightest objection to adding Paris green to this mixture, because they are not affected by each other, so that when it is necessary to use Paris green for the beetle, we can put it on in this form with very the extra labor. It is really safer to use them together than separate, because the Bordeaux mixture has a tendency to prevent injury from the Paris green, and this mixture sticks to the foliage for a very long time.

Discussion

Question-Can it be put on with a regular Paris green sprinkler, such as

Prof. Goff-I dont' know, I never Mr. Thayer-From your experience tried it, but I should think so. It with the Bordeaux mixture would you ought to be strained in any case.

Mr. Convey-Does it require as much Pais green when used with this mixture as if used separately?

Prof. Goff-I think not quite so much, because we find that this mixture keeps off the beetles to a considerable extent.

Question-Does the Bordeaux mixture injure the quality of potatoes?

Prof. Goff-We found a decided improvement in the quality of the potatoes where we used the mixture, as well as an increase in the crop.

Mr. Convey-Don't you think the treatment with the Bordeaux mixture will be calculated to produce a better quality of seed?

Prof. Goff-On general principles, anything that tends to improve the quality of the potato would tend to improve them for seed. Right here I want to say that it seems to me that Mr. Terry's fear with respect to Paris green is unfounded. If it is used in the right proportion it will not hurt the foliage. I do not think it necessary to use a quantity of Paris green that will endanger the health of the plant in any way.

Mr. Smith-Do you know of any remedy for scab?

Prof. Goff-I do not know of any satisfactory remedy. We have tried rolling potatoes in sulphur and sprinkling sulphur on them after they are in the ground. The result was perceptible, but there was still scab, and in some cases enough to injure the potatoes materially.

Question-Do you consider that scab remains in the ground and that there is danger of planting in the same place next year?

Prof. Goff-That is the opinion that is given by the micologists who have investigated the problem. The way to avoid scab is to use new land, is what we have been taught, but there is much to be learned about this disease.

recommend its use by the ordinary potato grower of Wisonsin?

Prof. Goff-I think the results are such as to warrant one at least in making the experiment for one or two years. I should leave at least a few rows unsprayed, as an experiment, and right here, it is not well to wait until we see our plants dying, before we do the spraying. Of course it is rather discouraging work to commence to spray on plants that show no indication of disease whatever, and yet it has been shown to be the wise thing to do, as we cannot get the full benefit of our treatment after the disease appears. If the disease once gets possession of our plants, we never can eradicate it. I should recommend you to begin spraying when the plant is six or eight inches high. Late potatoes seem to be much more subject to the disease than early ones.

Mr. Hatch-I used some of this Bordeaux mixture last year on my potatoes, and mixed Paris green with it. and it cost me no more to put the two together. I considered the experiment of quite enough value to me to continue

Prof. Goff-You can easily see that the reason why we need new applications frequently is that new shoots are continually coming on and the old ones are increasing in size, and every time a leaf forms that is not protected by this mixture the fungus is liable to attack it.

Mr. Woodward-In western New York last year I sprayed my potatoes three times with the Bordeaux mixture. I have an apparatus that goes with a herse for spraying my orchards, and I fixed on an arrangement of my own so that I could easily spray three rows at a time, straddling one row and spraying that and one row on each side. I could easily spray ten acres a day. I think I paid four and one half cents a pound for blue vitriol by the barrel, and it had one application

mixed with Paris green. I was so tion of ferrocyanide of potassium. well satisfied that I shall hereafter This will enable me to tell exactly when never omit spraying my potatoes. My I have added enough lime to combine recollection is that I used one and a with the sulphate of copper, and if half ozs, of lime and one and a half of the lime is fresh, all of the coarser part blue vitriol to a gallon of water. The can be left out. Pour in the lime and trouble with this Bordeaux mixture is water slowly, keeping the you get the lime very fine and keep it stirred, and add occasionally a drop or in suspension, no matter if you strain two of the ferrocyanide solution from it, if you stop your machine for a few a small necked bottle. So long as there minutes, it will settle in the butts of is a deficiency of lime, the drops will the nozzles and they will become clog- change to a dark brown, but as soon ged. In order to overcome that I as there is enough lime added, they slack my lime with boiling water and will retain their normal lemon-color. make it weak. I used old fashioned Be careful to procure the ferrocyanide gas burners, with two holes. I en- of potassium, and not the cyanide of larged those and as they came out of potassium. The latter is a deadly the two together it came out like a fog. ' poison, that would not answer Whenever one of the nozzles was ob-, purpose at all. structed I would strike on the pipe quick, and that generally released it.

Prof. Goff-There is another way of avoiding much of the trouble due to is. On some soils there might be a the settling of the lime, that I now in- little benefit from the lime. The invariably use myself, but as it makes the recipe a little more complicated. I to the fact that the blight was destroydid not mention it. It is to test the ed, and the potatoes grew in a natural mixture, as you are adding the lime manner. and water, with a few drops of solu- Adjourned to 7:30 P. M.

mixture the

Mr. Smith-Professor is there any fertilizer in this mixture?

Prof. Goff-I don't know that there crease in the crop, of course, is due

POTATO CULTURE IN A NUTSHELL.

E. S. GOFF, Madison, Wis.

Soil.

The best soil for potatoes is a rich, well-drained, rather light loam. For family use, potatoes may be grown upon almost any soil capable of producing grain or grass, but in market culture, the most satisfactory results in yield and quality can hardly be expected from a soil differing in character from the one described.

Soil Preparation.

A thorough preparation of the soil will pay as well for potatoes as for any lizers appear of doubtful favor in Wis-

other crop. The soil should be fine and loose at the time of planting, a condition that may be secured by a moderate use of the smoothing harrow shortly after a thorough plowing.

Manure.

Manure for potatoes should be thoroughly rotted and so well worked into the soil that every portion receives some of it. Fresh manure tends to produce scab and rot and to injure the quality of potatoes. Commercial ferticonsin. Clover sod grown on land previously enriched by stable manure is perhaps the best condition for a potato crop.

Planting.

The average results of early planting are probably best. Let the plow be started as soon as the ground will work well and the planting be done as soon as the ground is ready. Early planted potatoes are more likely to escape blight.

Next to early planting very late planting is preferable, in order that the potatoes may ripen during the cool weather of fall. Plant in drills running the long way of the field and aim to plant the seed at such distances apart that the tops when fully grown shall shade the ground like a crop of clover. For the medium early varieties, seed pieces 13 to 16 inches apart in drills 32 inches apart will answer well for land prepared as above described. Strong growing late varieties would better be planted 16 to 18 inches apart in drills 36 inches apart. The poorer the land, the farther apart should the seed be planted within certain limits.

Moderately deep planting, (about four inches) with very slight hilling is best for good potato soils.

Plant varieties that sell well in market and that yield well. The latter point must generally be settled by experiment.

Plant only smooth, well shaped, well maturer tubers of medium to large size that have not formed sprouts. The best tubers from the best hills is the ideal potato seed. Mixed seed should never be used.

Care of Seed.

Potatoes intended for seed should be kept in a cellar in which the temperature is maintained during winter at as near the freezing point as possible. They should be kept in tight barrels and should not be disturbed until planting time.

Cutting Seed.

In land well enriched and prepared ally, at times wh in the best manner, single eye cuttings ature is suitable.

are sufficient and probably are preferable. The size of the cutting should be increased in proportion to the poverty or lack of proper preparation of the soil. The weight of the cutting is of greater importance than the number of its eyes, provided only that it has one uninjured eye. To those who are growing potatoes to secure the largest returns, hand cutting with careful selection of the pieces will pay in the long run. The cuttings should be planted as fast as made.

Cultivation.

Within a week after planting, harrow the potato ground with the smoothing harrow, driving-lengthwise of the rows. Repeat the harrowing in four or five days, and after as many more days, harrow again crosswise of the rows. After the potato shoots appear, cultivate between the rows with a harrow tooth cultivator, and repeat this cultivation as often as weeds appear on the surface or the soil is puddled by rains until nearly time for the tubers to begin to set. Then cultivate once with a tool that makes a slight ridge about the plants without going more than two inches deep.

Watch for the appearance of potato beetles, and destroy them with Parisgreen, used dry with land plaster at the rate of one pound to a hundred, or with water at the rate of an ounce to ten gallons.

Harvesting.

Dig when fully ripe, and insist that the tubers be not injured in digging. Assort in the field, and if prices are fair, sell at once. Do not allow potatoes to lie exposed to the sun in hot weather.

Storage.

Deep cellars are preferable for storing potatoes. Store in bins holding 300 bushels each, separated by double boarded partitions with an air spare between the sides. Keep the cellar dark and the temperature at 32 to 35degrees. Ventilate one cellar occasionally, at times when the outside temperature is suitable.

A WHACK WITH THE SHILLALAH.

EVENING SESSION.

The Institute met at 7-30 P. M. Mr. Thayer in the Chair. "Bells of Seville" by Miss Watson. Music.

A WHACK WITH THE SHILLALAH.

T. I. VANMATRE, Fayette, Wis.

A Congregational minister who had preparing a paper for the Farmers' been conducting a series of revival Institute." Said she, "What is your meetings with very indifferent success, subject?" Said I, "I have no subject, said to a Methodist brother who was I am going to write my paper and name a very successful revivalist, "How is it, it afterward." "Well," said she, "that brother, that your meetings are attend- is precisely the way I courted. I courted with so much success, while mine ed without a subject, and when I got are so indifferently attended?" "Well," married I got nothing worth naming." said the Methodist brother, "I'll tell I suppose she was thinking of the you. When you get up into the pulpit number of cows she would have to milk to preach you have your sermons all and how she would be obliged to dig written down and the devil stands be- the wood out from under the snow to hind you and looks over your shoulder keep the kitchen stove running while and hardens the hearts of your con- I was off talking improved methods gregation against what you are going of agriculture to the farmers of this to say, but when I get up to preach I state. Now, I never thought it neceshave neither manuscript nor notes and sary for a man with a strong, healthy the devil himself don't know what I wife to build a wood-house. I always am going to say." Now, that just supposed it would be an easier matter about expresses my condition here to- to marry a second wife than it would night. I have neither manuscript nor be to build a wood-house. I never tried notes, and I scarcely know what I am going to say, and I don't believe the opportunity to present itself when I old nick himself knows.

Have an Object.

Last fall when I received a communication from Superintendent Morrison, many years ago in Roman history this saying my services would be required statement. Agricola came into Italy in the Institute work this winter. I at a very remote period, and first went off by myself and wrote for taught the people agriculture. I have three weeks. One day my wife came often wondered what system of agriculinto the room all strewn with books ture Agricola taught the Romans, for and papers, and said she, "What on ages later we find agriculture in all earth are you doing?" Said I, "I am continental Europe in a very primitive 6 - B

either, I am simply waiting for an may do both.

Fret not thy Gizzard.

I remember to have read a great

lishmen the most advanced agricul- night, that I have never had the least tural people on earth, hacking in their occasion to regret my chosen profeswheat and barley with the mattock, sion, because I believe there is no busiand the women dibbling in the mangles ness on earth which affords the same and turnips, the internal commerce amount of pleasure and independence being carried on alone by pack horses, wheeled vehicles being unknown, and atic farming. the external commerce by paddle boats and sail vessels of only a few tons is expected if a man presumes to stand burden. And still later we find our before the people and demand the atown fore-fathers turning over the stub- tention of the public ear that he has born glebe with the wooden mould- something interesting, if not entirely board and gathering their harvests new, to communicate, and although with a hook. And I have a distinct the subject of agriculture is as broad recollection of having plowed corn with as the universe, and the people affected an old single shovel plow that would thereby as numerous as the stars which no more scour than a wheel-barrow bedeck the night heavens, still the propelled by an old grey mule, who agricultural press, the agricultural colheld rigidly to the eleventh command- lege and the Farmers' Institutes have ment, "Fret not thy gizzard in the heat made it very difficult to say anything of the day." And after mature delib- new upon this subject, broad as it may eration I have come to the conclusion be,-and the most that we Institute that one of the great drawbacks of workers can hope to do is to retouch American agriculture to-day is the this subject as the artist retouches his great number of men and mules who picture, for the purpose of bringing out commandment. I have keep this known whole families who had an entire disregard for the whole decalogue in travelling over the state we often who could keep this commandment heard it said that if the legislature with pious zeal.

What are You Going to Do?

majority I found myself confronted entirely beyond the province of legiswith this question,-What are you go- lation. You may lead a horse to water, ing to do? This is a question which but you can't make him drink. So the everyone has to meet and settle for legislature may provide for our educahimself sooner or later in life, and I believe the sooner the better, for I have known many young men to spend much valuable time and money in the pursuit of studies which they never made use of in their business operations. I learned from history and tra- is our bounden duty to avail ourselves dition that my ancestry for generations of the opportunities offered. had been tillers of the soil, my great grandfather having been a pioneer farmer in Virginia, my grandfather a pioneer farmer in Ohio, and my father the people of this one thought, that a pioneer farmer in Wisconsin, and I anybody knows enough to farm. If we found myself predisposed to follow the shall ever take our place among the occupation of my ancestry, and I wish business men of earth to which the

state. And still later we find the Eng- | to say to you people assembled here tothat may be found in sensible, system-

In this day and age of progression it and making more prominent some partially concealed feature. Last winter would enact a law compelling the farmer to do as well as he knew how there would be a great advance along In 1865, after I had reached my agricultural lines. This is, of course, tion, but it cannot compel us to avail ourselves of the opportunities offered. So we, like other men, are the architects of our own respective fortunes. But if the state in its munificence has seen fit to provide for our education, it

Exalt Agriculture.

I wish I could disabuse the minds of

importance of our calling entitles us, a mother for her dying child:-that old manufacture. And the sooner this fact around the saloon in winter time and shall be fully established in the minds drink beer and munch tobacco, while of the people the sooner will the strug- poverty and cold were devouring his gle of the friends of improvement be stock. Of course you have no such crowned with success, and the victory farmers in this part of the state, but won over ignorance and its traditions. they are legion up in the northern part There is a grand principle involved in of Wisconsin, and you will always science of affects not only this generation, but all tural colleges, and Farmers' Institutes. succeeding generations and forms the They are always complaining against basis of all permanent improvement unjust legislation, high taxation and and the highest hopes of an intelligent discrimination. You will find this class and progressive people. Until quite in favor of the organizaton of a politirecenty the farmers of have had few facilities for becoming rights. Now, brother farmers, I wish well informed in regard to the economical improvements of soils, cultivated lieve there is any legislation on earth plants, and balanced rations for stock, and time will vindicate the wisdom of the grand old man, now gone, who was instrumental in giving us these extensions to our agricultural college which have brought this much needed information to our very doors, and no more fitting monument could have been erected to his memory than Hiram Smith Hall, which stands on college hill, and from whose classes must eventually spring young men who will surprise the world with their manipulations of milk, and whose achievements will stand as added monuments to his goodness and greatness.

Fifty Years on the Same Farm.

For more than half a century I have lived upon and cultivated the same farm, and often have I thrown myself prone upon the ground and kissed the

it will be after we have exhausted farm which has so often responded to every means within our reach for a every demand upon it, and has never complete understanding of our work. once turned me away empty handed A very small percent of the money now and unrequited. So, you see, I have wasted annually by agricultural igno- not been migratory in my habits and I rance would suffice to remove such assure you I have never been sedenignorance, if properly directed. The tary. I never had any patience with people must eventually discover that a sedentary farmer. I mean a farmer labor and capital employed in tillage who would sit around the streets on and husbandry is as worthy of legis- dry-goods boxes in summer time and lative consideration as labor and capi- tell long stories, while the weeds were tal employed in mining, commerce and devouring his crops, and who would sit agriculture which find this class dead set against agricul-Wisconsin cal party which shall give them their to say parenthetically, that I don't bethat will ever improve our condition until we fertilize our exhausted soils and improve upon our slip-shod methods of farming. We have relied entirely too much upon the virgin strength of our soil, and too little upon the rotation of crops and the excellent use of clover. It is the careful, painstaking farmer of to-day, who is blazing the path along which agriculture must eventually build the highway to success.

Poor Farming Makes Poor Citizens.

Mr. C. R. Beach, of Whitewater, one of the most successful farmers in southeastern Wisconsin, says it is never necessarily hard times for good farmers, and my observation and experience in life corroborates this statement. I never knew a man to bring to bear upon the farm a reasonable earth with the passionate fondness of amount of intelligence, industry and

economy, but what succeeded. I am | same store and buy twenty-five cents glad to note the growing tendency towards smaller farms and larger brains. Poor farming makes poor farmers. Conversely, good farming makes wellto-do and independent farmers. Over fifty years residence upon the same farm has given me a splendid opportunity for making observations. I have seen young men start in life with an inherited fortune under the most favorable circumstances, who, in twenty-five years were not worth a dollar, while on the other hand I have seen young men start in life without a dollar and under the most unfavorable circumstances, who, at the end of twenty-five years, were worth thousands, not made by speculaton, but by honest industry. This simply shows the capacity of different men to do business. You say this is luck. I don't believe in luck, but I have unbounded faith in indomitable pluck and energy. I would not give one red cent for the powdered dude who would sit around waiting for a job to turn up, but I would bank thousands on the young man who will draw on his cowhide boots and blue drilling overalls and go out and turn up a job. To be run against is simply a proof of position and existence. To run against something is proof of motion.

- "In battle, or business, whatever the game,
- In law or in love, it is ever the same; In the struggle for power, or the scramble for pelf,
- Let this be your motto, 'Rely on yourself.' "

Like Parents, Like Children.

I care not for a man's profession, but I will judge of his principles by his conduct. I saw a boy pass my place one cold frosty morning before sun up, last fall, barefoot, going two miles to the country store with a dozen of eggs tied up in an old bandanna handkerchief to buy his father a package of smoking tobacco. Like father like son. I saw a mother come into the like this thought. The desire to soar

worth of brown sugar and fifty cents worth of tobacco,-she and her husband both smoked, and he chewed. Like parents like children, again. I saw a neighbor step into a hotel at Mineral Point, throw down fifty cents and order the clerk to hand out the cigars. Ten men sat down, and in ten minutes this fifty cents had vanished in smoke. Thirty minutes before I had importuned this same neighbor to subscribe for an agricultural paper which would assist him in the successful management of his farm. Said he. "I have no money to spend for books and papers, and I don't believe much in book farming, anyhow." He belonged to that sedentary class to which I have already alluded.

Now, there is but little difference between success and failure in this life. The value of three five cent cigars daily deposited in a savings bank, which pays a small rate of interest on deposits would hand over to the depositor at the end of twenty-five years, three thousand, one hundred and ten dollars, and the value of three ten cent cigar's daily deposited in the same bank would leave the depositor at the end of twenty-five years the happy possessor of between five and six thousand dollars. This simple statement will enable any young man present here to-night to compute the financial difference in the standing of two men at the age of forty-five, one who smokes and one who does not.

There are no battles to be fought for our country to-day against hostile armies at home or abroad, but there are still battles to be fought against ignorance prejudice,-bloodless and battles but none the less decisive. You and I are the soldiers. Let us gird on our armor, and inscribe upon our banner "No quarters but unconditional surrender." Agriculture is the basis of all industry, and education is the foundation upon which the superstructure must be reared to success. I

gave the thought is our desire for an advanced agricultural education, which has given us our grand agricultural college, our dairy school, and our Farmers' Institutes,-monuments to which succeeding generations shall point and exclaim, "Alas! behold the benefactors of mankind."

Don't be in a Hurry to Leave the Farm.

In conclusion let me say to the young ladies and gentlemen present who are daughters and sons of farmers, Don't be in a hurry to leave the old farm, for city dissipation is swallowing up more people annually in the United States than all the monsters which lurk in the turbulent waters of the east. In the city you may see costly pictures, luxurious carpets and silken curtains, but remember that it takes wealth to secure them, and if you have the wealth you may enjoy all of the comforts in the country as well as in the city. Don't conclude that happiness and moral worth are alone confined to marble palaces and gilded interiors, for a large majority of the noble, self-sacrificing men and women who have blessed all ages sprung from humble homes, and by their own efforts have achieved distinction and bequeathed to their children and the world the example of a

eagle wings. A kindred pure life and a good name, which is far more desirable than great riches.

> History tells us that more than four hundred years ago a German duke married a peasant girl whose strong will and love of truth may be traced through all her royal descendants. And in our own colonial times the wife of a Virginia farmer taught to her son the courage, the simple habits, the reverence for God and for goodness, which, through him. gave to our young republic a strong and noble life. These women kindled lamps, not of brass and oil, which shall continue to burn as long as time endures, and any man or woman, I care not how obscure, whose life is pure, whose words are true, whose efforts are directed to the upbuilding of human society, kindles a lamp whose lambent flame can never go out. The stream which guides our children into the haven of eternal rest must have its rise in the fountain of purity.

- "Heaven is not reached at a single bound.-
 - But we build the ladder by which to rise

From the lowly earth to the vaulted skies,-

And we mount to its summit, round by round."

DOING THE TWENTIETH THING.

Mrs. J. M. SMITH, Green Bay, Wis.

I heard a woman many years ago, to go to sleep in the day time, with who had a large family and was burdened with many cares, who said to a friend on one of her specially busy days, "I have just twenty things to do; I think I will lie down and take a nap, and then I shall have but nineteen." I fancy some of you may say that she been now living happily surrounded by

so much work waiting to be done. With all such I must most decidedly differ, and say just here, that I believe many women who have been laid away in their graves, leaving their children to be cared for by strangers, might have must have been a very shiftless woman, their families, if they had been will-

ing often, to do the twentieth thing when I told him of the things he loved first.-when tired nature called plainly for a rest, thereby gathering strength to do the other nineteen. Let anyone notice the difference between the way a hard working, sensible man rests. and the way many women manage their resting time. The man stretches himself at full length, relieving every part of his body from all strain, and a half hour thus spent so restores his wasted strength that he goes to his work with new energy. The woman is very weary, but instead, of lying down, she says "I think I will rest awhile, and while I am sitting I will just mend these stockings and have them off my mind." Anyone can appreciate the man's advantage.

Childhood Memories.

Many women have very positive rules to do certain things on each particular day of the week, and if anything occurs to prevent them from carrying out their regular plans, are very much annoyed, and I am sorry to say are sometimes decidedly cross in consequence, thus making their husband and children very uncomfortable, and the little ones, who love sunshine and pleasant words creep away and do something which they ought not, instead of coming to mother for the story or song which they would have enjoyed, and which would have helped to develop them in the right direction. I never had time to prepare elaborate garments for my children. but always had time to tell them a story or to sing them a song:-and if it should be necessary for me again to have the care of little children I think I should sing again to them some of the songs my own children loved to hear. The habit early acquired, of always reading and storing in my memory pleasant things for the little ones, has clung to me through life. A dear little boy whose presence brightened our life for four short years used often to say to me as it neared his bed-time, "don't you think, mamma, It is time for our night story?" and

to hear he would sometimes say. "that was not a very long story, mamma, please tell us just another little one. just to make that long enough." These memories of the little ones come often to me, and are very precious. I have always thought the evening hour the most impressible to the little ones, and however much help I may have had at different times, when my children were young I always preferred to undress and lay them away for the night, with always some pleasant thought for their last waking moments.

The memories of my own child life are very distinct, and all are more or less connected with my mother. These may seem very small matters, but all my life has been so interwoven with the young lives around me, that I can not help caring for the things that will help to develop them in the right direction, and help to make of them such men and women as our country needs to make her queen among the nations of the earth.

Little Things Make Up Life,

Do you think I am making too much of little things? Suppose a farmer or a gardener should plow his land, manure it heavily, and plant it with the best of seed, and then say, "I am all right for a big crop, now I shall go hunting and fishing, and have lots of good times until my crops are grown," never considering that the weeds would grow faster than his corn, potatoes or strawberries, and when he had had his good times, should come around looking for the big crops he had expected. He might find, perhaps, some signs of the things he had planted. but principally weeds, or the wild oats we sometimes hear of young people sowing. Just as much reason have parents to expect their children to be strong upright and noble, who fail to throw around them the strengthening and helpful influences of a pure and happy home life. A few may overcome the unfavorable conditions, but the many weaker ones will fail to reach

the high standard to which they might have attained, if all this help and encouragement had been given them.

Many mothers seem to think that if they look after the daughters, the fathers should look after the sons. The fathers should look after the sons truly, and the daughters as well:-but if the sons are in any trouble I believe they will be more likely to go to the mothers for comfort than to the fathers. I once heard a young man say, when speaking of women generally, "I never think of comparing my mother with any other woman. To me she stands alone," and to that mother he went for comfort in many a worry and for sympathy in many a joy. Even his love affairs were confided first to her. The sons of such mothers are not apt to go very far astray.

Farm Homes Teach Sympathy and Co-operation.

Then there are many things which the young of both sexes must learn early in life:--and who so fitting to give them such instruction as their mother, and to give it in such a manner that they may see that the laws of our being, ordained by the Creator, are all pure and right, when carried out according to his will. But the mothers need the sons as much as the sons need her. Especially in farm homes, where the inmates are more isolated than in the towns, the closer the sympathy between the parents and children, the easier it will be for each to carry without stooping, the home burdens which are often hard to bear. Good house help is the exception rather than the rule and in many farming districts such help can scarcely be obtained at any price, and the mother's share is often too heavy without any wrong being intended by any one. If there is one place more than another where co-operative housekeeping should be practiced I think it should be in farm homes. Not only the able bodied members of the family, but even the children should have a share.

Do you ask what about the education of the children? They must be sent to school, of course, but the home is also a school, and the help which quite voung children can give, if rightly managed, will be as good to them as play, and often quite as enjoyable. even to the litle ones. The educational wheel is making great revolutions, and I believe the time is not far distant when a very important part of the children's education will be accomplished by their bearing some responsibility at home. Such an arrangement will lighten the mother's burdens, givin 2 her more time for rest and recreation. -time to keep up with the current literature of the day, and make herself more companionable to her sons and daughters, and better able to enter heartily into their plans and pleasures. It is a sad day in the home when the young people, as they gather around them in their homes their young friends for a good time, would prefer that the parents should keep in the background, lest their lack of intelligence and culture should elicit unfavorable remarks from their guests. If more of the daughters would take up the home burdens when the mothers are worn and weary, there would be more happy. sunshinv old ladies found in our homes. But it is not always the daughter's fault that the mothers work too hard. These changes if they come at all, must come by careful and systematic training and they must come so gradually and naturally that it will seem to both parties just the right thing to do.

If all the homes were run on the mutual benefit principle, each member of the family striving to scatter all the sunshine possible for the benefit of those around them, we should have much less of the terrible drudging to be endured in our farm homes. Finally let us each strive to work out in our daily lives the perfect law of love, and all shall be well.

Violin Solo, Miss Aurora Matteson.

WISCONSIN FARMERS' INSTITUTE.

THE WORK OF THE UNIVERSITY IN AGRI-CULTURE.

CHAS. K. ADAMS, LL. D., President of University of Wisconsin.

It is my purpose to speak to you in | bewilderment at this time as to how plain words of certain of the tendencies of education in agriculture, and then to speak a little more in detail of naturally, in the course of time, into what is accomplished in the College of three more or less distinct groups. Agriculture in the University of Wisconsin.

Scientific Agriculture.

The first struggle of any people, as you know, is simply to overcome obstacles, and during the early history of this country, the opportunities for anything like scientific agriculture were very few. The inhabitants at that giving typical examples. early day had to struggle with the conditions of soil, climate, etc. They regarded the trees as their natural enemies, and the trees first had to be removed. For a long time nothing more was accomplished than could be the general complaint was raised all done by simple tillage of the soil with a view of exacting from it the largest possible returns. The first half of the present century had hardly passed before it came to be known that something more than this was absolutely necessary, if we were to take any rank as an agricultural nation; and it was thought by a few, at least, that we might establish a system of education which would enable us to improve our agriculture. It was this thought that was in the minds of those who brought forward in 1859 and 1860 the measure that afterwards took definite form in what we know as the Morrill bill;-a bill by which it was provided that in all the states there should be established at least one institution where the leading object should be the teaching of the branches which relate to agriculture and the mechanic arts. Pro- quently a complaint has arisen against vision was made for the establishment that method, the complaint namely, of institutions of this kind in every that that college is not doing the work state in the Union. Now, it was not which it ought to do for the farmer. It

these schools should be organized. In the process of organization they fell

In almost all the states of the Union schools were established having four year courses. Gradually the colleges found themselves inclined to adopt different methods in order to adapt themselves to the wants of their environments. They naturally fell apart into groups. These may be described by

First, there were the colleges which relied upon the general training they should give to the sons of farmers without giving a special training in agriculture. But in regard to this class over the country that the agricultural college was educating the boys away from the farm;-for it was found that a very large proportion of the farmers' boys instead of going back to the farm drifted into other vocations.

The second class of institutions to which I referred were those in which an effort was made primarily to give a most thorough education in agriculture and allied branches, for the purpose of making at once intelligent farmers and professors of agriculture. 'Cornell University is an example of this kind of institution, and many of the best agricultural professors in the country have been educated at that school.

It is true that the number of farmers' sons who can afford to go there and remain four years for an education of that kind is very small; and consestrange that there was a great deal of is in answer to this complaint that

there has come to be established a three or four lessons a day besides short course where the teaching is several hours daily of work in the much more closely confined to agricul- barns and laboratories. ture, and where an effort is made to give that education to farmers' sons which they most especially need.

Now, the third class is one where the belief is prevalent that the instruction afforded by such a college should be exclusively of a technical nature. It should be of such nature that the farmer's boy who is to be a farmer, ought to be taught simply those things that will interest him and improve him as a farmer. It is upon this plan that the college of agriculture in the University of Wisconsin has been established.

Short Course in Agriculture.

what we know as the short course in agriculture, especially planned to supply the wants of farmer's sons. The six in which the farmers meet to hear professors offer just the instruction which they believe will be of the greatest benefit to those whom they instruct. They teach no modern languages, no history, no mathematics. But they teach everything possible that a farmer that the time is past when farming is should know. Here are six experts. employed because of their exceptional accomplished without skill. Successful knowledge of the subjects which they farming is the application of brains to are to teach. The students receive the laws of agrculture.

Connected with this instruction is the work of the University as an agricultural experment station. The results of experiments are published and distributed broadcast to the farmers of the state and country.

Then there is the dairy school. It is the hope of our professors that a professorship may be established and that such professor, during some months of the year may be at liberty to go out and superintend wherever it is desired, the erection of creameries or dairy houses throughout the state.

Another direction in which work is done is through these Institutes. Of The University of Wisconsin offers them I need not speak further than to say that in the course of the winter as many as a hundred Institutes are held what is to be said on the subjects great and small upon which their prosperity depends.

> I believe the farmers of this state. as well as of others, are coming to see considered to be a matter that can be

ADDRESS.

HENRY WALLACE, Editor Iowa Homestead.

Ladies and Gentlemen :-- I have been they often grope in the dark, and feel for more than 24 hours trying to get to the Wisconsin Institute for the grand round-up of which we hear so much, so favorably and deservedly.

The remark has been made here to the effect that the College, the Institute and the agricultural newspaper are the three great co-workers in developing the agriculture of the state and nation. That, of course, includes the Experiment Station, where the business

their way into the secrets of nature, and ask what she has to teach. The business of the agricultural professor is to teach the known, first thoroughly understand it himself, and drill it into the minds of the students.

The agricultural newspaper studies carefully the known, marks the discovery of the unknown and interprets it to the farmer on his farm. It is its business to be a teacher, to give is to find out the unknown, though counsel and advice, to get behind every

good movement, and the Institute be an Institute hall, a farmers' buildcomes in not as an experiment station, but as an experience station, where, all over the state your intelligent, progressive, inquiring farmers meet together, compare experiences and tell what they have learned, discuss without disputing, earnestly inquire, and in doing so, are drawn together and taught to magnify their office. Why, ladies and gentlemen, when the farmers of any state in the union, learn to magnify their office, to stand upon their feet, their slightest wish is known. Politicians keep their ears very close to the rail to get the first sound of the coming train before it is even telegraphed, and they understand that if the farmers magnify their office and respect themselves, they will demand what is due to them, and will have it.

Now, we all understand that Wisconsin is way ahead in the Institute idea, but, let me tell you, we haven't carried this Institute idea far enough. It takes too long to get around, too long a time elapses between the Institutes. A county cannot afford to have a piece only once a year. This Institute idea ought to be carried into every township and carried on twelve months in the year, meeting at least cases that they were born upon a once a month or two. The result would farm.

ing at a convenient place in every township, that would be a place for the Institutes to meet, and for any kind of agricultural organizations to meet. Why it would be a kind of Methodist prayer meeting, a Presbyterian presbytery, and a Congregational council, all in one. It would be agricultural headquarters.-there would be a library, and magic lantern and an outfit for giving experiments, and there would be flowers and a piano and it would be a grand centre in which farmers would meet and learn to understand and prize each other. learn to recognize each other's opinions and rights. Do you realize how far that would go in making farm life an ideal life, where there would be not only love for the money that is in farming, but a real love for the life of the farm, because after all we are coming to it in the next generation. Life on the farm is the ideal life;-it is the place where the strong men and women grow up. Trace back over the lives of those who are leaders in our great institutions and enterprises, and find out where they came from, and you will find in a great majority of

ADDRESS.

THOMAS BLACKSTOCK, Sheboygan, Wis.

Ladies and Gentlemen :-- It is very much of a surprise to me to be called upon to speak to you.

The question of to-night seems to be one of education. I agree with everything that has been said here; it is all true; it is all good, but after all this talk, I feel as if I want to rub the other way a little bit. It all simmers right down to this:-Farming is like any other business in life, the kind of was placed at a disadvantage, so 1

ty and confidence in his own work. whatever it may be, is what we want. I do not wish to reflect upon higher education, for there is no one has a higher wish than I have to have our young people get the benefit of it. I have longed for it myself, but it was too late. I have always felt when in the presence of educated men that there was something lacking, that I education that gives a man individuali- have been sorry that I didn't have it,

but all the same I asked this question. how does it happen,-and it certainly does happen,-that in a very large majority of cases our young men graduate at colleges and high universities, and go back home and are never heard of again,-they never amount to anything. It is not the fault of the colleges, it is not the fault. I was going to say, of the education, and yet I won't say just that, but I do say it is not the fault of the professors. There is no class of men in the world who work harder than the teachers in our schools and universities.

There seems to be an idea in the minds of a great many of our young men that when they have gotten through college that is the end of it. They forget that they must go to work, that after they have gone through an institution like that they have to go to work and forget a good deal that they have learned. Theory and practice never go exactly together. There is only one thing that will insure the success of any man in any business. and that is beginning right down at the bottom and working up. If you begin at the top you are likely to tumble and break your neck.

I don't think that farmers ought to consider themselves in the same light that they generally do. Your chance in the world has been just as good as anybody's. When farmers get together day.

they are a little inclined to think that all the rest of the world is against them, and that they are doing the hardest work in the world and having the hardest life. You are entirely mistaken, and you would soon see it if you would go into the large cities, or great factories and see the way men have to work there, and all the time are shut away from the fresh air and sunshine and proper exercise.

I don't mean to say that the farmers don't have to do any hard work. They do a great deal of it, and they do a great deal more of it than there is any neccessity of their doing. They make it hard and they make at harder not only for themselves, but for their families. Then the boys go away to the city and you complain. You can't make farmers of everybody, and if a man brings up seven or eight children, he can't expect a forty acre farm to support them all.

I think that the farmers' Institutes have done more good, and have been of more benefit to the farmers of the state of Wisconsin than anything else that has ever been done for them, and I hope that the legislature of the state will appreciate all this that has been done, and be liberal in their appropriation for the University work in all its branches.

Song, Miss Agnes Watson.

The Institute adjourned to 9:30 next day.



WISCONSIN FARMERS' INSTITUTE.

SHEEP DAY.

Morning Session --- Supt. Morrison in the Chair.

The Institute met at 9:30, March 2, upon our land. We ask that Thou 1893.

Prayer, by Rev. Mr. Holbrook-"Our Father, and Our God, we lift our hearts in praise to Thee for Thy infinite majesty, Oh, our Maker and our Preserver. We acknowledge Thee as the Giver of all good and perfect things. We offer our thanks to Thee this morning that Thou hast made this world for our temporary dwelling house, and that Thou dost place us in the use of it We thank Thee for the blessings of the people of our happy land. We pray for Thy blessing Amen."

wilt bless our rulers, and that Thou wilt grant that they be men who fear God and keep his commandments. May all the laws and institutions and customs of our land be founded on the law of God. We pray for Thy blessing upon the exercises of this day. and beseech that Thou wilt give wisdom and grace to those who are to speak to us this day. Bless us all that we may learn wisdom in this world, so that we may be ever prepared to live with Thee in our home above.

SELECTION OF BREEDING SHEEP.

A. O. FOX, Oregon, Wis.

Sheep," might properly be made to cover so wide a field as to monopolize too much time-I might discuss the various breeds and their characteristics; but the vital question is what are the best kinds of sheep with which to build the most profitable flocks, for Wisconsin to-day.

Wool vs. Mutton.

It seems scarcely necessary to take time to discuss before this audience the question as to whether mutton or wool pays best. Prime mutton is today worth \$6.25 per cwt.; wool from 15 to 30 cts. per 1b. It is being demonstrat-

My topic, "The selection of Breeding | made as cheaply as a pound of beef, All interested in sheep breeding, are no doubt fully convinced ere this. that the demand of to-day is for an early maturing mutton carcass. It is for a sheep that is ready for market at any time from eight to twenty months of age. This characteristic we must have, -all others are secondary. The most desirable secondary qualification is a fleece that will sell for a maximum price. To-day, and for some years back, the highest priced wool is classed as medium,-a staple three to five inches in length, of close texture. fine fibre, good strength and lustre, and free from gum or heavy grease. ed that a pound of mutton can be This class of wool enters largely into

the manufacture of our most durable | perfect staple of 7-8 medium, always and fashionable clothing. Its shrinkage is light in the hands of the manufacturer, and its freedom from oils renders it easily worked. It is alike popular with the manufacturer and consumer. This wool is worth to-day 22 to 30 cents, unwashed, according to conditon, while the shorter fine wools and the longer, coarser carpet and braid wools are worth 15 to 20 cts.

The Most Profitable Sheep.

The most practical sheep for to-day is therefore one that embodies in the greatest degree these characteristics of early mutton development and growing of medium wool. As a basis for building up such a combination sheep, experience has taught us that there is nothing better within our reach than the common American Merino ewe and for use as a sire, a ram of any of the improved British mutton breeds,-the Shropshire, Oxford, Hampshire, South-down, Cotswold and Leicester,-my preference being in the order named. But all these breeds have merit, and each has its devout advocates. Location and soil, no doubt, have much to do with the question as to which breed. This is well instanced in England, where all the above breeds originated, and each now flourishes in marvelous perfection in its particular locality.

I much prefer any of the Down breeds to the white faced Cotswold or Leicester cross. The Downs are possessed of much stronger constitution, are better feeders, better sucklers: they will wean a greater percentage of live lambs; their mutton is better when dressed, and last, but by no means least, they are covered with thick, close coats of wool, which afford ample protection for their bodies in the most severe weather, and which when shorn, is worth considerably more in the market. The Down wool nicks admirably with that of the Merino in the cross, producing a wonderfully

worth the top of the market.

Selection of Ewes.

There are already in the northwest many flocks of Down-Merino grades. embodying to a great degree the desirable characteristics I have been describing, so that it is not now difficult to get good grade ewes to start with in the establishing of a desirable mutton flock. There will always be found in every flock some ewes more nearly perfect than others. I believe it is generally cheapest to pay a fair price for the privilege of picking if possible, or for throwing back a few of the plainest or oldest.

Before selecting a flock of ewes one ought to have a very distinct type in his mind, and pick carefully to this type. The ewe, being a female, should embody decided characteristics of femininity. Size is a valuable characteristic, but a big coarse boned ewe, with a strong head and thick neck, is not the right sort to raise a good strong lamb, and to suckle it well for four months. The novice will always pick for extreme size, but the experienced breeder seldom, unless he finds it combined with excellent quality. It is safe to assume that the novice will generally select with size in view. The ewe of right type should be of medium size. weighing in moderate flesh as a yearling at least 150 lbs. Her bone should be medium sized, and she should stand with her pins well under her. The first thing to examine is her head. the index of the whole nervous system. Her head should be medium sized with a finely chisled nose and a wide nostril. Her eyes should be bright and full; they should light up her whole countenance with a lively and yet serene expression. Her ears should be small or medium, thin, and well pricked up. Her jaw and throttle must be free from meat or chuckiness underneath. These characteristics play an important part in establishing the ex-

pression of the countenance upon which 1 we must base our judgment in selecting for a strong nervous temperament and good disposition. Her neck should have good strength at the shoulder .-good medium length, not too short .and should taper in good proportion to the head. Her back should be strong and well sprung in the ribs. She will admit of a looser coupling at the loin than would be admissible in a ram. She must be of good width over the hips and they should extend well out in length. She must have a good barrel, but be careful that she is not paunchy. She should be deep and full through heart and lungs. Her skin should be as near a bright pink color as possible, a very dull lead color being objectionable. Her coat should he lustrous, close and even, to afford a good covering and conform as nearly as possible to the medium classification.

Selection of Ram.

The ram to head our mutton flock should be the embodiment of strong masculinity in every place. Beginning with the head, as in the case of the ewe;-we must form an opinion of his strength, vigor and life from what we see in his face. If long in his head and face, narrow at and below the eves, small in the nostrils, with sunken or sour eyes and thick, long ears,-if with these characteristics. surmounted as they are likely to be, upon a plain, thin ewe's neck,-condemn him at once, without further examination. The true ram's head should be deep and broad through the forehead; the nose thick and inclined to coarseness. the nostrils large and clearly defined; the eyes prominent. bright and full, with plenty of breadth between them; the ears medium size and carried well back. The jaw should be strong, rather short and deep, but should be free as possible from excessive folds of loose skin under the jaw, commonly called throatiness. The neck should be close and even, with a fine

from the base of the head to the shoulders. It should be short and deen. but should line up well from the shoulder, so as to give style and graceful carriage to the head. The shoulders should be deep and broad, but should not roll out so as to bring the forearm out of proper alignment with the body, and thus cause the animal to spraddle in front, especially if carrying heavy flesh. This formation is often attended by roughness on top of shculders through the heart. The proper alignment should exist with reference to the spine, the shoulder and the base of the neck. There ought to be a gradual rise from the top of the girt above the heart to the base of the head, with little or no depression forward of the shoulders. He should be strongly muscled in his forearms, and his front legs should stand well under him, and he should stand perfectly square on his feet.

Strength, Compactness and Style.

The above formation of shoulders and neck tend to throw the points of the shoulders back, and the brisket is brought down prominently in front. all of which tends to give strength, compactness and style. He should be well sprung in the ribs, and closely coupled the loins. at His hack should be level, and his back bone well covered with flesh. 80 38 not to be prominent to the eye or touch. He should have good length of body, but not too long in his sides. Much of his strength should be attained through a long, deep hip. If he is long in his sides and short in the hips. he is badly out of proportion. His hips should be of good breadth, well carried out to the tail. His thighs should be well stored with mutton. Great care should be taken that he stands square behind, and that he is well filled down in the crotch, carrying his meat near the hock. His coat should be broad, and heavily muscled lustre and a bright pink. He should

be well covered over head, belly, and scrotum. A shade of coarseness in the fibre of the ram's fleece, is not objectionable, as it indicates constitutional vigor. He should have strong bone, even bordering on coarseness rather than too fine, and should be short between the joints in his limbs. It is very important that he have a quick. elastic gait, showing an ability to carry his weight well, and also indicating that his usefulness has not been impaired by high feeding. In general, avoid the use of highly fitted, stable fed show rams. Field rams will always give the farmer the best results in produce.

Select and Breed Up.

Suppose the buyer now starts out to buy his flock. He is at once confronted with this dilemma:-the sheep he finds on the market do not fill the description. Here is his opportunity for selection. He must have his eve trained to the type most desired; pick to that as closely as possible; take the best, leave the culls. Then select the rams carefully, and breed up. Cull annually and continue to breed up;the flock will respond promptly to the effort.

Wisconsin, as a State for Sheep.

There is a large and lucrative field for this business in Wisconsin. We need have no fears of the business being overdone. Our latest statistics show that there are only a million or less mutton sheep in our entire state, while some of our sister states not nearly so well adapted to sheep, are carrying four to six millions. Wisconsin lies in the gateway of the Northwest, tributary alike to the eastern and western markets. Wisconsin has the most magnificently rolling surface to be found in any state in the Union. Nearly every farm has its dry, sunny hillside, sheltered with a strong belt of natural timber, while next below it

water of the purest crystal, only requiring the magic tread of the sheep's golden hoof and the sturdy husbandman's hand to cause it to respond generously, with a greater diversity of crops than can be found in almost any other country.

Population is rapidly increasing, and with it the demand for food, from our farms. Our cities are spreading in every direction. Within the lives of many here present, we shall see the entire shore of Lake Michigan, from Milwankee to Chicago. one solid phalanx of city. Our educational institutions are to-day, not only exciting the envious rivalry of our sister states, but the attention of the entire nation is turned to the achievements and the advantages of our splendid University.

A Plea for Progress.

Fellow farmers,-and I speak particularly to the young farmers-let us advance and keep abreast with the times: -Let us develop our opportunities;let us seek the University;-let us seek the Farmers' Institutes ;- let us partake of the free and liberal education offered at our very doors. Let us then turn to our farms to appreciate them :to build up our homes;-to dignify our social position;-to make our public/ roads suitable to the age we live in,such roads as will enable us to transact business like business men in all other pursuits,-roads that will enable us to deliver our produce and stock at all times of the year like business men, with promptness and dispatch;roads that will enable us to take our wives, daughters and sweethearts to the neighboring cities to scenes of pleasure and diversity,-roads that will daily bring the best buyers to our Such roads will add thousands doors. of dollars to the value of our farms:will bring comfort and sunlight to our homes, and will tend to make of the Wisconsin farmer's home a place of lies the beautiful fertile valley with comfort and intelligent delight to the

WISCONSIN FARMERS' INSTITUTE.

soul,-the place pre-eminent, in which | seen some second cross flocks to raise the best of men and the noblest of women.

Discussion

Mr. Chadwick-You recommend selecting ewes weighting from 100 to 150 pounds. I don't know where I can find such ewes for mutton and wool.

Mr. Fox-I was speaking of the grade, not of Merinos. You will find many of those grades in the state, and you will find plenty of them that will weigh over what I have named. Of course you could not apply that to a flock of Merinos. I suppose only a small percentage of the breeding ewes of this state will weigh that much. because the majority of flocks have been fine wools. I suppose that the Merinos predominate.

Mr. Hatch-In Richland County where they have bred largely from coarse rams I think 50 per cent. of the sheep will average 150 pounds when they are fattened.

Mr. Noyes-How many crosses would you have before you would have practically the same mutton sheep as is ordinarily bred?

Mr. Fox-That depends upon the judgment of the man who makes the crosses, but with good judgment the cross makes a perfect sheep. I have

that were very fine.

Mr. Cole-I find that it is necessary also to urge upon farmers going in to the sheep industry, that it is well to give their sheep good feed and good care also.

Mr. Shepherd-Isn't it a fact that the merino blood which remains in these crosses makes itself evident in the fleece, affecting it longer than the mutton characteristics?

Mr. Fox-I can nardly say that it does. I believe that the Merino bred fleece is better than any of the pure bred Down fleeces. The fleece of the third grades is as fine a piece of wool as you can find anywhere, except probably some of the Australian sheep.

Mr. Craig-I wish to say a word in regard to what we have done in cross breeding. We started some years ago with Merinos, perhaps an average weight of about 130 lbs. and these we crossed with Shropshires. We have continued crossing these with Shropshires, and some of the second cross can hardly be distinguished from the pure bred Shropshire. I feel justified in saying that you could in four crosses get a typical Shropshire sheep, with the form and markings and perhaps a little better fleece than the average Shropshire.



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MANAGEMENT OF BREEDING SHEEP.

MANAGEMENT OF BREEDING SHEEP.

ROBERT MILLER, Brougham, Ontario, Canada.

I think it will not be considered out | something else, as they often must, of place on my part, coming from a in order to keep in good condition. It long distance, and speaking as perhaps the only foreigner in this room, if I say to you that the work of your Experiment Station and your Farmers' Institutes are carefully watched by our people in Canada. I have never in my short life, and in the short life of the Farmers' Institute in Canada, been at a meeting where the Wisconsin Experiment Station and the Wisconsin Farmers' Institute were not mentioned. and mentioned greatly to the credit of those two institutions. I have heard extracts from your bulletins read by speakers, and they were certainly most attractive parts of the meetings.

Study Your Sheep.

In the first place before you can tend your sheep well, they have to be seen. Sheep should be seen no matter where they are, or what time of the year it is, at least once every day, and if possible twice. When a person rides along beside his field, or walks carelessly by the field in which his flock of sheep is grazing, and sees them at a distance of perhaps forty or fifty rods. that is not what I call seeing them. A man to be successful in raising and caring for sheep, must not only see them and know that there is the right number in the field, but he should watch mem carefully very day, and get to know their habits and their requirements, and he should know when any member of a flock fails to show that it is thriving as well as its mates. He should watch them carefully so as to be sure that some change is not redoes not do to wait until your flock is failing before you get your change of pasture or surroundings so as to make them improve again. What they have lost is not only lost in itself, but it takes some time before you get them recovered from that and going in the right direction again.

Sorting the Flock

Flocks should not be too large. Each man must be the judge of this for himself. I believe it may be admitted on all hands that any breed of sheep will give better results when flocked together in small numbers. In dividing your flocks, a great deal of attention should be paid to the way in which you do your sorting with respect to age, size and condition. If you have sheep for sale, customers are coming and looking them over every day, and you will very soon learn that it will be greatly to your advantage to have your flock of uniform size, age and condition. A good sheep does not look nearly so well when surrounded by inferior sheep, and vice versa. If you have two or three sheep that are rather out of condition, put them with a few lambs, that are in somewhat the same shape, give them a little extra care, and try to bring them up to a uniform condition with the rest. At this stage of advanced ideas in regard to the breeding of animals it would be ridiculous to say that pedigree amounts to nothing. It certainly does amount to a great deal, but it would be just as ridiculous to quired with reference to the feed or say that feed and care amounted to

nothing. We all know they are both important. It requires a man bred up at this kind of business to do it right; he should be born and live all his life among them, and make them a special study before he can give them the care and feed that is required by them in order to bring them anywhere near a state of perfection.

pecial Care Needed in the Spring.

I will endeavor to give you what my own experience has taught me as to the proper ways to handle sheep at different times of the year. In the spring, when our long winters have gone, our sheep have to be surrounded by changed conditions. We have to take them from comfortable quarters and put them in the fields. In doing this it is very important that the changes are not made too abruptly and that they have some special attention. When they are turned out in the spring, after having had a roof over them, and being protected from storms through the winter, it is important that they are not exposed to any rough weather at first. I do not mean to say that they have to be protected from every shower of rain, or from every snow fall that comes, but when they are turned into the fields, you should not allow them to depend on the soft, washy grasses all at once, but should gradually change their food until the grass gets a certain amount of substance.

The Flock in Summer.

The change from spring to summer is moderate and natural in this country, but there is a great deal to be learned about the care of sheep in should They very hot weather, have plenty of feed, plenty of salt once or twice a week, and plenty of water. I have noticed that wherever sheep are fed so that they will not drink water, they are fed in nearly the proper way. In this country where we have such warm summers It is hard to do that, but the nearer

you come to it the nearer we are feeding in a perfect way. In place of water they should have a liberal supply of roots. In our country we grow turnips, and our sheep do splendidly on our Swedish and white turnips, and they don't look at the water at all in cold weather. It is perhaps most important to have our sheep thriving in the autumn, not only because we are selling them, to a great extent, but they are being prepared to stand the rigorous cold weather and will want to be in good condition when we house them in the fall.

A great many of these things seem of small account, but the day will come when the man who pays attention to all these details will be well repaid for his trouble. I believe the men who can take a leading position in this country as sheep breeders, have the brightest future before them of any class of people.

Influences of Sheep Breeding.

There is another thing that I wish to say that I have never heard mentioned by any other person, and that is the influence of sheep breeding on those who pursue it. You have noticed that a man who is a great talker very seldom uses that gift in connection with the breeding of sheep. They are known notoriously throughout the whole world, as the most modest, and having the least pretentions of any class of people on the face of the earth. If a man is of a speculative spirit, he never thinks of entering into the sheep business, it is altogether too certain for him. Seriously speaking, in coming in contact with the breeders of the different classes of animals in Great Britian I have always felt different altogether in dealing with sheep men than with any one else. I do not pretend to account for it, but you will agree with me that it is certainly very creditable to the class of animals which we have met here to discuss today.

Discussion.

Dr. Smead-Give us the regular regime of feeding that you give your breeding ewes during the winter.

Mr. Miller-We have a different class cf food in Canada from what you have here. We have plenty of Swedish turnips and we feed them just as many as they will eat. We feed our turnips whole. They are very hard, harder than any other root, and we feed them whole on purpose, so that the sheep, in order to get enough of them, has to work hard at least ten hours a day. We think we cannot give them enough exercise in any other way. We feed oats and bran together as a grain ration, about half and half.

Mr. Hatch-How do you keep your turnips from freezing? They would freeze in Wisconsin in an hour.

Mr. Miller-We have cellars to keep them from freezing.

Mr. Hatch-I mean while the sheep are working those ten hours on them?

Mr. Miller-There isn't much frost in the pens where they are. There are some of them eating about all the time, so they keep up a little heat there. We feed a very small quantity of grain, not over half a pound of summer time? both per head to our breeding ewes.

and they need a very small grain ration. If we give them too heavy a grain ration they get too fat, and we find that is one of the things that should be guarded against more carefully than anything else in improved. breeds.

Question-How many do you put in a flock?

Mr. Miller-I would divide them as small as possible, say twenty in a flock in some cases. Others give better results with thirty or forty.

Question-How do you feed them in the summer so that they won't take water?

Mr. Miller-If you should ask me how to take care of a Scotchman so he wouldn't need any water, it would be very much easier ansy ered, but that is a difficult question to answer. I will admit. I can only say that the nearer you come to that state of things the better it is. We have a very heavy dew fall in Canada.

Mr. McKerrow-I do not understand that you forbid your flock having water, but you prefer that they should have it through the succulent food. Do you feed your breeding ewes grain in the

Mr. Miller-No, our chief trouble is They get plenty of hay, besides that, in keeping them thin enough.

CROPS TO GROW FOR SHEEP.

GEORGE McKERROW, Sussex.

Mr. Chairman, Ladies and Gentle- | kept, properly fed on the right kind men:-There is an old adage quoted among sheep men which I believe is a good pointer to us all, and that is that a sheep well wintered is half summered, and a sheep well summered is half wintered, which means keep them in good, plump condition all the year feeding stock that our friend Mr. Fox

of feeds, would not have a great deal of need of our veterinary friend from New York.

The Need of Variety.

While I believe in the principles of round, and I believe that a sheep so has laid down to us, and while I be-

lieve in the special care that Mr. Mill- (er has spoken about, and all the rest of the things that friends will tell us about later. I believe, in addition, that a good part of the success of the rearing of mutton sheep in the state of Wisconsin or any other state or country depends upon their feeding. Therefore it gives me pleasure this morning to talk to you a few minutes on the subject of feeds. In the first place, the scientific investigator, and the exthinker knows that, to a nerienced certain extent he must have what is termed a balanced ration to get the best returns for the feeds expended on the animals. If he feeds all one class of feeds, a certain amount of it goes to waste, but by combining two classes of feeds, which the scientists tell us are protein and carbo-hydrates, then the major portion of the food is utilized and assimilated by the animal and we get paid for it.

A Variety of Feeds Necessary.

So I would say to the Wisconsin sheep breeder, have a variety of feeds so that you can balance them up. We should have a variety, daily, and in making such changes as we have to make, make them gradually.

In the summer season, I have never had as good results with a pasture of one kind of grass as I have with mixed pastures. We have pasture on our farm in which there is some clover. some June grass, some Alsike clover, and the sheep like the mixture.

I find that my stock always does better when they can have access to a permanent pasture, the more grasses the better,-and to a clover pasture, and they drink less water when on these pastures. Then I find it a good plan to change from one pasture to another, every week or ten days.

Supplement the Pastures.

Then later in the season, in the dry times in this state, when we don't get dew for four weeks. I find that my pastures have to be supplemented times sowed oats and tares mixed. which make a very good food. I have grown white turnips and rape for later fall feeding. Rape is quite new to the Wisconsin farmer, but we are satisfied with the results. In growing turnips or mangolds. I find it suits best to prepare the soil previously. having fed with clover the year before. plowing either late in the fall, or early in the spring and making the land very rich, working thoroughly with the disc harrrw, spring tooth harrow or any kind that will work the surface two inches nicely, then I am ready to put in this crop of rape.

Preparing for the Rape Crop.

drill it in with We a planet drill, the same 38 VOL Junior would drill in turnip seed. then cultivate with a fine toothed cultivator. keeping it clean and moist by keeping a dust blanket on it. Keep it fine in this way until the rape is large enough to cover the ground so you can't get through. We generally put it in two and a half feet apart in a good growing season. Allow it to grow until along in October, and then when you begin to feed your stock on it, take special care not to allow them to gorge themselves. and not to go onto it on an empty stomach. I believe I have made the greatest gains on my farm in feeding that rape. It answers nicely too, for fattening lambs.

We also raise turnips, mangolds, and some sweet turnips, although they have not done as well with us as with our friend from Canada. I have noticed upon Mr. Miller's farm, and upon other farms in Canada, that they raise turnips in ten, fifteen and twenty acre pastures, by the thousand bushels, and feed them to their stock.

Grain Foods for Sheep.

The grain foods that we raise on our farm mainly for thin sheep are corn, oats and wheat; we also raise oats, and spring wheat as one crop, by putting in with some other food. I have some about one quater wheat and three

quarters oats. We use some bran, a little oil meal, which are not raised on the farm. I have raised a few peas, although they have not flourished very well on our land. Clover, as with Mr. Miller, is our main ration. We grow clover for the benefit it does our farm, but especially for the good food that it makes for the sheep; and in raising clover for sheep, as well as for any other class of stock, there is one thing I have found which is very important, and that is the curing of the hay in such a way that it will be in the best food form; I mean most digestible.

Curing Clover for Sheep.

I find that a ton of clover put up in the right way will come out green, and in nice shape, and is worth two. and in some cases three tons of clover put up so that it will come out in bad condition. The digestibility of clover is seriously injured either by standing upon the ground until it is very ripe, or by curing and cutting entirely in the sun so that the leaves dry off. The stock cannot possibly get the best out of it. I have found the best satisfaction in clover for sheep feeding to cut it just as it comes to full bloom, putting it up in cocks, leaving it to sweat a short time, then airing it out to allow the sweat to pass off, and putting it into the house quite green. Such a crop of hay as that will winter my flock in good shape, until nearly the time that the ewes begin to drop the lambs, without any grain, although for the sake of variety I like to feed a very small ration of grain. Our breeding ewes this winter are not getting over a quarter of a pound of grain, consisting of a mixture of oats, bran, and a very small percentage of oil meal.

Discussion.

Mr. Hayes—What kind of rape do you sow?

Mr. McKerrow-The dwarf Essex I believe is the best kind of seed. Some of our seed men tell me they have been imposed upon by foreign sellers, and a lot of rape was sent out into this country that was not true to name. The kind of seed is very important. The only house I know of in Wisconsin that sells it is Curry Bros., Milwaukee, although I believe all seedsmen are handling it.

Mr. Edgerton-What do you mean by, bird rape?

Mr. McKerrow-That is the name they use for it. I think the seed is used for canary birds. A question has been asked me in regard to ensilage. I have not fed any myself, but a friend of mine who has a flock of a hundred grade Cotswolds fed them four pounds of corn ensilage morning and evening, and he considered it good food for them. His ewes improved in appearance during the winter, but in the spring his lamb crop was very unsatisfactory. The next year the same man used four pounds of ensilage per day, clover hay once a day, and straw once a day, and a very small grain ration, and had very good success, so that it would seem that ensilage fed in proper proportions is all right.

Mr. Hatch-I am now feeding ensilage for the sixth winter, and I find that if properly fed, as you would feed roots or any other succulent feed, it is one of the most valuable feeds for sheep, for the reason that it is easy to handle, and the sheep do well on it. Anyone who has made a study of balanced ration knows that the trouble experienced by Mr. McKerrows's friend was due not on account of the ensilage, but because he was feeding a ration that was entirely deficient in nitrogenous compound. I think the result would have been the same if he had fed corn fodder and straw. I cannot say too much in favor of ensilage as a sheep food. If a man has good clover hay and good corn ensilage, he has a perfect ration for sheep.

Mr. Fox—I was fooled last year on my rape the same as a good many others were. I applied last fall to Prof. Thos. Shaw of Guelph, to assist me in getting some reliable seed, and he directed me to a seedman in Ontario, whose seed they have tested. That is the only way to be safe-get tested seed.

Mr. Morrison-Curry Bros., of Milwaukee, will have tested seed this year.

Mr. McKerrow-I want to warn you of one thing about rape. There is a great deal of danger from bloat in feeding this crop.

Mr. Miller—Every year we grow from ten to fifteen or twenty acres of rape, and every year we put every sheep in that rape to pasture, and we never remove them till they are sold or removed for some special cause. The trouble in regard to bloat is only when they are put in the field when they are about famished and eat very greedily.

Mr. Kingman—Do you know of any better grass to sow with clover than timothy?

Mr. McKerrow-No sir, not to take the place of timothy.

Mr. Miller-We always sow our rape broadcast, and as nearly as possible six pounds to the acre, after thoroughly preparing the ground. We clean our land with the turnip crop, and plow enough so that there is no danger from weeds. I have heard it said that the sheep will go between the rows and eat the rape without tramping it, if it is sown in drills. This last year we had a rather better crop than usual, and I noticed that the sheep would eat it in front of them just as clean as though it was mowed and raked by hand. They would not step inside of it. You could not tell by the flock of sheep that they had been in the rape field at all, the fleece was perfectly clean.

Mr. McKerrow—I found that true when I sowed in drills; they worked altogether on one side of the crop, The rape takes possession of all the ground, and they would just work on one side of it. Mr. Chadwick-When you sow Alsike and white clover to renew your pasture, how much do you sow per acre and at what time of year?

Mr. McKerrow-I top dress these permanent pastures with manure in the fall and in the winter. I sow this seed at the rate of two pounds of Alsike and a pound of white clover, and harrow it over, very early in the spring, two or three times, just as soon as it is dry enough to get the harrows and the team on it, sowing the seed just before I harrow.

Mr. Fox—I wish Mr. Miller would tell us a little more about this rape culture. If he is correct in sowing broadcast it means a difference of fifty per cent. in putting it in. Is there a particular period at the growth of the plant when it is just right for turning in the flock?

Mr. Miller-My experience has been when I had a field of rape ready so that it will stand a little feeding, I would put in a few small lambs. something that I wanted to give the best care to, or a few lambs that I wanted to push very fast that would receive a lot of benefit from it, and I would add the sheep as the crop would carry them, but rape is not at its best till it gets a strong growth. If properly sown it never will get woody, and I think the chief reason for sowing it broadcast is that it keeps the ground clean, if it is comparatively clean to start with. To have rape just right, you want it quite thick on the land, you want it so sappy and juicy that when you cut it it will all break up, almost go to pieces like an icicle. If it is in that conditon it will give you the best results. I believe the time to sow differs in different localities. We have a turnip fly that would eat our rape if it come up before the 20th of June, so that we must not sow it before that time.

Mr. McKerrow-I like to sow it about two or three different times,--the earliest sowing about the 15th. of June, and that comes in for earlier feeding. | of the other varieties. About the mid-Last year I sewed some broadcast about the 15th of July, and it made a good stand.

Mr. Chadwick-I see in England they sow turnips and let the sheep harvest them. Did you try that?

Mr. McKerrow-Yes, I often sow turnips in the cornfield and feed them off on the ground. I sow at the last cultivation which comes pretty early in July.

Mr. Wallace-The Iowa Agricultural College last year sowed quite an amount of rape in May. It made a splendid growth, but it seemed that every cabbage worm and fiy and everything of that kind was made for that catch. It was so good that along in July it was burned perfectly black. The late sowing did better.

Mr. Woodward-I have been raising rape some four years. I commenced by sowing it in drills, and I found that it needed a great deal of cultivation. Then I adopted this plan. I plow my ground early in the spring, and prenare it just as I would for a crop of cabbages. About the 15th of June, I sow a plat of rape, and about a week or ten days after, I sow another, and then later on the third crop. When the first crop has grown up about a foot or so high, I put some lambs into that, and they eat it off clean. By the time that is gone, I am ready to turn them into the other, and so on, and by the time I have gotten through with the three the first one is ready again.

On the subject of rape, Mr. S. W. Hays, a practical breeder and feeder of Oxford Down sheep at Alderly, Wis., says:-

I have had some experience with this valuable plant, and know that the day is not far off when most of our prosperous sheep raisers will have acres of it. The greatest difficully seems to lie in procuring the seed true to name. The Dwarf Essex, or Fodder rape, is dle of August I visited a friend of mine in Waukesha county. I discovered his rape was bird rape. It grew up about two feet high, resembling that of wild mustard, with the yellow flower on top. This is the effect of procuring rape not true to name.

Growing the Crop.

About the first of July, I prepared a piece of land very nicely, and drilled to rape, using Planet Junior seed drill. using about two and a half pounds seed per acre; drills three feet apart. Would not advise drilling any closer on account of giving sheep more room between rows when feeding upon it. as it grows very rank and spreads out between rows. The seed germinates verv rapidly, if there is sufficient moisture in the ground. One week after I drilled it I could see the rows clear across the piece, (eighty rods long), resembling turnips very much. I then went onto it with a Planet Jr. drag tooth cultivator, and ran very close to the rows, thus killing all weeds and grass.

The Nature of the Plant.

It seemed to grow very rapidly and then a week later I went through it again in the same way, and finally finished by using Planet cultivator with side shovels, throwing the drill toward the plant. By the last of September it had grown up so rank that it covered the whole ground, affording large quantities of very valuable food for the sheep or lambs. It seems to be a plant that makes the larger portion of its growth when the days and nights are getting cold. and I would caution all desirous of growing rape not to drill too early in the season -not earlier than July first. or any time during that month.

A good plan is to grow a piece of rape in several of your fields, so that when your grain or hay is cut you can put in a flock of sheep, as they should have the kind to raise, not bird rape, or any access to both grass and rape. By so

doing very favorable results will be heavy frost, as it has a tendency to obtained, far more so than by feeding grain, and the cost will be much less.

Care in Feeding the Crop.

When lambs are first turned upon rape they should have a little bran at first, as the rape has a tendency to loosen the bowels, especially when the lambs have been turned upon it before the rape has been frested. Far better results with rape have been gotten when flocks have been turned onto it after a heavy frost in the fall of the year, as the frost seems to nourish or ripen it, and they will eat more of it. Care should be taken when the flock is first turned on, especially after a

bloat. I would caution those having valuable sheep to look out for them when at first turned on, although I have not lost a single sheep in that way yet. My breeding ewes had to be taken off as I discovered them getting too fat. To those who have flocks I would say try rape.-The Dwarf Essex variety,-and you will never regret drilling acres of it upon your farms, as it affords an excellent food for sheep, and it is a very good method of manuring the land it grows upon.

Music, Swiss Song, Mrs. Blankenburg.

The Institute adjourned to 1:30 P. M.

FEEDING SHEEP.

Prof. J. A. CRAIG, Experiment Station, Madison, Wis.

The feeding of fattening sheep is the leading interest covered by this topic, and as it of itself affords sufficient scope for a liberal discussion, I shall accept it as the best subject to present to you.

that has taken place in the improve- the fattening process begins. It is the ment of fattening stock has occurred general belief that lambs fed in this in the shortening of the time they take way will have gained as much and in reaching maturity. Early maturity weigh as heavy when marketed in the and profit are so closely associated spring as those that have been fed that every feeder now realizes the grain judiciously since the time they necessity of securing the former to were able to eat it. get the latter. In sheep feeding this theory is to the effect that it is better has become evident in the extent to to only give the lambs good pasture, which lambs are fattened, instead of so that they may grow large frames yearlings and aged sheep as in earlier and then when they receive grain later times. In treating of the fattening of they will make more rapid progress. sheep I shall limit the facts I have The facts that I have collected bearing to hand to those that bear on the feed- on this practice, show clearly that it ing of lambs, for this is certainly the is not right, and to present those to most profitable line of sheep feeding you in the best and plainest manner, that may be carried on the majority let me outline the experiments that I of our farms.

Method of Feeding Generally Adopted.

Lamb feeding under the general course of our conditions is carried on after this plan: The lambs after being dropped, get no grain until late in the Of recent years the greatest progress fall, when they are penned and The common have made.
Experiments with New Methods.

The data so far collected at our station covers two years, and includes all the facts we could gather from the time the lambs were dropped in March and April until they were ready for the butcher the following February.

In both experiments-they are about exact duplicates of each other-the lambs experimented with were taken as young as it was possible to get them to eat grain. The first periods of the experiments extend up to the time of weening, which was in July. The second periods extend from the time of weaning in July, until the fattening begins, generally in November. The third period began with November and ended when the lambs were matured for the butcher in February.

During these periods, there were two lots of lambs on experiment; Lot I, receiving grain during them all, and Lot II, receiving no grain from the first until the beginning of the third period. During the third or fattening period, they received exactly the same grain and management as the lambs in the 1892 the rations fed during the fattenlot that received grain during all the periods.

At the end of the first period the lambs were about 3 1-2 to 4 months old. At the end of the second, in both All the lots received these as grain experiments, they were 7 1-2 to 8 rations. The fodders used were the months old, and at the end of the third period when ready for market part of corn fodder and mixed hay they were in all cases about 10 months, with roots as succulent food. old.

The Feeding of the Lambs.

and those that received grain were that the facts may be readily comfed what they would eat with a relish. pared. For this reason the differences They were never forced, but fed a full may not be striking enough to attract ration. During the first periods of the notice; whereas, if applied to the numtwo experiments, the lambs receiving ber of sheep that many feeders fatten grain were fed a mixture of bran and they would more effectively indicate oilmeal. In No. 1, the lambs received in the first two practices.

period, one part bran, one part corn meal and one-fourth part oilmeal. The following year, when experiment No. 2 was conducted, they received during this period three parts bran and one part oilmeal. A lamb creep was used to enable the lambs to get their grain without being disturbed by the ewes.

In the second period, after the lambs were weaned in both experiments, those that were given grain received oats until the fattening period arrived. During this second period the lambs had similar pasturage, and received like management in every way.

When the fattening or third period began in November, both lots of lambs, those that had received grain previously and those that had not. were fed exactly the same rations, the object being to study the effects of the previous feeding of the lambs on their gain during the fattening period, and further prove the truth or falsity of the common practice.

In both the experiments of 1891 and ing period were the same. The lambs were started on this period by feeding them lightly on oats and then adding whole corn and finally some oilmeal. same for all, consisting for the most

The table which is appended on the next page will present the positions of these lambs in a condensed form.

In this table the data has been re-The lambs were weighed weekly, duced to apply to a single animal, so the experiment called the differences in the profit of the

LAMBS
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No Grain Brevi-ously. Difference in value per head in favor of Grain 22 2.09 1.94 \$0.88 1.55 0.95 2 No Grain Beiore Last Period. \$7.80 33 Average Weight and Value per Head. \$8. 7 lbs. wool at 23 cts.... } 119.5 lbs. mutton ai \$5.48 | 7.8 lbs. wool at 23 cts.. } 78.3 lbs. at \$5.00=\$3 91. 55.8 lbs. at \$9.36-\$5.23 84.5 lbs. at \$5.00-\$4.22. 57.6 lbs. at \$936=\$5.37. Lot II. Extra Ct st of Gain per Head. 1.62 2.60 46 Total Gain Per Head. I.bB. 36.5 6 41 4 33.2 26.9 42.9 88 Aver. Weekly Gain per Head. Lbs. 3.6. 1.57 1.78 2.86 2.9 2.5 135.7 lbs. mutton at \$5.48 | \$9.75 \$9.28 Average Weight and Value per Head. 132.5 lbs. mutton at \$5.45 (8.8 lbs. wool at 23 cts..) 63.5 lbs. at \$9.36-\$5.94. 103.7 lbs. at \$5.79=\$6.00. 67 lbs. at \$9.36-\$6.27. 99.8 lbs. at \$5.79=\$5.77. Grain Since Birth. Extra Cost of Gain per Head. .18 1.47 1.62 1.06 .37 64 02 Total Gain Per Head. Lbs. 41.8 -39.4 32.8 41.6 Lot I.-42. 50. Aver. Weekly Gain Per Head. Lbs. 4.48 2.69 2.88 2.18 22.2 3.2 Experiment No. I, 1891-92. 1st perio 1; 10 wks, Apr. 30 to July 9... 2d period; 19 wks. July 9 to Nov. 9... 3d period: 11 wks, Nov. 9 to Feb. 29... Experiment No. II, 1692–93. 3d period; 15 wks. Nov.9 to Feb. 22.. 1st period; 13 wks. Apr. 2 to July 27.. 2d period; 12 wks, July 27 to Nov. 9...

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lated on the basis of the prices current at the time of the experiment, and the same is true of the valuation of the products. The prices of foods fed have been considered as follows:-

Mixed hay, \$8 per ton; corn fodder. \$4 per ton; corn, 71 cents per hundred pounds; oats, 90 cents per hundred pounds; oilmeal, \$25 per ton; wheat bran, \$12 and \$13 per ton.

Valuation of the Lambs.

In the credits that are given the lambs the prices current on Chicago market for these lambs have been used. These are high, but they do not affect the comparison of the lambs and they are the fairest that could be used. From data supplied by Messrs. Clay, Robinson & Co., of Chicago, I have arranged the following table to show the variation in the prices of lambs at the three months of the year when lambs are sold. These are figures for the years 1891 and 1892.

MONTHS.	NUMBER OF LAMBS	AVERAGE WEIGHT.	PRICE PER 100 LBS.
July,	324	69.4 lbs.	\$9.36
November	169	95.4 "	5.79
March,	286	103.5 "	6.23

It will be noted that the average weights of the lambs given in this quotation are very near those in the lots at the different periods of the experiment. It should be noted that the difference in the conditions of the lambs has not been given enough consideration in the statement of the position of the grain fed lambs compared with those that are not grain fed. But as this could not be exactly the lambs were determined placed nearly on the same footing as to their valuation per pound.

Grain Feeding Pays.

It may be noticed that at the end

The cost of the feed has been calcu-| there was a clear balance in favor of grain feeding. During the third period the differences in the gain and the cost of the grain of the two lots is very similar, the balance being slightly more favorable to the lot that had not received grain previously. As those grains are charged to the lambs at fair market prices and as the labor of feeding is not sufficient to turn the balance, it seems clear that it paid to feed the lambs grain during all the periods; and that in comparison it is unprofitable to follow the common practice of feeding grain only when the lambs are being prepared for market.

The Younger the Lamb the Greater and More Profitable is the Gain.

A fact made evident from the foregoing figures is that the younger the lamb the greater the gain, and the less the cost of gain. In both experiments, when the lambs were with their dams the rate of gain was the highest of all the periods, being 4.48 pounds and 3 pounds per head in the respective experiments. This is made at a cheap rate even when the cost of maintaining the ewe is considered; for a fair estimate for the pasturage of a ewe when suckling her lamb would be about 15 cents per month. If heavily fed on grain and pasturage the cost might approach 30 cents per month, but even if the latter is allowed it will be found that the gain of the lambs during the first period of each experiment was the cheapest made during the experiments.

Differences in Fleece Weights.

In the comparison of the lambs at the end of the final period the lambs are considered to be disposed of shorn. On Chicago market the differences in lambs shorn and unshorn varies from 75 cents to one dollar, and this has been adopted in the estimate. By this means the differences in the growth of the wool is also made evident for the grain fed lambs in the first experiment of each period in both experiments averaged about one-half pound more

wool per head than those in the other | they will eat 1-2 to 3-4 of a pound per lot, and in the second experiment the head per day and on this I have had in favor of continuous grain feeding.

Grain Feeding Specially Beneficial at Weaning Time

It was made evident during the course of the first experiment that the lambs in the grain fed lot received much benefit from the grain they received when the weaning process was progressing. From July 9 to Sept. 3 the five grain fed lambs gained 144.3 pounds, which is over one-half the total gain of the second half period, while those, without grain, on the same pasturage gained less than one-half of their total gain in the same time. To produce this gain it took one-third of the total quantity of grain that they ate during the whole period. This indicates that it is specially advisable to feed the lambs grain when they are being weaned.

Quantity to Feed.

The judgment of the feeder should be accurate enough to inform him as to the capacity of his lambs for eating. Their appetites are the best guages to measure the quantity of food that they should receive. The animal machine requires a given amount of food to keep up its repairs and run it. It must tave a surplus before gain can be 2 3-4 pounds per head in weekly gain. made and this surplus the feeder can only supply by liberal feeding. The two leading directions connected with feeding sheep during the fattening process are to know the appetites of the sheep being fed and satisfy these to the fullest extent.

Feeding Before Weaning.

For lambs before weaning, bran or oats make an excellent feed. Oilmeal is a good addition to these if it is reasonable in price. I have found bran they were shorn the first week in and oilmeal to give better gains than November and fatted until the followthe same with the addition of corn ing February, and in that experiment meal. The lambs will begin to eat when the results were not convincing as to about two to three weeks old and by the profitableness of the practice. In

difference was one-fifth of a pound lambs make an average gain of 3 to 4 1-2 pounds per week, according to their quality.

Ration After Weaning

After weaning the lambs, and when they are on fair pasture, they should be fed some grain,-about 1-2 pound per head, according to the condition of their pasture. About the middle of November when the fattening actually begins the lambs should get a heavier ration. At this time they ought to be getting about one pound of grain per head daily. On such a ration they will make an average gain of 2 1-2 pounds per head weekly.

Ration for Fattening.

When fattening sheep in the winter months we generally include as part of the ration roots or silage and clover hay or corn fodder. The clover hay and roots would be the choice I would make of these foods. Wethers that are in hale condition will eat 1 1-2 pounds of clover hay or corn fodder and the same quantity of roots or silage when on a full ration with grain. When the fattening approaches completion they will be eating about 2 pounds of grain mixture per head daily. On this ration they will average about

shearing before Fattening.

It has been thought that the shearing of wethers in the fall, before they are fatted, would be favorable to the laying on of flesh. A series of three experiments, extending over as many winters, have been tried at our station on this one point. In the first experiment the wethers were shorn the middle of December and that was decidedly unprofitable. The next year the time it is proper to wean them the last experiment the wethers were

shorn on October 14, and the results | ers gained slightly more (7.9 pounds) of the fattening carried on until the and the cost of 100 pounds gain cost 24th of February are all in favor of 94 cents less than that of the others. the practice, though not very decidedly so. These wethers were fed in a com- quarters for the shorn sheep, would mon shed and were given similar care you not? and feed to those not shorn. The wethers that were shorn in the fall Oct. 14, so that by the time cold before fattening gained in wool and weather arrived they had a fleece that flesh an average of 3 pounds per head weekly. during the weeks' feeding, while the other lot left unshorn gained 2.48 pounds per of a single ply of boards and they head weekly. The shorn wethers ate were not battened or lined. slightly less food, and sheared a total wethers did not show any evidence of of 1.2 pounds more unwashed wool, being uncomfortable. They were in This wool would not, however, bring pens in this shed during the time they quite as much per pound as that of were being fattened and were seldom the wethers that were only shorn once, let out into the yards. as the former was shorter in fiber owing to the fact that it was in two clippings.

Discussion.

able under ordinary conditions to shear in pens with enough room to allow lambs before fattening them?

Prof. Craig-If the lambs were dropped in February or March they would have well grown fleeces by the middle of October. Such lambs would benefit by having their fleeces removed. The most noticeable effect of the removal of the fleece is the rapidity with which the wethers fatten during the succeeding two months. It hastens their maturity. In the last experiment made at our station the lambs that were shorn in October during the first half of the period they were on the experiment gained about the same as they did during the second half, and they did it on two-thirds the quantity of grain that they received during the last half. The shorn sheep were kept in a shed or ordinary temperature. Betore the cold weather arrived in the fall they had a good growth of wool. The practice would be most beneficially used when a bunch of wethers troubled with ticks are about to be fattened. In the experiment in which the wethers | slightly more per pound. were shorn in October, the shorn weth- Mr. McKerrow-If you were raising

Mr. Hayes-You would need warm

Prof. Craig-We sheared the wethers would give them all the protection they fifteen required. The walls of the shed in which they were kept were constructed The They were treated like others in that respect.

Question-In fattening sheep do you consider it best to keep them closely confined in shed pens?

Prof. Craig-For quick fattening at Mr. McKerrow-Would it be profit- all times it is best to put the sheep them to turn in nicely. When fattening during the winter months it has proven to be the best plan with us to keep the wethers confined and only leave them out at rare intervals in a small yard. If the wethers are made comfortable inside a well ventilated building they will make the best possible gains. Oftentimes after leaving them out I have noticed that they get off feed, and they appear to become restless.

> Mr. Hatch-Is the wool that you took off in the fall of any value?

> Prof. Craig-Yes. Owing to the shortness of the fibre it would likely be classed as a clothing wool. The length of the fiber would, however, depend greatly on the time that the lambs were dropped. These that were experimented with were mostly March lambs and when shorn in October the wool was about half grown. The wool of the spring shearing was freer from dust and yolk and hence would bring

these lambs for breeding purposes do where little grain is grown, and in such wav?

modify it some. The ewe lambs or them, that is a profitable plan if the the ram lambs that are to be kept for season is favorable. As I have noted breeders should get some grain before Chicago market only makes a difference weaning them. They will pay for it in of 75 cents to one dollar on the value growth of frame and fleece, and when of shorn and unshorn wethers. It will you wean them you will find that they be readily seen that it would be an continue their growth if fed some grain. exceedingly light and poor fleece that After the weaning process has been would not be worth more than this completed, good pasture will be all when shorn from the sheep. that they need. It has been our plan to feed grain to such lambs as we fed on grass in the fall, what grain intended to keep for breeding purposes foods would you feed? before and shortly after they are weaned and the good results were al- have been able to get from wethers on ways apparent afterwards.

grain at the different periods and the time of weaning in July until the midprices current on Chicago markets for dle of November, the wethers made an lambs so finished I would say that at average weekly gain of 2.66 pounds per the time when they are weaned. If head. They ate 1 1-3 pounds of the such grains as oats, corn or wheat are mixture daily. It has been our practice selling below the usual prices it might to feed oats mostly when the wethers be well to carry the wethers over part are on pasture, but the gain has not

age you get the greatest gain for the period of fifteen weeks when the food given?

I have so far conducted the greatest until put in the shed to fatten, they gain, considering the amount of food gained an average of 2.18 pounds per fed, was made before the lambs were week. The wethers ate 1.12 pounds weaned. Of course they were receiv- of oats per head daily. At the average ing the milk of their dams at the same prices of our state the cost of gain time, but even if the cost of keeping would stand \$2.63 per 100 pounds gain the ewes is considered, I believe that with the crushed corn and oilmeal

ordinary farmers the best plan would pasture these wethers received was be to keep their lambs until they are the common blue grass pasture of our from ten to twelve months old, then state. shear them and send them to market at once?

fed, that would be the best plan to in the way you have described? recommend. There are sections in this Prof. Craig-That is a hard point to

you think your plan would be the best it would be most profitable to sell the lambs to feeders in the fall. As to Prof. Craig-It would be better to shearing the wethers before selling

Mr. Favill-When wethers are being

Prof. Craig-The best gain that T grass came from feeding a grain mix-Mr. Chadwick-In feeding lambs in ture consisting of two parts crushed this way when is it best to sell them? corn and one part oilmeal. During a Prof. Craig-Considering the cost of period of nineteen weeks, from the of the winter and fatten them on these. been so great as in the instance of the Mr. Favill-Can you tell us at what crushed corn and oilmeal. During a wethers were on blue grass pasture Prof. Craig-In all the experiments and oats from the time of weaning the cheapest gain is made at that time. ration, and \$2.88 per 100 pounds gain Mr. Hatch-Do you think that for with the ration of whole oats. The

Question-From these figures how much can I make from an acre of good Prof. Craig-As lambs are commonly blue grass pasture in feeding wethers

state, I refer more especially to the determine. Supposing on such pasture counties noted for their grazing lands, as you have in your mind we can keep

DISEASES, REMEDIES AND CARE OF THE FLOCK.

three sheep per acre. These sheep, prices. At five cents per pound the according to the figures I have laid be- gain of 8 pounds would amount to 40 fore you, will gain a total of 8 pounds cents and cost of the grain ration per week. The grain feed to those on amounting to 24 cents would leave 16 the basis of the figures given for the cents as the amount derived from an ration of crushed corn and oilmeal acre of pasture in one week. Or would amount to 27.3 pounds for the a wether can make five cents per week three sheep for one week. This would from good blue grass. cost about 24 cents at average market

DISEASES, REMEDIES AND CARE OF THE FLOCK.

C. D. SMEAD, V S., Logan, N. Y.

It is written that in the beginning perfection any one of these breeds of God created the earth and all things animals. Like the railroad and other upon the earth, including the beasts of the fields and the fowls of the air, and the fish in the sea, and then he rested. He then created man and gave him dominion over all the earth, that he might so manage these beasts as to develop them, and make of them creatures of beauty and profit, and then God rested again. But he soon, in his infinite wisdom, saw that it was not good for man to be alone, in all this dominon, and he created woman to aid him and to be his helpmate in the management of it.

Domesticated Animals the Reflection of Man's Intellect

The domesticated animals of the earth are but the reflections of man's intellect. Created as they were in a very crude state, as compared with what all of our animals are at the present time, it has been man who has dictated the food that they should eat, and also dictated their mating with each other, so that each succeeding generation should be an improvement on the past. In this manner have all of the breeds of horses, cattle, sheep upon the diseases of sheep and the and other animals been established, and yet no one man has ever lived they are but few in this country in

great results of inventive genius, one man started the plan, another followed upon the same line of thought, and others followed, until we have something that we call, until the next great invention, a perfect machine, or applied to our brute creation, a perfect animal.

Such has been the past history of all the improved breeds of animals that the world possesses at the present time, and yet man, in the methods pursued, has seemingly overlooked the important question of so breeding. feeding and caring for the animal as to preserve its constitutional vigor, to the extent of maintaining perfect health :- and it is a fact, that our animals, with their improved forms and better adaptability for the purposes for which they have been bred, are far more susceptible to disease than the generations which have preceded them.

Diseases are Likely to Increase.

I am here to talk more especially causes which produce them. Luckily long enough to bring to anywhere near comparison with what some of the

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countries of the old world have to con-1 of the flock is ailing before he thinks tend with, especially England. But 1 regret to say that the present outlook is not very encouraging for the flock owner of this country to escape much longer;-in fact, as regards the parasitic diseases that have been the cause of such serious trouble for so long a period to the English flock owner, we of this country have not escaped. The liver fluke, the cause of the so-called liver rot,-the paper skin, caused by a worm in the lungs,-although intestinal worms have in my own experience, been the cause of more serious loss to the flock owner, producing death in a similar manner,-the intestinal tapeworm, which we have had in various parts of our country, and the hydatid, a worm whose habitation is in or near the brain, have all troubled us.

Necessity of Timely Treatment.

I have not the time to say anything concerning these parasites. What the farmer wants to know is how to cure his animals when they are sick. He cares but little about the parasites, bacterial germs or other things which produce these diseases. He wants a prescription that will knock these parasites, or bacterial germs higher than Gilderoy's kite was said to have flown, and he wants the medicine so prepared that he will not be put to any special trouble in the administration of it. I want to say to that farmer that he never will find any such antidote. I want to hammer into that farmer's brain the fact, that when one animal. (the sheep) is attacked by 1,000 or more animals in the form of worms or other parasites, and the sheep has been preyed upon by them for months until there is scarcely any vitality left in its system, it is a mighty poor time to begin to doctor it. Some say there is no use to doctor a sheep, they will die anyway, and they will if the owner is going to wait until the sheep is nearly dead before he commences the treatit worth while to try to cure them.

These internal parasites in the near future are liable to cause considerable trouble in all parts of this country, and it is highly proper for all sheep owners to prepare for it. When disease of that kind appears in a flock nip it in the bud. The treating of all these diseases of a parasitic origin is like putting out a fire;-when first kindled a quart of water may subdue it, but when once under way a fire engine throwing a stream of water cannot stop it. I cannot make veterinarians of you, neither can I make sheep doctors of you all, but I can tell you the way that you can prevent some of the diseases that are liable to infest your flocks, if not already there.

Attend Constantly to the Comfort of the Flock

The successful flock owner is the man who is constantly looking after the comforts of his flock. He provides comfortable quarters for them, during the inclement parts of the year,-he studies the habits of the animal, and provides a kind and quality of food that the appetite relishes and the animal system requires. He is constantly looking for anything that may appear wrong in the flock, and when one or more is discovered to be suffering with scours or losing flesh, he seeks for a cause and strives to remove it. This is a duty that every would-be successful flock owner owes to the creatures under his care. But you may say "What am I to do? I don't know anything about the diseases of sheep, nor how to doctor them." Here comes in that great bane and difficulty that the American farmer is laboring under, and crops out and leads him into trouble, more or less, in all of his farm operations, that is, ignorance in regard to what is termed the minor details of his business. The American farmer I by no means dement, or wait until 50 per cent. or more | sire to call an ignorant man, far from





Imported Shropshire ram Shrawardine Swell 7, A. S. A. 28271; used in cross breeding experiment with Shropshire and Merino sheep. Average weight of wool shorn 14 lbs; weight 278 lbs. when three years old, and it was at that time this photograph was taken.



Aged Merino ewe No. 16; illustrating the type of the Merino ewes that were bred to the Shropshire rams.

Average live weight of Merino ewes 107	lbs
Average weight of fleece	bs.
Average price obtained for fleece	.53



Four year old nest cross Shropshire-Merino ewe No. 55; illustration	ng the type regulting
from crossing Shropshire rams on Merino ewes.	as the type resulting
Average live weight of first cross ewes	148 8 lbe
Average weight of fleece	0 9 lbs
Average price obtained for fleece	



Two year old second cross Shropshire-Merino ewe No. 401, illust ating the type resulting
rom crossing Shropshire rams on first cross Shropshire Merino ewes.
average live weight of two year olds 132. 3 lbs
Average weight of fleece
The most marked improvement is observable in the better mutton form of the crosses.



it as regards the general events of the | day, and politics of his country,-but ignorant of the best methods of successfully prosecuting his business, as a farmer, and so managing it as to prevent the yearly losses that he sustains from many causes, among which are found losses from dead and diseased sheep. But thanks to a Jeremiah Rusk, a citizen of this state, and the present Secretary of Agriculture. who has already caused to be published works treating the diseases of horses. cattle and the - parasitic diseases of sheep, which can be had for the asking, so there is no longer any excuse for the farmer of this country remaining in total ignorance in regard to some of the diseases that afflict his flocks and herds.

Indications of Worm Trouble.

But this is wandering from my subject. Whenever a lamb or young sheep is noticed to be coughing, having a deep, hard cough, or even a short, dry, hacking cough, continuing for a few days with no sign of loosening, it is quite certain that there is present a worm of one of the species that inhabit the lungs or bronchial tubes. The first thing to do is to separate that sheep or lamb from the rest of the flock, immediately. If allowed to remain the whole flock may be infected. The remedy for the sick or coughing lamb I will give later on. Whenever a sheep or lamb is noticed to have periods of scouring, unless that scouring is known to be caused by some food that has been eaten, or some other well known cause, it is quite safe to conclude there is an intestinal worm that is causing the trouble, generally the large round worm. Or whenever the sheep or lamb is noticed to be growing weak, and losing flesh, with a desire to follow behind the flock, instead of being up with the rest, the cause,-if the animal is killed and a post-mortem made,-will generally be found in the form of a very minute

worm, the largest but little over a half inch in length, and in size about one-half the diameter of a horse hair. The mucuous membrane of the fourth stomach is where they generally make their home although I have seen them in the other stomachs and in the intestines. There are other species of worms also,—the liver fluke that I might speak of. But I can better interest you by giving a remedy and taking up some other diseases.

Tr. atment for Internal Parasites.

The first thing to do whenever a sheep or lamb is manifesting any of the symptoms that I have mentioned, is to take that sheep or lamb from the flock. Don't take any risk in these things by leaving them in the flock. You may not sustain loss by allowing them to remain, but it is far better to go safe in these matters. Now for medical treatment I am not going to give you any sure cures, for I have none to give. Neither am I going to give you a remedy with a long name that you have to send to Alaska or the Sandwich Islands to find,-but a simple, common remedy, and one that I believe, all things considered, to be just as effectual as any. The oil, or commonly called the spirits of turpentine, has long been used in domestic and veterinary practice as an authilmintic. Other remedies like sautonine, areca nut, extract of malefern, and some others have in a measure supplanted it in domestic use for the destruction of internal parasites of the sheep. I consider it the best and cheapest remedy that I am acquainted with. Now, how shall it be given? It is of an irritating, firey nature, consequently we must mix it with some of the oils, and raw linseed oil is as cheap as any, so we will use that. A dose of the turpentine for a full grown sheep is a tablespoonful when used as an intestinal worm destroyer. For lung worms onethird or one half the quantity.

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Method of Administering Medicine.

But we are using it now to destroy the worms in the alimentary canal or fourth stomach. so we will mix the tablespoonful of turpentine with about four tablespoonfuls of the raw linseed oil. If we give this dose when the rumen or first stomach is full of coarse food, which at this season of the year is mostly dry food, this food will soak up the medicine, and by the time that it reaches the worm it will be so much absorbed that it will have but little upon him. If the sheep's effect stomach is full of grass or food containing water the medicine will be so separated and diluted that its full effect will not be felt by the worm. Now the proper time to give any medicine for the purpose of destroying or gitting rid of intestinal worms in the sheep, is when the stomachs are quite empty. Then the medicine goes directly to the habitation of the worm in the fourth stomach or intestine. We don't expect that the turpentine is going to kill the worm when it touches him, by any means. It is a medicine that seems to have a stupefying effect upon the lower organic life, and during the period of stupification he loses his hold and passes from the body. If we can induce the worm to eat some of this turpentine we have him, sure, so we will take our dose, as prepared, and we will add a gill or more of sweet, new milk and sweeten it with a tablespoonful of molasses, put into a bottle and pour down the throat of the sheep, after it has been fasted for at least twelve hours. Repeat this dose in a week and generally speaking a cure will be effected, providing the sheep is not too far gone when treatment is commenced. And I want to say, that right here is where the farmer mistake. He the generally makes keeps waiting, and thinking that perhaps the sheep will get better without anything. It seems to eat well, yet continues to grow poor, perhaps scouring all of the time, until it gets too

weak to stand, and then he thinks that perhaps he had better give a dose of this or that, and when the lamb dies he is ready to say that he tried that remedy that the Institute fellows recommended, and found that it was no good, even if he don't go farther and say that it killed the sheep.

Treatment for Lung Worms.

I have previously stated that I would advise the same treatment for lung worm, only in about one-half or onethird the quantity. This calls for an explanation. As before stated turpentine has a stupefying effect upon the whole worm family, and I have not the least doubt if we could devise means whereby we could reach the lung worm with it that his destruction or expulsion would be accomplished. But this we could only accomplish by mixing the turpentine with the food in such a manner that it will be digested and assimilated, taken into the sytem, and in that way in a sort of round about way, we can, to some extent, reach him. It is a noticeable fact, that when even a minute dose is given to a sheep, in a few hours, or even a few minutes, his breath will be strongly tainted with the odor of the turpentine. I do not give this as a sure cure for lung worm, or paper skin, as it is sometimes called. But if the flock owner will separate those that are infected from the flock before they are so far gone as to have lost too much of their vitality, I claim that by giving a tablespoonful of turpentine in about a tablespoonful of the cil, mixing them in half a pint of new milk, and pour down the lamb's throat every day for three days, then skip for three days and repeat for a period of from 15 to 21 days, a large per cent. of cases will be cured of the ailment. The object is to so impregnate the lungs with the fumes of the turpentine that the worm will loosen its hold and be coughed up.

When worms of any species are

DISEASES, REMEDIES AND CARE OF THE FLOCK.

known or believed to be present in the flock, a gill of turpentine mixed in six quarts of salt and put in some place where the flock can help themselves at will, is a very good remedy to prevent further infection.

But I have already taken up too much time upon this worm question. and some are no doubt ready to believe from my saying so much in favor of turpentine that I am a turpentine crank, or have an interest in some manufactury where it is made. But I am neither. I give it to you as a safe, cheap remedy, and a very efficient one if used as directed, but an overdose will cause great nervous prostration, and sometimes death. In small doses given too frequently it will, from its diuretic effect so irritate the urinary organs as to produce stranguary. Use just as directed and no harm need be feared.

External Parasites of Sheep.

Of the external parasites that afflict sheep I need say but little. There are about three of them that are causing any serious loss to the flock owners of this country. The first is the scab mite, and I may say that it is the most difficult to rid the flock of when once they are badly infected. Many elements will destroy them, but it requires thorough work to complete its total extermination. The difficulty lies in first dislodging him from the scab under which the mite hides after he has produced it.. There are so many remedies advertised that I will refrain from giving anv. Most of them will cure if the directions are strictly followed. Of the other two parasites, viz.,-the common sheep tick and the red headed louse I only need say that they are both so easy of extermination that it is a disgrace to any flock owner to let them remain long in his flock. I will however stop to say something concerning this little red headed louse.

The Sheep Louse.

Everybody knows what a sheep tick is, but this little louse may have been present in the flock for years and the owner never have known of his presence. His size is very small, a full grown one being but little larger than a timothy seed divided lengthwise. Yet as small as he is he is capable of keeping a sheep upon whose back he resides, in a constant state of worriment. If present in large numbers it is difficult to keep a sheep in a thriving condition. Losses occur annually from sheep getting cast in the pasture by getting upon their back, and unable to get up. I spoke of the louse inhabiting the back of the sheep, which statement I again wish to call your attention to. The back seems to be their favorite part of the body to feed upon. and they are rarely ever found below midway of the body. Thus we see that they cause the back of the sheep to itch, and while lying down he strives to bite or scratch his back upon the ground, and thus becomes cast, and if not helped up he soon dies. The remedy is to dip the sheep in some preparation that will kill them and not injure him.

Dipping Advisable for Sheep and Lambs.

There are many sheep dips prepared and placed upon the market and sold so cheaply that I will not formulate one for the farmer to prepare for himself. I will say of these, however, that I much prefer a dip whose killing element consists of carbolic acid to one whose destructive agent is arsenic. A carbolic dip leaves an odor that will last for weeks, and thus prevent attacks from flies. It also prevents the sheep from again becoming infected if brought in contact with ticky or lousy sheep. The same is true as regards the scab mite. I therefore advise the dipping of the whole flock old and young, scon after shearing, as a safeguard. Even a few ticks or lice, to

say nothing of the scab mite, will, be- | fore another spring, cause a serious loss to the flock owner if allowed to remain. We cannot afford to feed valuable hay and grain to ticks and lice, and the best of feed and care will not keep a flock in a thriving condition when these little parasites are present in large numbers, and small numbers in the summer get to be large numbers before mid winter. So dip the sheep and lambs also, and thus banish this little pest from the earth.

The Care Required to Prevent Diseases.

I have briefly spoken of some of the parasites which are causing serious loss to the flock owner and given a remedy. Next in order will come the care of the flock so as to prevent disease. The flock that has been properly bred, fed and cared for, providing the parasites are not present, rarely have any disease. But a great deal is involved in that little word care. How very few there are who properly care for and feed even a flock of sheep. We, as Americans, are quite too shiftless as regards these things, even if we know that we are not doing just the right thing by our flocks we seem willing to take the chances, hoping that luck will favor us, and it will come out right someway, just how we don't know.

The Necessity of Shelter.

We realize that the sheep is an animal that has a great aversion to water, and does not fancy baptism by it, either by sprinkling, pouring or immersion. And we also realize the fact that water applied externally, in the form of cold rain storms, is injurious to the health of a sheep, and yet with this knowledge many flock owners allow their flocks to remain out in the fields during the fall rainstorms,-in fact, not even think of preparing any shelter whatever, until the snow gets so deep that they can't get to the ground, then bring them in, sometimes with their fleeces soaked with water,

to steam it out, or put them in a vard with a shed upon one side about half large enough for the flock to get under when it storms. He feeds them out of doors, anyway, rain or shine. Another man reasons that it is all folly to shelter a sheep at all, as their wool is ample protection, he says. Feed them out in the field is the way to keep sheep, he will tell you. He doesn't have any greater losses than the man who shuts his sheep up. In fact there is but little difference as regards the maintaining of the health of the flock in the methods practiced by these three men. They are all ready to tell you that some of their sheep have grub in the head, and are snuffling and snorting around all winter and will generally die before the flowers bloom in the spring. The owner thinks that he is in no way to blame. The grubs gnawed into the brain and killed them, he will sometimes tell you. Perhaps it was the grub in the head that did, by its presence in large numbers, actually aid in the killing of the sheep, but in a far greater number of cases it was the lack of grub inside the animal, of a proper kind and quality that aided in causing its death. The little gad fly that deposits its eggs in the nostril of a sheep which soon hatches into a worm and crawls up into the cavities of the head there to remain until the next spring, does no doubt cause some of this spuffling and discharge from the nostrils of the sheep, but a very la ge per cent. of it is caused by a catarrh that was produced from the sheep getting its fleece soaked with water during the last equinoxial storm, and the storms that followed afterwards. That fleece is hardly dry for six weeks. During some falls in this country there is not sunshine enough to dry if and it rains again before the animal heat dries it out. This allowing the flock to remain out in the fall rain storms is causing more loss directly and indirectcrowd them into some tight building ly than any one cause. When the

wool on a sheep's back which is always quite long at this season of the year, once gets wet it takes a large amount of the animal's vitality to dry it again, even if acute pneumonia, acute or chronic catarrh, or a bronchial disease is not produced, from which the animal never fully recovers. Herein lies the grub that started the killing process. The little one produced by the fly only helped on in the work after it got under way.

Prevention of Grub in the Head.

Now for a remedy. The best one of all is to prevent this form of disease. Every flock owner has it within his power to do it if he will. The preservation of the health of the sheep in this country requires that they be furnished a shelter from all fall and winter rains and wet storms. It is then that the seeds of disease are sown that culminate in the death of the sheep, sooner or later. The time to put the sheep to shelter is just before it begins to rain, not after it is as wet as it can well be. Putting them under cover then makes matters worse than if they had been left out, from the fact that the steaming that is produced helps poison the air that they breathe. and aids in causing disease of the membranes of the head, bronchial tubes and lungs. Some farmers in the west keep so many sheep that they think they cannot afford to build sheds or large barns to keep them in. Others say it is too much trouble, and still others argue that their father used to let his flock run out the year through. and they think he knew pretty near the right thing to do by a flock of sheep. To the first one I will say you are losing money enough yearly, in dead and diseased sheep to pay the cost of building a comfortable shed or stable to keep them in. A very comfortable shed can be made with even a few poles and straw, if the owner cannot afford anything better to build with. To the man who thinks it too much

trouble to bring his sheep under cover during storms I will insist that he is either a very lazy man, or he has not yet learned to save money by properly caring for his flock, and no one is to blame but himself when he has only sheep pelts to sell in the spring instead of wool and a fine crop of lambs. To the last man I will say, although your father may have been a very good man, and a good farmer, there may have been some things concerning the cause of disease among sheep that he did not know, and many sheep died from what he called grub in the head, that was not produced from a worm grub, the result of the gad fly, but a disease created by the exposure to cold fall rain storms. The money loss is too great for us to sustain in sheep growing by allowing 20, 10, 5, or even 3 per cent. of the flock to die annually from a cause that we can prevent. Our fathers with cheaper sheep, may have stood it, but we can't. Neither can we afford to have 10 or 20 per cent. of our flock snuffling around all winter, and produce for us a lot of weakly lambs that die from the mother being in such a condition at the time she was carrying it, that she could not impart vitality to it. The flocks of this country are a far different animal from that of our fathers' and of far more value. We cannot therefore follow the old gentleman's method and maintain their health and constitutional vigor. Put the flock under cover, then, just before it begins to rain, when the equinoxial storm comes, and house them from all storms that follow and avoid very much of the head, throat, and lung disease that is carrying off thousands of sheep annually.

Succulent Food Required for Breeding Ewes.

But this is not all. The proper housing of the flock from the fall storms insures a much larger and healthier lamb crop the following spring. But I am here to talk upon the

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diseases of sheep, and not lamb rais- with a feather will destroy it and ing. The sheep, more than the cow, and horse, is subject to constipation. in fact, is known to the veterinary profession as a constinated animal. When the breeding ewe is in a constantly constipated condition during her pregnant state, we can look for nothing less than dead lambs when the lambing time comes -- also little or no milk for the lamb to subsist upon, and that of a quality that soon causes death to the lamb. It is too late to remedy the evil then. Give the ewe a succulent food of some kind during the winter and thus avoid seeing many of the flock go humped up, with a pinched look, or suffering with colic, commonly called the stretches. Turnips have, for a century or more, been the food of all breeds of sheep in England, and when brought to our shores they must have them or some food of like nature, or they will suffer from constipation before spring. Our American Merinos may go through our long winter without a laxative food, but the English breeds cannot and maintain perfect health.

Foot Rot and its Treatment.

The last disease that I will speak of is foot rot, or properly speaking, hoofail. I will not take time to dwell upon the contagious nature of it, or the germ that causes it. Farmers care but little about such things. A cure is what they want. Very many remedies have been offered from time to time as sure cures for this disease, but I think that we can well banish all of the various acids that are recommended, also all of the ointments. They are all perhaps good when properly used by skilled men, but I am talking to farmers, and propose to put safe remedies in their hands. The common blue vitriol in strong solution will kill the germs of foot rot, and if proud flesh, or more properly called fungus growth have sprung up from the sensitive parts of the foot, the but-

both the vitriol and antimony are safe for farmers to use, and will cure any case of hoofail, if properly used, at any stage of the disease before the whole horn of the foot is destroyed.

Best Method of Treatment

When the farmer sets out to cure hoofail, he needs to make a business of it, and be thorough in his work, and yet there is no need of his being brutal in his manner towards the animal. He needs a pair of toe nippers, and a good stout bladed sharp knife. All detached horn must be removed if it takes the whole foot, but never cut away any horn that is not detached. Work slowly and carefully, remembering that it is a suffering brute that you are working upon, and a very sensitive foot. When the cutting is done have a tub, vat or vessel of some kind large enough for a sheep to stand in conveniently, with enough vitriol solution in to cover the foot to near the ankle joint. Make this solution by dissolving one pound of the vitriol (sulphate of copper) in two gallons of water. Let the sheep stand in this full five minutes, or in bad cases ten minutes. If there are fungus growths apply a little of the antimony to them, and let the sheep go in the barn, which should be well bedded with clean straw. In a week catch every sheep and repeat the operation, where necessary, but little or no cutting will be required if the first was done properly. It is well, however, to let each sheep stand in the solution for a few minutes. It will do no harm, even to a well foot. Hoofail is not difficult to cure if taken in time, nor even if in the second stage of the disease. It simply needs careful, thorough work, and the keeping of the flock from the wet ground for a short time, but like any of the parasitic diseases mentioned, the flock owner does not want to stand around and wait until his sheep are rotten ber of antimony, applied once or twice with it before he commences to treat

it. When a sheep is noticed to be lame catch it and examine it. Cure that one, and don't wait until half the flock has it before commencing treatment.

Prompt and Thorough Attention to Details Necessary.

In conclusion I will say that when flock owners learn the importance of looking after the so-called little comforts of the animal, which means shelter from storms during the late fall. winter and early spring months, when they learn the importance of furnishing a succulent food during the winter, and not only a succulent food, but a variety of food as the sheep's appetite craves variety and does not long relish any one kind of food if made to wholly subsist upon it,-when the owner learns to study the nature of the animals under his care, and strives to carry out nature's laws and not violate them,-then will very much be accomplished by way of preventing disease and thus bring sheckles to the owner's pocket. The intelligence of man has created what there is of merit in the animal to the extent of producing wool and mutton. Now let man use his intellect in so learning to feed and care for the flock as to not only cure the disease in it, but prevent a large share of them by better care and more rational feeding.

Discussion.

Mr. McKerrow-Doctor, what do you think of the practice of feeding sulphur with salt and also using copperas in salt for these parasites?

Dr. Smead—In • case I was certain there was internal parasites in the sheep, I would introduce the copperas. It is time enough to treat a disease when you are certain there is something to treat. Keep up good feeding, leave cut tae sulphur and leave out the copperas. Place a box of salt where the sheep can help themselves at all times.

Mr. Hayes—We have a disease among our sheep, some affection of the brain, something like inflammation of the brain. The first you notice the sheep is a little dizzy, and then it will become partially blind; it will run down, and if you don't do something, the first you know it will be dead in about three or four days, and it appears to be catching.

Dr. Smead-Is there any time of the year when this occurs more than ary otter?

Mr. Hayes—Two years ago it happened in the fall of the year, just before the sheep went onto the feed. I saw in one paper a recommendation to bleed right under the eye, and those that were bled when they were first taken, got well. I believe as much as anything it is lack of exercise.

Dr. Smead—Probably that and a constipated condition.

Mr. Hayes—No, they had a variety of food with sufficient of a succulent nature.

Dr. Smead-Well, then I should say that as quick as you discover it give the sheep about 4 oz. of Epsom salts. It comes from determination of blood to the brain, and we know that it soon has to be relieved or there will be inflammation of the brain, and then your animal will die.

Mr. Hatch—I have found in my practice that it is to my advantage to keep wood ashes and clay where the sheep can have access to it at all times.

Dr. Smead—Of course wood ashes is not a food. They are taken into the stomach of the animal simply because it reduces a portion of the fats in the stomach to soap, and in that way physics the animal. It shows indigestion when they want it.

Mr. McKerrow—Is it possible to have shelters too warm for sheep, and what is your idea of ventilation?

Dr. Smead--I want good, pure air, and I don't want to keep sheep in the dark. I would advise some means whereby, you can ventilate from above, or carry off the foul air.

Mr. Chadwick—I know quite a large number of people who give tar to their sheep by putting it in the trough and sprinkling salt on it.

Dr. Smead-That is on the line of turpentines. In the state of New York the older farmers would go into the woods and cut down pine and hemlock boughs, and draw them into their sheep yards. They said the sheep needed something green, but the fact is they needed something else. The sheep is by nature his own doctor, and when he is allowed to run out in the fields he will eat bitter weeds that no other animal will touch. Now. he doesn't always eat those weeds, because he likes them, but because it is necessary for his own medicine and nutrition, perhaps, to a certain extent. Many of these weeds, if we examine them, we find to be anthrometic. That is one reason why sheep love the pine boughs. Consequently if I am going to introduce any medicine whatever to sheep, it would be in the nature of turpentine or tar.

Mr. McKerrow—Won't this tar serve another purpose in the summer season, to keep the gad-fly away from the nose?

Dr. Smead—If you can apply it often enough, yes.

Question-How would it do to dip your flocks once a year?

Dr. Smead—That, of course, is owing to what you would dip for. If there is any special kind of parasite give them the dip. I have sometimes thought it might be of advantage in the middle of August, when the gadfly was the most troublesome.

Mr. Cole—Do you think that sheep will ever contract the foot-rot without infection, as for instance by running in the wet.

Dr. Smead—Foul in the foot may be produced that way, and go on until there is disease.

Mr. Miller-Have you ever noticed

on turning sheep out in the morning that a majority of them had the snuffles? While after the rain had stopped even if they had been exposed to it, none of them have?

Dr. Smead—Yes, you will often drive them out in the field and many of them will give a little snuffle, and that particularly happens if they come from a house where there is a lack of ventilation. Keep the air pure, keep them housed through the storms and keep them comfortable. Keep the buildings as cool as you can without getting it down to freezing point.

Mr. Gillett-How can we detect the scab in sheep?

Dr. Smead—If the sheep is very much infected, he will begin to rub and scratch and tear, often taking off the wool. You will notice a small eruption on the skin that soon forms in a scab.

Mr. Meekin—We often lose the best lambs we have just before weaning time, in the latter part of July. What is the cause of that?

Dr. Smead—They probably die either from getting something in the pasture of a poisonous nature, or if they were very fleshy, I should say they died of apoplexy.

Mr. Root—Have you ever had any experience with taking a flock of sheep from a short pasture and turning them out to heavy pasture, as to how it would effect them?

Dr. Smead-That would produce scouring.

Mr. Stowe—I had some sheep last fall that came out of the pasture and I gave them salt and some water, and I went out in the morning and found fourteen dead. We thought it was on account of the salt water.

Dr. Smead—It might have been if they had not been salted for a long time.

Question—Wouldn't it be wise to have a shed adjacent to the pasture so the sheep could seek shelter during the storms of summer also, and from the hot sun?

Dr. Smead-Yes, I should advise that right from this platform, if I thought there were half a dozen would carry it out. I believe when we get a little further up in this sheep knowledge, that there will be sheds prepared in the pasture and so arranged that the sheep can get in them. On this question of salting there is danger if a man is going to let the sheep go a long time without. The sheep needs a little salt every day, and if a man gives his sheep salt once in three weeks or two weeks, or even one week, they will take a great quantity and are liable to get too much, because they will drink a lot of water and chill the stomach, so that indigestion is produced, and the animal is liable to die.

Question-Do you know of any remedy for dogs among your sheep?

Dr. Smead—Yes, the best remedy is the gun! Down our way we use sheep bells, about one in every ten or twelve sheep,—a small sized cow bell, and to a great extent it prevents the ravages of dogs. The sheep dog is like a sneak thief, he don't like noise, and when he hears twenty or thirty of these bells tinkling it scares him. Question-How do you prepare that carbolic dip?

Dr. Smead—You can always make a good dip providing you can get the carbolic acid pure. Get ordinary carbolic acid, mix one gallon of crude carbolic acid, one quart of soft soap, and one pound of glycerine, and then use one part of this mixture to about sixty or sixty-five parts of water.

Mr. McKerrow—There are a great many dips advertised and we cannot tell which are arsenical dips and which are carbolic. Will you please name some?

Dr. Smead-Little's is a good one, and so is McDougal's. They are just about the same.

Question—Is the Gruger an irsenical or carbolic?

Dr. Smead-It is arsenical.

Mr. Martin—Is washing sheep injurious to health?

Dr. Smead-It does not do them any good.

Mr. Elliot—Why are the fine wool sheep more apt to have the hoof disease by running on damp ground?

Dr. Smead-From the shape of their foot dirt is apt to accumulate in it.

WINTER LAMB RAISING.

J. S. WOODWARD, Lockport, N. Y.

Mr. President, Ladies and Gentlemen—We have had mutton served in all kinds of styles to-day, and I fear you will be in the condition of the man who had goose every meal from Christmas for two or three weeks, and he was requested to ask a blessing. This was what he said:

"Of gander young, of gander old, Of gander hot of gander cold, Of gander tender and gander tough, Good Lord, we thank Thee Lord, we've had enough."

I was asked to come up here and talk to you about winter lamb raising. I do not know that there is one in this audience engaged in that business. I have been in it for about a quarter of a century. Like a good many men who are going to engage in a new business, I studied it up from books. I went to

New Jersey and took lessons, and I | who want quality, not quantity. If you launched out into the business pretty strong. When the season was over I was a little over \$350 out of pocket. I have learned better since. I don't make the same mistake now, although I am constantly making mistakes. I am going to give you a few points from my methods, those which I have found to be the best. In the first place if there is any man in the world who should be thankful that there are plenty of rich men in the world it is the man who is raising winter lambs for an early market. If he had to depend upon the men who are getting from six to six times six dollars a week, for his customers, he had better keep out of the business. It is the men of unbounded wealth, who think a great deal more of the gratification of their appeutes than they do of their gold, who buy lambs such as I produce, and you want to seek a market where these men are found, and the nearer you are to it the better. You can make a reasonably good success within the reach of cities that contain a moderate number of these men, but if you want to make a big success, you want to be within reach of the cities where there are many of this kind of men who think more of quality than quantity.

Requirements of the Markets.

I took occasion while in Chicago to look up the early lamb market. I never sent any lambs to Chicago, and so I looked it up with some care. I found several places where they had what they called spring lamb, but I only saw one lot of this spring's lambs hanging in the shambles of Chicago. I did see lambs hanging there that were spring lambs last year;-they were late lambs and had been fed up and dressed lamb style, and were being sold for spring lambs the nine of them, for fifty dollars. A butcher said to me: "I don't care about weight, 'it is the quality 1 want." The trouble is to get the lambs good enough. The men

go into the market and find two lambs hanging side by side, one weighing 25 pounds, dressed, with a well developed leg of mutton, with plenty of lean meat, tender and juicy, with a good thick caul spread over him, that lamb will sell for more money than one hanging by the side of it, weighing 45 or 50 pounds that is lean and bony. In lamb raising there is always room at the top, but there isn't any elevator that will take you up. You have to get up by hard work and close attention.

The Need of a Good Shepherd.

In the first place more depends upon the man than upon the surroundings and the breed. He must be prompt, ready to act, always full of resources to meet any emergency;-he must be one of the most patient men you ever saw, and one of the best natured, with a heart full of love and kindness. I wouldn't have a swearing man around my barn under any consideration,-not that I would be afraid that he would ruin the morals of the little fellows. for they all go to early graves,-but I never yet saw a swearing man that was not a passionate man, and you do not want that kind around in this business. I don't want a quick, snappish, nervous fellow either. I have a man who is so gentle that when he is not busy at his work, you will see him with a lamb in his arms, hugging and kissing it, and talking baby talk to it. There is just one thing he won't do, he won't catch a lamb to be killed. He says, "I'd just as soon catch one of my babies."

Warm Quarters Required.

The next thing is in regard to the quarters where the lambs are kept. They must be warm. I put that over and above everything else;-I am a crank on that point. The next thing is to have them dry;-there isn't any animal in the world that is as afraid who use this kind of food are men of water as a sheep. The next thing

sheep's lungs are very sensitive, and more easily influenced by poisonous gases than those of man. We want the air in the quarters pure. I have found it a capital method of ventilating to have air chutes or shafts run from the folds up to and out at the top of the building in number and size proportionate to the capacity of the barn and then by putting trunks, running across the barn from one window to the other. inches deep. and About twelve about eighteen inches wide, and they are so made that when either window is let down there is a piece of canvas that comes down, so that the air blows right into this trunk, the underside of which is bored with innumerable 3-4 inch holes, which throws the air down on the sheep without there being any direct draft. It has been proved by experiments that animals require about one foot of cubic air to every pound of weight, and that is a good rule to go by in building your sheep quarters.

The Best Sheep for this Work.

I believe that all the breeds of sheep that we have in this country have a place, and I have tried them all except three. What we want in this business is early lambs. A lamb that will get into the market before the first day of February will sell for twice as much money as the same lamb would going into market after the middle of April. I have found nothing so good for producing this very early lamb as what is called the Dorset-Horned sheep. They are not a handsome sheep at all, and I would not recommend them for general purposes, but for this there is nothing equal to them. They will drop their lambs at any time that you want them; they are exceedingly good milkers, and they are great eaters in fact I have never seen an English sheep that was not a good eater, and I don't want an animal around me that won't eat. I can't afford to keep Dorset ewes, and so ' use grade sheep lambs fit for market by New Year's

is, you want you quarters airy. The is the ordinary stock of the country, what we call Michigan Merinos. I buy them in the Buffalo market. I go there and pick out good short-legged, heavy bodied, stocky ewes, and then I use a Dorset ram.

An Experiment with Breeds.

In the summer of 1890, I experimented by taking 125 ewes. I put with them a Dorset, a Hampshire and a Shorpshire ram. They were all thoroughbreds of about the same age. When that bunch of ewes went into the barn and came to drop their lambs. of the first sixty-two that were dropped, there were only three blackfaced lambs, three quarters of the whole crop were Dorset crosses, and more than twice as many number pairs of twins, in proportion to the number of lambs dropped, were from the Dorset crosses. You ask if it is advisable to have twins in the business. It certainly is after a few of the first lambs are dropped. As soon as the first go to market we break up the twins and by scattering them around on the different mothers, we have no trouble in bringing them forward to market.

Time of Coupling.

The question may be asked as to when we would couple these sheep. You know that the period of gestation in sheep is about five months. We like to have our lambs begin to drop about the first days of November, then we can get them into market about Christmas time. You should not expect that you can take a hundred ewes and get a hundred lambs on the first day of November. If you get twenty lambs you should be a very happy man. We raise anywhere from four to eight hundred. If I wished to raise four hundred I would put the males in early, and I would expect out of five hundred ewes to get four hundred lambs having at least two hunderd and the best mother I have ever found day; and by the middle of January I

should expect to be sending them along | lively to market, and about the first of February we would send forty or fifty a week out of five hundred ewes, and I should expect to have at least four hundred marketed by the first of May. When we are ready to put our sheep in the barn permanently, which is as soon as the first killing frost has come in the fall, usually by the middle of November,-we sort them according to size and ages, and never put to exceed twenty in a pen. We sort out those that are not in lamb and usually sell them as stores or else breed them for spring lambs.

The Condition of the Lambs,

What we want to get for the market is not a lamb that is exceedingly fat, but a lamb with the largest possible development of lean meat, and we have got where we can just about control the development of muscle and fat on a young animal to suit ourselves. The market likes a lamb that has a good caul and a large kidney, but they want it with the largest proportion of lean meat, and in order to produce that we must feed our animals largely on nitrogenous food, such as linseed meal and clover, etc.

When our sheep are put into winter quarters, we commence to grain them every day, increasing gradually from a small quantity to full feed. We don't care how fat a ewe is when she drops her lamb, but it makes a great difference upon what kind of food she has been fattened. If you have fed a ewe on corn meal and timothy hay until she has a lamb and she dies, don't blame your luck, only blame your own ignorance. Clover hay is the dry forage we prefer to feed. We feed linseed meal, bran and a little corn meal. We also feed ensilage, mangolds and flat turnips. We depend mainly upon the mangolds for our root crop. We are now feeding our breeding ewes about four pounds of ensilage to one hundred pounds live weight every day in this corn. I want to give the sheep 9 variety. I believe if you keep your ewes in warm quarters, you may give them all the succulent food you please with perfect safety.

Lamb Pens

We have pens, in addition to the sixteen foot square pens,-little pens with hay racks, lambs and troughs where the lambs always have something to eat. These are shown in the illustrations. They are first fed when they are about two weeks old, and they learn very rapidly. We feed them first pure, unmixed, new process linseed meal. The troughs are cleaned every morning and a new supply put in, and we give them all they want. When they are a few weeks older we mix with that generally, cracked corn; very soon we put in some barley and like enough a few oats, varying it so as to give them variety. The more we can get them to eat, the faster they grow, and the more money we can get out of them. We always cut some clover hay for our lambs, and cut it just when it is in full bloom, and cure it just right. We save this hay in a special mow for the lambs and aim to have it in the best conditon. Of course, the great trick is to get the first lambs into the market early. We have learned one thing to do, if a lamb is not doing well, to take an oldfashioned teapot with a spout to it, and we buy those rubber feeder cots, and stretch over the spout of the teapot and puncture a little hole in it. We always manage to have some new milch cows about the time the lambs are coming on, and the weakly lambs get a little taste of new milk a few times a day which helps along wonderfully. After we make the first shipment, we take the best ewes from which the lambs were taken, and if we have twins, we break them up, and put one lamb to a ewe and make her own it, and then she fats that one. To do this we have some movable pens, and we put the winter and the ensilage is very rich in | lamb and the ewe in one of them together, and catch the ewe twenty times also for cleaning out manure two or a day and let the lamb suck. Some- three times during the winter. times we take water weakly tinctured with the essence of peppermint and sprinkle the nose of the ewe and sprinkle the lamb, and usually she owns the lamb.

Sometimes we have had lambs go to market at six weeks that dressed thirty-four pounds. They would weigh about forty-four to forty-seven pounds alive.

A word now, in reference to barns and pens. Barns may be made of any shape or size desired, only that each pen for twenty ewes shall contain 320 square feet of space and in addition shall have an annex or small pen. 6 x 18 or 20 feet into which the lambs can go by themselves to eat extra food. The illustration on p 127 shows a barn 54x72 feet inside-a very convenient size and shape, and ample to accommodate 160 ewes. If so much storage room is not needed the barn may have an upright 44x54 feet, with a leanto on each side of 14 feet, which will give the same space below for ewes. Or the barn may be of the size first named, and may be double decked, -that is, the floor above the basement may be made tight and sheep be kept in the two stories. In this case it will be ample for 320. I have often double decked them and always those on the upper floor do the best.

Through the middle of the plan as shown, is an alley 6 feet wide, with a door at each end and a gate in the alley fences, by which to enter the pens. The feeding racks form the partitions between the pens. Back of each pen is the annex for lambs separated from the sheep pen by a fence havor "creeps," either two in ing holes each through which the lambs go to eat. Attached to this fence between the "creeps" is the water trough, which should be always and abundantly supplied with clean, fresh water. In each lamb pen is a hay rack and also trough for grain. Opposite each pen is a window; also two in each end of barn. These for giving plenty of light and to play "tag."

I have tried many styles of racks but like ours better than all others for this purpose. I show the end which will give a good idea of the way in which it is made. P. P. are the corner posts, 2x4, 36 inches long, the top cut slanting, as shown, to receive the top beards A. A., which are 1x12 inch stuff. B. B. are slats 2 1-2 wide, 1 inch thick, and 18 inches long, and should be nailed at the bottom alternately to the edges of the boards C. C., which are 1x7 inches, with the lower edge chamfered to receive the bottom boards D. D., which are about 9 inches wide, or wide enough to be cut to receive the corner posts and extend beyend to take the side boards E. E., to form the grain troughs. The top ends of slats are nailed to inner side of slanting top boards A. A. with wire nai's clinched on the outer side. A piece of 2x6 inch plank is cut to nail on the inner edges of corner posts, its upper edge cut to go up between the slanting bottom boards C. C., and to which they and the flat bottom boards D. D. are all firmly nailed.

These racks may be of length sufficient to divide the pens and sheep can eat from each side. It is well to have about four of the slats B. B. on each side cut long enough to go to the top of boards A. A., and to be firmly nailed to them to form cleets to stiffen them and prevent their splitting.

By the dotted lines running across the end of the rack I have shown the boards which are put on to form the end. These racks should be two feet wide from the outside of posts and as the top board is cut with slant corners to fit the slant of each top board A. A., it will be about 30 inches long in its extreme width top.

These racks are easily cleaned and are handy to feed in. The troughs at the bottom cut all leaves from the hay, take the ensilage roots or grain, or what is better than all else for this purpose the lambs cannot get into them



- P. P. Corner Posts.
- B. B. Slats.
- E. E. Side Boards of Trough.

A. A. Top Boards.D. D. Bottom Boards.

WINTER LAMB RAISING.



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Discussion.

Question-What price do you get for these lambs at the weight you have named?

Mr. Woodward-I have sold them as high as \$18 apiece.

Question-We want about the average of what you will get for the first month.

Mr. Woodward-A year ago last winter we sold a little over 800, and the average price was \$7.46 a head, for the whole lot. They nearly all went to New York, where there are men who want the lamb and are willing to pay for it. We dress them. I found a gentleman in Chicago market, who had some genuine spring lambs, though they were not very good ones, and he told me he was getting \$7.50 for them a head, but he said he did not think that if they were ever so good he could get over \$9.00 for them. A man can afford to raise them for \$5.00 each.

Mr. Kingman-Do you use artificial heat in your stables?

Mr. Woodward-No, we have more trouble in keeping cool than warm. Our ewes are all shorn as are all our sheep, everything, pure breds and all have to be shorn. We shear our breeding ewes for early lamb raising for three reasons;-one is, they take less room; another is, that the lambs don't run and jump over onto the sheep so much after they have been shorn; another is, we can keep the quarters warmer. The sheep will give more milk too. We aim to keep our sheep folds as nearly fifty degrees as we can, and I wouldn't like to have them go below forty. Our water pipes run all around the ceiling, over the sheep fold, and the boys all know that if the sheep fold gets cold, there will be trouble with the water pipes.

Question-Do you cut your turnips or feed them whole?

Mr. Woodward-We cut the turnips. We can't afford to furnish muscle to sheep to cut them.

you not troubled with bad odors in the pens?

Mr. Woodward-In answer to the first question I would say lambs commence to drop about the first of November, and we generally shear in January, There is no trouble if a man is gentle and kind. We use lots of plaster to keep down the odors of the barn. The sheep racks are kept full of straw.

Prof. Craig-When do you first turn the ewes and rams together?

Mr. Woodward-About the first of June.

Prof. Craig-How many ewes do you put to one ram?

Mr. Woodward-About fifty.

Prof. Craig-Do you give them any special food?

Mr. Woodward-No, Sir. I believe this however that if you take a lot of ewes and shut them up in a yard away from food for a couple of days or longer, before you put the males with them, and then turn them onto good food, and give them a little extra food, they will be more likely to get in lamb than they will under common conditions.

Question-Suppose your lambs are a year old now. Would you breed them for early lambs this year?

Mr. Woodward-No, I would let them go until the following year. In regard to the age which is best adapted for this purpose, at no age is a sheep so tender or require so much care and nursing as from one to two years old, and we don't like that class of ewes to breed from for early lambs. We don't want them less than two years old. Two years old coming three is a good age.

Mr. Hatch-Do you mean to say that you put those ewes in those small pens and never take them out during the winter? How do they get exercise enough?

Mr. Woodward-I am not one of the exercise cranks. I do not believe there Question-Do you shear these ewes is a man in the world who has experibefore the lambs are dropped? Are mented more than I have to ascertain

about how much exercise a sheep that a ewe that has a lamb early this needs. All the exercise they get over and above the actual want of nature is a loss to me, because it is made to have a lamb next November, as one at the expense of my food. I have watched the sheep a great deal, and I in April or May. Sometimes I keep don't believe that they are so stupid but what if they needed exercise they would know it, and they don't show any such need. The little lambs need exercise and they get it. I have watched the ewes, and I never yet saw a mature sheep take one single step for exercise. One of these exercise cranks came to my place once, and I showed him about. While doing so I asked him what he thought of it, and he said, "I have seen my sheep when they were in the pasture, in a nice June day, in the clover up to their eyes, and I never saw them when they looked as extremely happy as yours do in the pens. They are as plump as ticks, and in the best condition." I said, "Those sheep have not been out of those folds since they were put in in November, and they won't be till they get onto pasture in the spring."

Mr. McKerrow-According to my experience, if you are going to keep ewes flock, the store sheep. The breeding over to drop lambs in March and April, in this Wisconsin climate, you must give them exercise.

Mr. Woodward-I would not keep them in this Wisconsin climate. I would make an artificial climate, to ercise. I have not wintered less than suit the sheep. I have followed this a hundred and fifty per cent. of live practice for twenty years. No sheep lambs for ten years, and we have often that I owned has been out of doors in winter except as an experiment for these twenty years.

Dr. Smead-These ewes that you are raising winter lambs from dropped their lambs in November. Do you carry those over until the next year and breed from them?

Mr. Woodward-Yes, from the best ones. I am constantly changing some of my ewes. I find some ewes that can't be induced to accept another lamb. All the best ewes and all those keeping the ewes in airy warm quarthat are perfect and not beyond a ters, where they have at least sixteen

winter, between now and the middle of this month, is ten times as likely that I bought that had a lamb along those until they die of old age. As long as a ewe will raise me a lamb every year that I can sell for from six to ten dollars, I don't turn her off.

Mr. Chadwick-What percentage of lambs do you raise from your breeding ewes?

Mr. Woodward-If we wanted to raise five hundred lambs, we put the males with at least six hundred ewes.

Mr. Fox-I am one of the exercise cranks that Mr. Woodward talks about. I am very much opposed to enclosing the ewes, or surrounding them with any hindrance to all the exercise they will take. I should divide my flock into two sections for the winter. One section is turned onto a reserved blue grass pasture, in which is located an open cattle shed, always kept well bedded with straw, in which the sheep can lie down if they choose. That is the kind of housing that we give that ewes are brought down to buildings where we can control the temperature. We oblige the ewes to go out every day about eleven o'clock, and again about three and they get a lot of excut the tails off of a hundred and eighty per cent. This last year Τ wintered a hundred and seventy per cent of lambs, not including what died between the time we cut their tails off and the time they were taken from the ewe. I give my shepherds a certain amount of money per head for every lamb over and above the regular complement, and at weaning time, is the day of reckoning between us.

Mr. Woodward-Did you ever try certain age, I keep over. I find this,- square feet each of floor room?

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9-B.

Mr. Fox-I have. I noticed the 40 Hampshire ewes. He bought them, amount of space that you have pro- and when I met the gentleman he told vided for your ewes, and we would me he was ashamed of the sheep. I like more for ours. I have tried them told him he need not be, for I had in warm barns, but have discarded the seen store sheep before that had been barns altogether for the sheep, except- shipped long distances. I think they ing occasionally, where we are feed-had been abused on the voyage. I ing off a lot to market them in fat took those 40 ewes, put them in the -condition. I would endorse your plan car, and sent them home, and sent just on the same principle that the poultry man acts on in fattening his capon. It is all right if you want to fatten an animal.

sheep pens; two of them are so situ- say nothing to anyone about our having ated that the sheep that are in them them, but to keep them in the barn. can get really no exercise. Attached Now, the gentlemen here have said to one of them that hold about seventy ewes, we have a large yard. We have smaller percentage of lambs than they had those pens for the last twenty do if they are out in the pasture. These years, I believe, and while at first we sheep were put in the barns in July. thought there was no difference as to having come from close quarters on the success in raising lambs, we have ship for the previous two weeks and come to the conclusion that the pens with the yard attached have given us the best satisfaction. Two or three nice lambs. They got in lamb in the years ago, it was almost absolutely barn, and they dropped their lambs necessary that we should feed a very heavy supply of roots. We had come to the conclusion before that where men make their sheep live too much a heavy quantity of roots were fed, the ewes did not have such good success in raising lambs, the claim being that it produced a soft and flabby appearance in the ewe, which, of course, is not consistent with what we wish. We fed clover hay also. As a general thing we feed very little grain,-if any, we feed oats and bran, never more than half a pound when the supply of roots is plentiful. We never had good results until we adopted the plan of feeding our roots whole, and making our sheep work for a living. My experience has settled the fact to my satisfaction that sheep cannot be kept fat without having exercise, for any lenght of time and keep in good condition.

Mr. Woodward-In 1890 I asked a friend who was going over to England to go into a certain flock that I had seen the year before and buy me told us these Hampshire ewes dropped

word to my nephew to feed them in the barn. I must say I was ashamed of their condition. They were just skin and bones:-they had been starved Mr. Miller-We have three different and choked to death. I told him to that sheep that are housed produce a were not out of doors until the next June, and those forty ewes raised 75 in the barn along in January and February. I think some of these gentleon succulent food. I never have a breeding sheep around me that is pregnant that does not eat some wheat bran every day, and I never have any trouble with my lambs. It may be that their conditions are different from mine. Very likely they do not make all the conditions as near right as we do.

> Dr. Smead-I think these gentlemen are all right, but they look at the thing from different points of view. Mr. Woodward raises his lambs from merino grades and from a mutton sire. The merino isn't a mutton sheep, and they stand a different kind of close confinement. It is his habit, also, as he tells us, to select those of peculiar milking value. The vital powers of such a ewe are used up in the production of milk to grow lambs. Now, in regard to his pure bred sheep, he has

their lambs shortly after they went | weigh 200 pounds would grow a big. into the barn. I believe it is necessary bony lamb. I tried the other breeds, for all animals to have more or less ex- and I satisfied myself very well as to ercise, especially all pregnant ani- which is the best. You cannot afford mals up to the time they drop their to use pure bred mothers for this busiyoung. These were in thin condition ness at the present price. I never let when they went into the barn and my ewes get fat. I only feed them dropped hteir lambs and were giving to get them in the best condition for milk before they got to a better con- productiveness and maternity. dition.

derstood what I said. These Hamp- market. shire ewes were shipped from England the last of June, landed in New York | corn to breeding ewes safely? in July, went immediately into the barns, had the rams put with them the right along now but I would much in August, dropped lambs in January prefer a mixed ration of which wheat and February, and during all this time bran constituted a good part. I wouldnever saw the outside or had more n't advise the use of shocked corn exercise than what was taken in pens right up to lambing time without they as described. Farther I find that my were in the hands of an experienced merino ewes that have been closely man and running out of doors in a housed and highly fed to raise a winter Wisconsin winter. A good careful sheplamb when carried over to the second herd will watch his ewes and he can winter always do better and raise tell what ought to be done. better lambs than they did the first I too believe that all ani- perience with goiter in lambs? winter. mals should have sufficient exercise for their health, but prefer mine should I suppose there is not a flock owner get it in a well ventilated warm barn in the north but what has had some than in an open field in a Wisconsin experience with it. winter.

Mr. Foster-According to the figur- it? ing Mr. Woodward has done here he had about 90 per cent. of lambs out of six hundred ewes.

Mr. Woodward-This gentleman does not understand me. The ewes that do not get in lamb early go out. Of course the whole five hundred of those ewes have lambs. If I get 400 in lamb I do exceedingly well so early.

Mr. Foster-Wouldn't you find a Down cross a little more advantageous to you?

Mr. Woodward-I have tried most of the breeds of sheep. When I first commenced this business I bought 350 thoroughbred and high grade Cotswolds. But I could not get these ewes to have lambs before the first day of January to save my life, and when they Another man says, "For my sheep the

and the success of the lamb is what I am Mr. Woodward-The doctor misun- after. I am crowding them for the

Question-How long can you feed

Mr. Woodward-We are feeding a lit-

Question-Have you ever had any ex-

Mr. Woodward-Yes, but very little.

Question-To what do you attribute

Mr. Woodward-That is a very easy question to answer. I don't know.

Question-What does Dr. Smead say about it?

Dr. Smead-I say I don't know. There isn't a man in the United States who does know, but there are a great many theories in regard to it. I do not think there is any one cause: I believe there is a combination of causes.

Question-I have had it in my flock, and I attributed it largely to feeding corn.

Dr. Smead-And I know another man down in the state of New York, and he attributed it to feeding clover hay. Another man says, "Why, my sheep have had nothing but soft water." did, a great big Cotswold that would water is too hard." I don't believe any

one of those causes ever produced it. | folds about twice during the winter. I will say that in-breeding is conducive What accumulates after the last cleanto goiter. I believe hae tendency 9 towards tuberculosis in a lesser degree than cows, and I believe that under certain conditions it can be brought out, and while it will not manifest itself in the same way, it would manifest itself by a granular enlargement in the lamb. so I will say that enlarged glands, just for the time being, indicate a tuberculocis tendency, which is brought out by some conditions in the feeding during the winter. We will probably know more about this matter in a year or two.

Mr. Woodward-Once in Michigan when I went up after a lot of ewes. I met a man who told me he had a flock of 100 ewes and they all had lambs, and out of the 100 he only raised three, the balance dving with goiter. He offered to sell me these ewes for so much money. I said I never had had the goiter, and I was willing to take my chances, so I bought those ewes, took them home, and I never saw a nicer lot of lambs. and not a sign of goiter in one of them.

Mr. Noves-Is there as much goiter in the mutton breeds as in the fine wools?

Dr. Smead-Not as far as my observation goes.

Prof. Craig-My experience has been a little different from Mr. Woodwards. I have known ewes with these large glands transmit them to their lambs. I have tried a good many things to get over it and I succeeded last year in saving a lamb by bleeding it. I took the lamb, bled it slightly through a vein in the neck. When a lamb gets so that it can breathe all right, it will pull through.

Mr. Hayes-Do you allow the manure to accumulate in the barn? How often do you find it necessary to clean your sheds?

that the sheep ing we allow to remain undisturbed until succeeding fall to apply to wheat or meadows. We have no sheds on our premises. We have found them the coldest place on the farm.

Mr. Fox-By allowing the manure to lie so long in barns is there not danger that it will heat and deleterious gases form?

Mr. Woodward-The sheep pack the manure very firmly, and if plenty of absorbent is used, or plenty of bedding used, there is no great danger of any bad results.

Prof. Craig-What absorbent would you use and how apply it?

Mr. Woodward-We use land plaster. Fine dry earth or muck is very good. If you attempt to scatter plaster or dry duct in the pens among the sheep in the day time, it will greatly frighten them. To avoid this, we scatter it in the dark at night, being careful to avoid throwing it upon the sheep.

Mr. Fox-How should the lambs be dressed to sell to the best advantage?

Mr. Woodward-The lamb should be hog dressed, that is, it should be thoroughly bled, should be skinned down the hind legs, the hind feet being cut off attached to the skin, it should be skinned down the belly to the brisket. It should then be split down the brisket, which should be opened a little. The bowels should then be removed. The caul being first carefully taken off and put where it will be kept warm. A pair of cross sticks are then put across the back, the ends passing through the edge of sides so as to open the carcass wide exposing the kidneys. The hind legs should be tied together firmly and the caul then be spread over the opening in the abdomen and come well up around the hams or more properly the front side of the legs.

Mr. McKerrow-What plan do you adopt to dry the ewes when the lambs are weaned so early?

Mr. Woodward-We simply reduce Mr. Woodward-We clean our sheep their feed somewhat, taking away all succulent food and if necessary milk | that came upon the market improperty them out once or twice.

lambs for shipment to market?

Mr. Woodward-We wrap the lamb in clean muslin, covering all parts from which the skin was taken. A piece of burlap is then put around so as to cover the muslin, and this is firmly sewed up. Of course no attempt is made to cover those parts not skinned. including the head.

Prof. Craig-Do you dock and castrate the lambs before selling them? And if so, what method do you follow?

Mr. Woodward-We never dock any. We do, however, castrate all males at from two to three days old. We find that wether lambs make better gain and die better. To castrate, we cut off end of sack and pull male organs out with pair of pinchers, or If strong enough, with thumb and forefinger. We have sometimes cut off the entire sack. and if this be done when lambs are not over two days old. and it be done with a pair of sheep shears, it is a very good way.

Mr. Hatch-In shearing your sheep at the season you do, have you found that there is a tendency for the fleece to drop off during the warm seasons of the year?

Mr. Woodward-Not in the least.

The illustrations that are here presented show in a graphic manner the main features of Mr. Woodward's description. They have been kindly loaned by the Rural New Yorker and have been made from subjects obtained in a New York dealer's store. Figure 1 represents a properly dressed lamb with wrappings rolled back to show the arrangement of the caul and the muslin. In figure 2 the manner of fastening the cross sticks or skewers across the back of the lamb is shown. The lamb illustrated in figure 3 has been prepared for market and is ready for shipment. It is tightly and neatly sewn in burlap. Figure 4 shows a lamb

dressed. The Rural correspondent Mr. Cole-How do you prepare the states that it had been poorly bled as the meat had a dark, unattractive color. The dressing was considered to



that has been done in a slovenly man-ner, as the backsets were so short that tion for market were found to be of

the carcass was rolled too far over, about equal quality but it is stated breaking some of the ribs and the caul that the one would not sell for much was not evenly and neatly spread over more than one-half as much as the the kidneys. The two lambs showing the other.



Fig. 2.

Fig. 3.

Fig. 4.

SUMMARY.

STATEMENTS AND SUGGESTIONS ABOUT SHEEP.

These statements and suggestions! have been summarized from the sheep sessions of the past two years. They are presented in this way so as to enable the reader to get at the kernel without the labor of cracking the shell.

Claims Made for Sheep.

1. They are profitable. Instances are given where breeding ewes have yielded a profit of \$12.60 per head; where fat lambs, made to weigh 115 pounds at nine months of age, have sold for six cents per pound, during grade American Merinos and by conthe last five years; where a breeding secutive crossing with Shropshires or ewe has given annually a profit of ten to fifteen dollars; where a farm was bought for three thousand dollars, with one thousand dollars down and the rest to be paid in two years, and during that time the sheep paid fifteen hundred dollars and the original number remained: where they have made land worth sixty dollars an acre from that worth twenty-five.

2. They weaken the soil least and farmer the best results in produce. strengthen it most.

3. They are enemies of weeds.

4. The care they need is required when other farm operations are slack.

not be large.

6. The returns are quick and many. handled of all farm stock.

more largely from cash grains while months. those from the sheep are made principally from pasture.

9. There is no other product of the flesh, 150 pounds at least, as a yearling. farm that has fluctuated so slightly in value as good mutton.

ing, for does not the horse and cow, in leave the culls. shedding their coats waste what the sheep saves?

Hints for Beginners

11. Study your farm conditions so as to be able to select sheep suitable for your locality.

12. There is no breed suitable for all conditions.

13. There are so many sheep that it is easy to choose sheep adapted for any locality.

14. Of all things use a pure bred ram.

15. It is possible to begin with Oxfords get good mutton sheep.

16. A source of failure in crossing the Merino with mutton sheep has been that the shepherd used to Merinos did not feed the crosses sufficient.

17. Before beginning to select a flock of ewes, one should have a distinct type in mind and pick carefully to this type.

18. Field rams always give the

19. Avoid the use of highly fitted. stable fed, show rams.

20. Select the rams carefully; continue to grade towards a better type; 5. The amount of investment need cull out those deficient, and the flock will respond promptly to the effort.

21. A big, coarse-boned ewe with a 7. They are the quietest and easiest strong head and thick neck is not the right sort to raise a good vigorous 8. Other farm products are made lamb and suckle it properly for two

> 22. The ewe of right type should be medium sized, weighing in moderate

23. In buying sheep keep the most profitable type in view; pick to that as 10. By comparison wool costs noth- closely as possible; take the best and

> 24. The demand of today is for a sheep that may be made ready for

market any time before it becomes twelve months old.

Management of the Flock

25. Before you can tend your sheep well you must make a study of them.

26. In dividing the flock pay attention to age, size and condition.

27. The ewes should be in fleshy condition in the fall. Feed one-half pound of oats daily until they become so.

28. A grain-fed flock will yield two pounds per head more wool than one poorly fed.

29. All ewes with unsound mouths, injured udders and bad coats should be fed for market.

30. Select those ewes to remain in the flock that have been the most prolific and the best milkers.

31. Breed your ewes to a pure bred male of the same breed so that each year the increase will be better than the year before.

32. Ewe lambs should not be bred until they are eighteen months old.

33. A good daily ration for a breeding ewe is two pounds of clover hay or corn fodder, three pounds of silage or roots, and one quarter pound of oats in early winter, changed to one-quarter of a pound of bran in the spring.

34. Supply ewes with salt and clean drinking water at all times.

35. Do not keep more than fifty ewes in a single pen.

36. Breeding ewes should have exercise and should not be confined in warm, close buildings.

37. Before being put on pasture the ewes should be tagged.

38. When the flock is turned out in the spring after having a roof over them and protected from the winter showers, it is important that they be not exposed to any rough weather.

39. They should not be permitted to depend solely on the soft, washy grasses of early spring.

40. There should be no decrease in the quantity of hay and grain fed to the ewes until they have been on pasture for some time.

41. The thrift of the ewes and lambs depends on change of pasture in summer.

42. It does not do to wait until your flock is failing before changing their pastures to make them improve again.

43. Pastures containing a mixture of grasses and clovers keep the sheep in the best thrift.

44. It is a good plan to change the sheep from one pasture to another every week or ten days.

45. Oats and tares mixed make a good supplement for the pastures.

46. Give the flock, including the lambs, the aftermath of timothy and clover.

 47_4 The best satisfaction will be obtained from clover as a sheep food, by cutting it when it reaches full bloom, putting it in cocks, leaving it to sweat a short while, then airing it and putting it in the barn quite green.

48. A ton of clover put up in the right way will come out green, and it is worth two, and in some instances three tons put up so that it comes out in bad condition.

49. Clover is a benefit to the farm and a good food for the flock.

50. Give the breeding ewe succulent food of some kind during the winter and thus avoid seeing many of them humped up, with a pinched look, suffering with colic, which is commonly called the stretches.

Treatment of Lambs.

51. A lamb dropped in March will outstrip the later lambs during the hot weather of August and September.

52. Keep a service record so that you will know when the lambs will be dropped.

53. Provide lambing pens for comfort of ewes and safety of lambs.

54. Be on hand at lambing time to see that each lamb is on its feet and feeding.

55. Teach the lambs to eat a mixture of two parts bran and one part oil meal by weight as early as possible. 56. Arrange a lamb creep and trough for the lambs.
when from three to four weeks old and docked a few days later.

58. About two weeks after the ewes have been shorn dip the lambs.

59. Wean the lambs when three and a half to four months old.

60. Clover aftermath is the best pasture for lambs that have been weaned.

61. Early maturity and profit in feeding are so closely associated that every feeder realizes the necessity of securing the former to obtain the latter.

Feeding Lambs.

62. Lambs fed grain before weaning made an average weekly gain during ten weeks of 4.48 pounds per head; those fed no grain gained in the same time 3.6 pounds per head weekly. The cost of the gain amounted to 18 cents per head. If sold at the time of weaning the lambs that received grain would have yielded a profit of 72 cents more per head than the others.

63. In the nineteen weeks intervening between the time of weaning and before fattening, the lambs receiving grain made an average weekly gain of 2.69, while those not receiving grain made a weekly gain of 1.57 pounds per head. The grain cost \$1.47 per head. The difference in the market value if sold at the end of the period would have been \$2.09 per head in favor of the grain fed lambs.

64. The fact that the lambs had or had not received grain previous to the fattening did not have any appreciable effect on the rate of increase during the fattening period which followed.

65. The lambs that received grain to the time of fattening previous sheared heavier and the fibres of the fleece were longer.

66. The greatest and most profitable gain is made by the lamb before it is weaned.

67. It is found specially beneficial to feed grain to the lambs when they were being weaned.

68. The two leading directions connected with feeding sheep during the

57. The lambs should be castrated fattening process are to know the appetites of the sheep and satisfy these to the fullest extent.

> 69. When two weeks old the lambs will begin to eat grain, and by the time it is proper to wean them they will eat 1-2 to 3-4 of a pound per head per day, and on this and good pasture they will make an average gain of from 3 to 4 1-2 pounds per week.

> 70. After weaning about 1-2 pounds of oats should be fed and increased gradually until fattening begins. With common pasture and this ration 2 1-2 pounds per head per week is fair gain.

Fattening Wethers

71. Wethers in hearty condition will eat about 1 1-2 pounds of roots or silage and when on full ration 2 pounds of grain mixture per head daily and on this they will average 2 3-4 pounds per head in weekly gain

72. Be sure and have the wethers free from ticks before beginning to fatten them.

73. The benefit from shearing the wethers about the middle of October, before they are fattened appears in the effect the removel of the fleece has in hastening the maturity of the sheep.

74. Feed a variety of fodders.

75. Feed them often all they will eat eagerly.

76. Keep the feed troughs clean.

77. See that they are dry and quiet in their pens.

78. For quick fattening it is best to keep the sheep confined in small but well ventilated pens.

79. Do not keep more than twentyfive in a single pen.

80. Be careful in damp weather to keep the grain troughs clean and feed slightly less.

81. Feed at the same time each day.

82. Keep them out of storms.

Rape for Fattening Sheep.

83. Rape has been sufficiently tested to prove its adaptibility to Wisconsin's climatic conditions.

84. Rape is a valuable fodder for the fall fattening of sheep.

hest to sow.

86. Plow the land late in the fall or early in the spring and make the soil rich

87. It is desirable to make the soil for about two inches of fine tilth with a disc or a spring tooth harrow.

88. Drill in rows two and a half feet apart with a Planet, Jr. drill, sowing about two and one-half pounds per acre.

89. The first or second week in July is the best time to sow it for feeding the latter part of September or fore part of October.

90. Cultivate with a fine tooth cultivator until the rape plants are large enough to cover the ground.

91. Sheep should not be allowed to go into the rape field without having been feeding on pasture previously.

92. When hungry they will gorge themselves on it and bloating will result.

93. It is a good plan to grow some rape in several fields so that when your hay or grain is cut you can turn in a flock of sheep and they will have access to both grass and rape.

94. It is advisable to feed some bran or oats to the sheep when they are first turned on the rape.

Winter Lamb Raising.

95. In the early lamb market the lamb weighing 25 pounds dressed, with a well developed leg of mutton with plenty of lean meat, tender and juicy. with a good thick caul spread over him will sell for more money than the lamb weighing 45 pounds that is lean and bony.

96. The market likes a lamb that has a good caul, a large kidney and the largest proportion of lean meat.

97. The Dorsets have given the best satisfaction for early lamb raising.

98. Out of five hundred ewes you may expect to get four hundred lambs that will be fit for market by New Years day, and by the first week of February you may expect to be send- lap and firmly sewed.

85. The Dwarf Essex variety is the ing 40 to 50 a week and by the first of May the 400 would likely be marketed.

99. The ewes and rams should be first turned together about the first of June.

100. About fifty ewes should be allowed to each ram.

101. The breeding ewes selected for early lamb raising should be shorn in the fall because they will then occupy less room, the lambs do not have the opportunity of injuring the fleece by getting on the backs of the ewes, and in addition the quarters may be kept warmer than if the fleeces were not removed.

102. The lambs should begin to drop about the first day of November, then they can be put on the market about Christmas time.

103. The quarters for the lambs must be warm and properly ventilated.

104. Small pens and troughs should be provided for the lambs so that they may feed frequently without being interfered with by the older sheep.

105. For forcing the lambs new process linseed meal, unmixed, gives good results.

106. When the lambs are a few weeks old cracked corn is a good addition to the oilmeal.

107. The more the lambs can be made to eat the faster they grow and the more money there is to be made out of them.

108. The lambs should have some well cured clover hay cut for them.

109. For weak and backward lambs fresh cow's milk is nourishing.

110. The males should be castrated when two or three days old.

111. After the first shipment is made divide the twin lambs remaining among the best ewes.

112. The lambs require special dressing for this market.

preparing the lambs for 113. In market after they have been dressed they should be covered with clean muslin and then put in a piece of bur-

Treatment of Sheep Diseases.

114. Din the ewes for ticks and exposure to cold fall rain storms. scab.

115. A dip in which the killing element is carbolic acid is better than one in which the destructive agent is arsenic. The former leaves an odor that will last for weeks and thus prevent the attack of flies and keep the sheep from becoming infected if brought in contact with ticky or lousy sheep.

116. An effective home made dip for 100 sheep is 100 gallons of water, the juice from 25 pounds of tobacco. and 10 pounds of sulphur.

117. For scab, dip the sheep again after two weeks' interval.

that the dipping see 118. When sheep are not overheated or thirsty.

119. They should be at least one minute in the bath.

120. Keep the fluid stirred.

121. The preservation of the health of the sheep in this country requires that they be furnished shelter from all fall and winter rains.

sheep die from what some may call grub in the head which a feather will destroy it. 122. Many

really resulted from disease created by

123. The flockmaster cannot afford to have 10 or 20 per cent. of his flock snuffling all winter and producing weakly lambs that die because of the condition of the mother when pregnant. Kind care and proper shelter will lessen this.

124. The proper time to give any medicine for the destruction of intestinal worms is when the stomachs are quite empty.

125. The oil or spirits of turpentine is the best remedy for any of the internal parasites of sheep. For a full grown sheep give a tablespoonful when used as an intestinal worm destroyer. and when used for lung worms one-third of the quantity mixed with about four times as much raw linseed oil to loosen the irritation.

126. Common blue vitriol in strong solution will kill the germs of foot rot and if proud flesh is present butter of antimony applica once or twice with



WISCONSIN FARMERS' INSTITUTE.

EVENING SESSION.

Mrs. Blankenburg and The Institute met at 7:30 P. M. | Vocal Duet, Mr. Breed. Mr. Goodrich in the Chair.

WHAT THE WISCONSIN AGRICULTURAL EX-PERIMENT STATION IS DOING FOR THE FARMER.

Prof. W. A. HENRY.

sion of the great work of our State Uni- tion of these factories, those who-know versity. This division is further di- the most of them and their workings vided into three departments. The first are far from satisfied with them. Sevwork is that of investigation, the sec- eral years since creameries came into ond teaching young men who come to operation through gathering cream; in the Agricultural College for instruc- a short time farmers had learned how tion, and third, carrying instruction to to dilute the cream and were cheating the farming people through the Farm- the life out of such creameries as were er's Institute. All before me in this not cheating the farmers. The oil test audience are for the time being in at- churn came into use, and though an tendance on the work of the State imperfect instrument was most help-University through the Co'lege of Agri- ful in regulating the business. Cream culture. I place the work of the Ex- gathering had vital difficulties, and the periment station first because in many power centrifugal separator made the respects it is the most difficult, and in drawing of all milk to the factory posothers the most important. The United sible. But at once one class of dis-States government makes an appropri- honest people put water into the milk ation of \$15,000 annually to each state or took off some of the cream, while in the Union for experimental work. another proceeded to accomplish the In addition to this the state of Wis- same end by keeping cows that gave consin gives annually about \$5,000 for thin milk. The life of factory dairying this same specific purpose, and on was in the balance. Honest people these two funds the Experiment Sta- could not be associated with dishonest tion is maintained. A number of lines people and would leave the factory and of work are undertaken, the most im- handle their own milk. Factories portant being investigation in the mat- could not live with only dishonest ters connected with the dairy.

Our Dairy Industry.

creameries and cheese factories and milk test. When you remember that the number is increasing rapidly. I for fifty years chemists had been at am pleased to say that while many work on this problem and that scores

The Agricultural College is a divi- are satisfied with the present condidairymen for patrons. Recognizing the situation I set one of our chemists, Already Wisconsin has about 1,600 Mr. Short, to work to devise a simple

THE AGRICULTURAL EXPERIMENT STATION.

milk test was given to the public. It This done the good cows will be better was correct but unfortnately had bad fed and cared for than ever before, defects. Then came the Patrick test and the poor ones will no longer refrom the Iowa Experiment Station, main on the farm "eating their heads which was a great improvement over off." I believe the Babcock milk test the Short's test. But this test was will return to the farmers of Wisconmaking its way too slowly and our dairymen were constantly urging the necessity of something still better.

The Babcock Test.

It was then I urged Dr. Babcock to start about the work, and to be brief, for time presses, the Babcock milk test was given to the world without patent or hindrance of any kind. When chemists first learned of this test they doubted its accuracy because it was so simplethey did not see how so simple a test as this could be accurate. If it was, why had so many chemists failed to learn that with sulphuric acid and whirling machine they could accurately measure the fat in milk. The Babcock method has now been put to the most severe test by the leading chemists of America and some of the best in the old world, and wherever known is gaining friends, having stood the most Already thoucrucial investigation. sands of the tests are in use and yet half the dairymen of the country do the north of us is a district eminently not know that such a thing exists. By its use the patron who delivers the poorest and the patron who delivers the richest milk at the factory are each paid according to his desserts. The man who now wishes to Station is working earnestly to help take a little cream off his milk when educate an intelligent set of sheep company comes can do so without feel- growers, not men who are sticklers for ing he is wronging any one, for when he takes the milk thus skimmed to believers in fine mutton. Let us relethe factory he is paid for the fat he gate to the plains of the west to South delivers and no more. Not only has America and to Australia the fine woolthe Babcock test given co-operative bearing sheep. each cow will be weighed and recorded the Down sheep and the production of

of devices had been sent forth you at least once a week and samples of will agree it must have been no easy milk will be analyzed to determine After a year's study Short's the standing of each cow in the herd. sin every year many times what her experiment station costs.

Swine Feeding Experiments.

In swine feeding a large number of experiments have been conducted. Among the results brought out is the high value of skim milk for making the bones of hogs strong, the beneficial effects of wood ashes which save feed and strengthen the bones of cornfed hogs and last but not least, the numerous experiments to test the value of cooking feed for hogs. Our results show most plainly that it does not pay to cook feed for hogs. By this we do not mean that warm feed and a variety of food does not pay, but that merely cooking corn or other grain in itself does not render food more digestible or make more pork.

Possibilities of Sheep Husbandry.

We believe there is a large field before Wisconsin in sheep husbandry. To adapted to growing mutton sheep and the time is not far distant when hundreds of thousands of fine mutton sheep will be upon farms that are now covered with forests. The Wisconsin fine wool, but who are advocates and There the land costs dairying new life and forever settled nothing and wonderfully even wool is its destiny, but it has also thrown produced. In the production of mutton light in dark places on the dairy farm. these sections do not compete with us Every progressive dairyman owns or and Wisconsin need have no fear of will own this milk test. The milk of rivalry. Believing this we are studying periment Station do not fail to see our we investigate, but that teaching of flock of high grade Shropshires and our cross bred Shropshire-Merinos.

Other lines of investigation are in studying the moisture in soils and how to conserve it for our crops. The research for hardy varieties of apples and other fruits adapted to our section. It is probable the present legislature will direct us to begin tobacco investigations.

Write for the Bulletin and the Reports of the Experiment Station

But many farmers through pressure of work and distance from Madison are unable to visit the Experiment Station. How can they receive its possible benefits and in what way can it help them? At every farmers' institute reference is made to our Station and its work; all who attend these meetings can and do receive help therefrom. We issue an annual report of which 15.000 copies are printed for free distribution. Besides this there are quarterly bulletins, generally in editions of 10,000 each. We keep a mailing list and send our reports and bulletins free to all who ask for them. she would be if it were not for Madi-If there is a farmer in the state of son. Kansas is looking to you for Wisconsin who does not receive our light on this subject, as I happen to reports and bulletins, it is only because know from personal investigation on we do not have his name on our mail- the spot. Address a postal card to ing list. Agricutural Experiment Madison, Wis., writing on the other hid, therefore let your light shine. Only side your name and post office plainly, the day before I came here I had saying you wish to receive the re- a letter from a gentleman in New ports and bulletins of the Experiment York, "Can't you get me the Wisconsin Station, and you will get them.

Should you go to Madison do not to write to these men, fail to visit the University and College enough for postage to W. H. Morrison, of Agriculture, including the main Madison, Wisconsin, and you will get building on the hill, the dairy school- them, if the people of Wisconsin havethe farm. building and will certainly find of interest to you there are interested in farming. Remember gentlemen.

fine mutton. Should you visit the Ex- that our work is varied; not only do students at Madison and work in the institutes is all a part of the great scheme for instruction in agriculture.

Music-Violin Solo,

Mr. Lang.

Mr. Wallace-There is one phase of the subject treated upon by Prof. Henry which he was too modest to bring out, and that is, that grand as has been the work that has been done in Wisconsin, and the grandeur of it you do not appreciate, my friends, I care not how high your appreciation may be.-I say, grand as this work is, it does not end in Wisconsin. Iowa, my own state, is further ahead today than she would be if she had not the example of Wisconsin. Iowa is second to no state in the Union in many respects-has I think, an agriculture of greater possibilities than any piece of land on which the sun shines, and yet when it comes to this question of improvement and dairy investigation, Madison and not Ames, is our Mecca. Nebraska is further ahead today than

Gentlemen, the old scripture story is Station, true, a city set on a hill cannot be Bulletin, No. 6?" I am glad to be able "Just send You n't got them all." The good work you objects are doing here does not end here. You if you cannot hide your light under a bushel.

THE WIFE'S SHARE.

T. B. TERRY, Hudson, Ohio.

address in full. The following brief outline will not do it justice, because the very life and point of the talk, all through, was the incidents and illustrations with which it abounded.

Mr. Terry began by saying that when two men went into partnership the profits were equally divided, as a rule, at any rate, each partner had a certain fixed share of the income that was his individually.

When a young man and young woman enter into a partnership to do business together for life, it doesn't seem to work the same way, as a general rule. The man then holds the funds and draws the profits, and when the woman wants any she has to ask for it.

Then the audience were shown why this is so, that the old curse pronounced against Eve had not yet been quite forgotten, in short, that woman was not yet looked upon as quite the equal of man. The speaker thought the time had now come when the last vestage of this old curse should be wiped away and women be acknowledged the full equal of man, and as having earned, when in partnership with a husband, a certain share of the income, otherwise she is no partner at all, but something of a slave, ruled ever more or less by a lord and master. Because the men, by their division of labor, do the work that directly bring the dollars, is no reason why he should think his work more important than his wife's. It is not, nor is it harded. On account of the everlasting tread-mill grind of woman's work, its monotonous character, the farmer's n't quite got there yet. Meanwhile we wife, as a rule, works as hard as her ought to make a will at once, or arhusband. All this work,

It will not be possible to give this making, the care of the little ones, and the farm work, must be done. The only noble, manly way is to consider your wife as doing that which nature points out as most naturally her share. just as faithfully as you do yours, and as an equal partner, with equal rights in the returns.

Women have shown themselves able to succeed in all departments of business; when they have had equal experience with men they may do just as well; but still Mr. Terry preferred. while recognizing their ability. that they should usually be found "making Heavenly homes on earth for us men," and in return should be considered as having done their full half in the great partnership.

Man and wife should have one pocketbook, consult together about all large outlays, but be free to take from the general fund any little sum that either might wish, and the wife just as free to do this as the husband. This for young people who started that way; but not, perhaps, for the old man who had held tight reins on the wife for many years. She might be extravagant then, not being used to being trusted with her hand in the pocketbook.

Here are some of the many points that were illustrated and talked over:

We ought to take our wives with us as much as we can when we go away from the farm, to town or anywhere-to get them away from their monotonous work.

Our laws are coming to acknowledge husband and wife as equal, but havethe home range in some way so our wives, in justly belongs to them, and what we Mr. Terry's plea from these few words, want them to have.

wife should have, absolutely, half of -and no really just man in the audieverything she and her husband have ence could take any exceptions to what together accumulated. Then the life was said. It was a glimpse into the use of the other half would be very better days of the future as the wheels proper; but Mr. Terry goes farther, of time are to roll around. Right will and has willed everything to his wife, triumph. Mr. Terry easily explained as has she to him, and whichever one away all objections that could come survives the other, be it wife or hus- from the teachings of scripture that band, will be absolute owner of what man was the head and lord and masthey have together earned, and will ter. When one good old man after be trusted to leave it as he or she the meeting said to him, "My dear sir, thinks best after they are through how do you get around this; all scripwith it.

equal partner you may at least, treat Terry, "Read the original carefully, her as well as you do the hired girl, and you will find it says (It is so, I and give her a certain amount each believe in the Revised Version, "All month to do as she pleases with. Don't scripture given by inspiration of God oblige her to ask you for a little is profitable to men." It is utterly imchange every time she wants any. possible for you to prove that you have Let her feel like a free woman, and inspired authority for lording it over not like a slave; but better yet, if she your wife. It isn't right, and God can feel like a partner and not a paid never inspired man to teach what was servant.

case of sudden death, may have what. You can get but a feeble idea of but it was for simple right and justice There is but one right way. The -not woman's rights, but equal rights, ture is given by inspiration of God If you won't make your wife a full and is profitable to men?" Said Mr. wrong.

THIS AND THAT.

By Mrs. O. K. JONES, Platteville, Wis

per is a small one. A farmer's wife most likely there is found there no is expected to think and talk and name for God. The original idea the write about that in which she is most ancients had in building temples, was interested. I cannot think of any de- to make a home for the object of their partment of my subject of more in- worship. King David was not satisfied terest to the farmer's wife and indeed with his palace of cedar wood but he to every other man's wife, than Home had a yearning desire for the building and Homebuilding. There is no other of a home, or "habitation for Israel's word in any vocabulary, that is so God." He even rejoiced that the towprecious and so full of tenderest mem- ers in that great structure should furory and affection as the word Home. nish a home for the birds that were So highly does it rank among Heaven's wanderers in the sky. Its altars were choicest gifts to man, that in every to afford the swallow a home, and

My subject is a large one. My pa- not found a name for the word home. nation in whose vocabulary there is the sparrow a nest for her little ones.

Home and Heaven.

Home and Heaven are two words very mearly akin to each other. Who has not felt the magic influence of John "Home. Sweet Payne's Howard Home?" There is no particular excellence of meter, or grandeur of thought in it. It simply voices the melody of every human heart, since the first home was built on earth, till now. Home is a talisman and we whisper the word in our heart, and we wear the thought of it about us like a charm. Whenever the time comes, in a young man's life that he no longer enjoys the home of his parents and his childhood, he may be quite sure that there is something morally wrong with him and that he is on the downward grade. The greatest men in the history of this and every other country, have been and still are those who cling, with the strongest affection, to the scenes and memories of their childhood. The prodigal son may demand and receive his share of the family inheritance but when he has wasted it "in riotous living" he may then come to himself. If he does. and his better nature and real manhood assert themselves, he finds that the best thing he can do is to go home.

Home Builders.

We are told that there is a class of persons who are incapable of loving or caring for a home. We hope there are not many such and that their posterity may be very few and shortlived. It should be the ambition of every youth to be a successful homebuilder, and to earn, by early industry, a home of his own. It is a hard thing to do, to sow all one's life that another may reap. While the saying that "He who by the plow would thrive, himself must either hold or drive," is true, it is equally true that both he who holds and he who drives ought to thrive by it. It is the old story of povertystricken Ireland, foreign proprietorship and tenantry of serf, capital and labor, that is the great social problem that is little restfulness and true pleasure shaking society to its center today. found in what ought to be genuine But this state of affairs is near its homes. The getting of a house does

10 - B

close. The day cannot be far distant when each cultivator of the soil shall have a home of his own. It is said that the Germans and English of all nationalities, are the most noted for their love of home. Americans are a restless nervous people, moving about, from east to west and from west to east, often making their homes far from where their childhood days were spent. But, perhaps this changing makes them cherish the memories of the old home all the more. It is a restless, homeless, unsatisfying way, that of living in hotels. Strange faces, though very pleasant and kindly, do not fill the places of familiar faces. And the banquet of a palace, in which one is a guest by courtesy, never is one-half so well relished as the social meal in one's own home. It is man's duty to lay the home foundation and erect the building. It is woman's to beautify it. Her hand should be cunning in needlework, and if need be, she should make the plainest fare tempting in both look and taste.

The Mother's Influence.

Her touch should be that of purifying. transforming and beautifying. The best security for civilization is the home, and it is quite certain that without home life, humanity would be lost to all the nobler conditions of existence. It takes but a little to make a home, and it requires but a little to Harmony among those beautify it. composing the family circle and some degree of worldly comfort are two ingredients, indispensable to the makeup of a real home. The basis upon which all homes should be founded, is good living. And no matter how limited the circumstances or how small the sum to be expended, this can always be secured if the housekeeper will begin at the beginning, that is, in the kitchen. And that they do not begin there is the principal reason why there is so little real home comfort and so

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a home. But the presence of a good at stated times, and where the events housekeeper does, for, where the physi- of the day are discussed. Oftentimes, cal welfare of a family is looked after where beginners with limited means the mental and spiritual welfare are fail in home-making, is in paying too almost as certainly sought. It is na- much attention to outward surroundtural for children to love to be in the ings. Their greatest desires are that kitchen, especially is this true in farm the finishings, furnishings and arrangehomes, and for their comfort, if for ments of their parlor shall be much no other reason, I would recommend more elaborate (and consequently much that the kitchen be made one of the more costly) than the more commonly most cheerful rooms in the house. And used rooms of the home. to make sure to have it right I would often needless extravagance is indulged build it first, before the demands of in which may, in future, cause regrets, the more elaborate rooms should ex- not at all pleasant to the home life. haust the finances of the family firm. For instance, a chattel mortgage on

Domestic Help.

not depend wholly upon the inefficient should never be uncomfortably nice. help to be employed today, but must There are a great many ladies who can instead, to a great degree, depend upon get very little real comfort out of a her own efforts, and the way to have parlor and its furnishings, especially a good cook, is to be one herself; and the parlor carpet. Indeed, it is just one way to make a home happy, is to have a well supplied table. Three well served meals each day will, under ordinary circumstances, go far toward happiness takes her flight. Some peothe establishing of home happiness in ple cease to be free the moment they almost any reasonable household. Adjoining and convenient to a light, cheerthe dinshould be kitchen ful ing room, which is really the telltale room of the house, which at a glance, as if by magic, reports the condition of each apartment in the house, "upstairs, downstairs, and in my lady's chamber." Dingy carpets. soiled linen ware and cracked dishes do not make favorable impressions in regard to the unseen apartments, and they go just as far toward establishing the ability of the housewife, as do neat table linen, well dusted furniture and uninjured china.

A Pleasant Dining Room.

the most pleasant rooms in the house. of life, the human faces, the nursery It is the regular meeting room where and earliest objects and associations.

not always guarantee the possession of the family are expected to be present And too a parlor set is not very often a com-The average American housewife can- fortable ornament. Indeed, a parlor wonderful how much real misery some people can get out of a carpet. Too often when the carpet enters the home, purchase a carpet, and "the thing of beauty" is far from being "a joy forever."

Home Reminiscenses,

Home is too sacred a place to permit the entrance of anything that is an encroachment upon the happiness of any one of its inmates. Especially should the memories of childhood home be the dearest, for earliest scenes form the latest memories, and the mind's first impressions are the deepest and most lasting. The years that lie between our childhood and old age seem common-place, and we forget many of their occurrences and experiences, but no one ever forgets the home where The dining room ought to be one of the eyes first opened on the new scenes

DAIRY DAY.

Morning Session-Mr. Convey in the Chair.

HOW SHALL WE SECURE PROFITABLE COWS.

By R. S. KINGMAN, Sparta, Wis.

This subject might be disposed of in a very few words by saying, careful age farmer to have these specially selection, systematic breeding and ju- bred cows,-they are too high in price dicious feeding; but let us examine and too scarce. To the dairyman who some of the methods.

have been brought to their high stand- select from among his own, or by purard of excellence by long years of chase, the best cows he can find as a careful selection of the fittest, with reference to milk production. When domestic animals have been bred in one line for many generations with a certain object in view, these traits become and temperament of the cow. She established and such animals have power to transmit these peculiar characteristics to their offspring with almost unerring certainty; but animals that have no such special breeding, have no such special potency.

Law of Inheritance.

We often see excellent cows of mixed breeding whose heifers make utterly worthless cows, and vice versa. This law of inheritance and transmission seems to be too little studied by farmers building up their flocks and herds. It is true that the offspring of full blood animals are not always as perfect as the parents, but as a rule they are, and the failure is the good dairy cow. A dam with no special exception. breeding, coupled with a sire that has been bred in a special line, the offspring, as a rule, will have more of the characteristics of the thoroughbred animal, because he is more potent milk from the cow you are selecting to transmit his peculiar traits.

Now, it is not practical for the averwishes to improve the dairy qualities All of our dairy breeds of cattle of his herd, let me suggest that he foundation for a herd.

Selection of Cows.

In selecting, look well to the type should have a relaxed appearance, a clear expression of the eye, a broad muzzle, a thin neck, muscle like a race horse, with broad long hips, strong back and pelvic arch, thin thighs well apart, to make room for the udder, with angular shoulders, with plenty of chest capacity for lungs and digestion. Above all she should be deep through the flank, giving her a wedge shape, with square udder running well forward on belly, and well up behind, with teats good length and squarely. placed. She should have long tortuous or ramifying milk veins terminating forward with large aperture. The size is not essential in the make up of a

These are some of the outward indications of a good dairy cow. The real test, however, is the amount and quality of milk she will give in a year; therefore weigh and carefully test the for the foundation of your herd.

A Pure Bred Sire.

Having the foundation selected, next study carefully the different breeds of dairy cattle, and make up your mind which breed is best adapted to your business. Then select a full blood sire from this particular breed to put at the head of your herd. Be particular to get an animal that has good individuality, sound and healthy, of masculine appearance;-one that has the type and temperament of the cow above described so far as they can apply to a sire; one whose maternal ancestors are good dairy cows for several generations back, and you have little risk to run. Always keep the best thoroughbred sire at the head of your herd that your money will buy. The best you can find is none too good. Never put a poor sire at the head of your herd if you know it, and when you get one you know is good keep him as long as you can. A mature sire is better than a young one. When you have gotten the first cross you will find some very satisfactory cows, provided you have the right kind of a sire, and when you get the third and fourth cross, the majority of your heifers make good profitable cows, and for aught I know as good at the pail as the full bloods of the breed selected.

Some farmers conceive the idea that if they cross the Holstein for instance, that gives a large flow of milk, with the Guernsey that is supposed to give a rich milk, they will produce a cow that will have the power to give a large flow of rich milk. Finding the result very unsatisfactory, they try experimenting still farther by crossing the first cross with some other pure breed and so on, finding at last that they have nothing but scrubs. In my experience I have never known such methods of breeding to result in anything but disappointment. Stick to the breed of your choice, unless you have good reasons to change to another breed.

The Heifer Calves,

calves that are being raised for the dairy, for much depends upon the start a cow gets in early life whether she will make a profitable cow or not. First, I assume that the calf has dewith scended from dairy ancestors, good constitution and well developed. When it is anywhere from one to three days old remove it from the cow. Feed new milk, warm from the cow, till ten to twelve days old,-three times a day is best, but twice a day will do. After this time feed twice a day until she is about four weeks old, then gradually wean her onto skim milk. At four to five weeks old, the calf will commence to eat hay and grain, at which time you can have her entirely on skim Never feed a calf cold milk. milk. During the first few weeks of a calf's existence be very careful and not overfeed,-better err on the side of feeding too little, and many times it will save you much trouble. Many cows give a milk rich in butter fat. Such milk should not be fed to young calves without reducing it with skim milk or water. Many good calves are lost by feeding such rich milk. When she is four or five weeks old she will show an inclination to eat hay and grain, so have some nice, soft hay to put before her at this time, and also have a box where she can get at it, in which keep a few oats, and they will soon learn to eat them. Later you can mix a little shorts on oil cake meal, which I regard an excellent food for calves. Do not put meal, shorts, or any solid substances into milk for a calf to drink; always feed such things dry for obvious reasons.

Calf Pens or Stanchions.

If possible keep your calves in pens by themselves. There are good reasons for this. One reason is that on this method each calf gets what you feed her and no more. Another reason is, that calves handled in this way cannot suck one another's ears and thereby develop a habit of self sucking and sucking other cows in the herd. If A few words relative to the heifer it is not practical to have a pen for each, the next best method I know of is to arrange some small stanchions in the pen where calves are kept in the barn or field, wherever it is convenient to feed, and when they put their heads through the stanchion to get their milk lock them in and keep them there until their taste for sucking one another disappears, which will be in an hour or less, or as soon as they have eaten their grain ration. Then they can be let out. Calves should have good ventilation in stables and plenty of exercise in yard or lot.

Care and Feed,

Feed calves such food as will keep them growing, but do not give them fat-forming foods, such as corn, in any shape. Never allow those that are being grown for the dairy to get fat either in calf-hood or heifer-hood. Always feed and handle in the direction of dairy production and never in the line of beef production. Heifers of the quick maturing breeds, if well grown and matured, should become cows at two years of age; other kinds a little later. There are good reasons for this practice. Handle your heifers and heifer calves enough so they never shy away from you, treat them kindly and you will have little or no trouble in breaking them to milk when they become cows. Do not discard a heifer because she does not come up to your idea of excellence with her first calf. Keep her till she has her second, and if she does not improve then dispose of her. Never sell your best heifers or cows because you can realize a little more immediate money, and then continue to breed from your inferior cows. Such a course is fatal to success. No one can secure profitable cows and pursue such methods.

Keep Only Profitable Cows.

Statistics show that the average cow in Wisconsin only produced 125 pounds of butter per year. If this is true the cows of this state are positively kept at a loss. With proper care and feed no dairyman should keep cows that it keeps them clean.

cannot average 250 to 300 pounds of butter per year. This is not a high average. Many dairymen are getting much better results. Some cows give a large flow of milk for a short season and then insist on going dry three, four, and as high as six months in the year. Cows of this description are unprofitable: weed them out at once. The cow that the dairyman needs for profit is one that gives a fair mess of milk at milking, of good quality, and does not incline to go dry more than six weeks in the year. Good cows are not plenty. When you have found such a one do not be too anxious to dispose of her. Don't think she is getting old when she has served you ten or twelve years. Many farmers, anxious to realize a few dollars, sell good cows for beef when they are just in their prime. Beef is not the mission of a good dairy cow.

Warmth, Comfort and Cleanliness.

The next important thing to be considered in the development of the cow, is her care and environment. First of all, a cow must be well sheltered in well ventilated light and warm. stables, in all cold and stormy weather. It is by no means necessary to have costly and elaborate barns unless one can afford it; then it is a pleasure of course, and sometimes a little more convenient. They should be kept well bedded when in stables for two reasons: First, it keeps them warm and comfortable, and second, it keeps them clean. One great matter to be considered here is the method of fastening cattle in a stable. Many methods and devices are in use, some, as the rigid stanchion, keep the cows clean, but do not give them latitude enough. The swing stanchion is better but by no means perfect. Tying by the head or neck gives the cow too much latitude and you cannot keep her clean. The Newton tie I regard as a better method, but the Bidwell tie I regard as the best and most perfect in use. While it gives cattle more freedom

WISCONSIN FARMERS' INSTITUTE.

No cow can elaborate milk profitably when she is not perfectly at ease, both mentally and physically. The average farmer and dairyman does not seem to realize the importance of this matter as he should. Cows should never be hurried or worried by dogs or boys in driving to and from the pastures, or excited in any way. They should never be unnecessarily exposed to cold and storms of wind or rain or snow in winter or wintry weather. Never strike a cow with a milking stool or anything else, or kick or prod her with a fork, or treat her harshly in any way, no matter what she does. If you do so you will pay for it at the expense of impoverished milk. If you cannot control your temper so as to treat her as kindly and gently as any female member of your family you had better quit the dairy business entirely, you will never succeed as a The dairyman who does dairyman. succeed with dairy cows is one who is constantly studying how to make his cows comfortable and at ease. When he goes into the yard his cows crowd around him to be caressed or petted. or get some delicate luxury from his hand; such treatment puts the cow in a mode to elaborate milk. A good cow, as a rule, is of a nervous temperament, therefore on all occasions be careful not to disturb her in any way. Any unusual excitement at the time of milking will cause her to withhold her milk. Let each milker have his particular cows to milk each time and never change unless you are obliged to do so. When you commence to milk do not stop until you have the last drop. Many cows will withhold their milk in whole or in part if the milker is not ready to take it when she is ready to give it down. In your methods of handling and care of cows be systematic and regular in all things, especially in the time of milking. If your habit is to milk at six in the morning and six in the evening do so every time.

Intelligent Feeding.

In the development of a cow very much depends upon the matter of feeding, both as to the quality of the food given and the manner in which it is The success or failure in this fed. matter depends largely upon the intelligence and skill of the dairyman. We will hardly find two cows in any stable that should be treated exactly alike in the method of rations, and here comes in the great and important study of the feeder. One cow with a voracious appetite, with great powers of digestion and assimilation, will need twice as much feed as another with a more dainty appetite. Heifers should never be fed as generously as mature Another great study for the cows. feeder comes in here; it is this: Sometimes a cow, when crowded for business, commences taking on flesh, and then dries up in her milk. This cow is of a beefy tendency. If she is fed with a food less fat-forming, she might continue to be a fairly good cow, but weed her out when you have a cow to sell. She is not exactly what you want in your business. Another cow you may find, is a great eater with great powers of assimilation. What food you give her she gives you back in the pail, in the shape of milk. You can feed her to the extent of her power of digestion. and you cannot make her take on a pound of flesh as long as she is giving milk. Great care must be exercised in feeding this cow. She never knows when she has food enough, and an overfeed may put her out of condition. This is the cow the dairyman should pin his faith to. She may not be the handsomest to look at, but she is truly the dairy cow. Save the heifer calves from this cow, and raise them in the direction of dairy production to take the place of some poor cow in the herd. As a rule, great performers are great eaters. Encourage the production of cows with great assimilative and digestive powers.

Again, the dairyman should be regular and systematic in his methods of feeding. If he feeds before milking, do so every time. Whatever his habits and methods are today the same should be followed tomorrow, and every day, because the cow expects it, and in this way you do not disappoint and disturb her. Cows in full flow of milk drink nearly twice as much water as a dry cow or fattening steer. Therefore do not compel your cows in winter to drink ice water. It injures her, and besides the cow's stomach is an expensive place to warm water.

On the Up-Grade.

In conclusion let me say, that the remarks I have made relative to feeding and care of dows are more from the standpoint of the development of the cow than from the standpoint of milk production, although the same rules apply. One point I would like to bring out here, and that is, the heifer calf from a cow with good environments, feed and care, doing her best in the dairy, this calf is liable to make a better cow than another from the same cow under poor treatment, care and feed. If we expect to improve the 125-pound cow of Wisconsin we must follow in the main the methods above indicated;by judiciously crossing them with thoroughbreds of our selection, saving and raising the best heifer calves from such crosses, feeding and caring for them in the direction of dairy production, giving our cows the best environment, feed and care we can give them, and I am confident that the profitable cow will be forth coming.

Discussion.

Mr. Remvite—Is that a common cow or a scrub cow, or what kind of a cow that you have been talking about?

Mr. Kingman—What I have said is with a view of developing a dairy cow. If I was going to develop a beef animal, I would improve our common cows in the direction of beef.

Question-No, I mean a milk cow for cheese.

Mr. Kingman—A cow that is a good butter cow is a good cheese cow.

Question-But a milk cow for delivering milk to city folks?

Mr. Kingman-If you want to cheat your customers, buy a cow that gives a large quantity of thin milk.

Question-Would you inbreed?

Mr. Kingman-Yes, I would inbreed once.

Question—Would you feed your calves on whole milk for four months if you could sell the butter fat that is in the milk for 25 to 30 cents a pound?

Mr. Kingman—No, I would feed them until they are ten days or two weeks old, and then perhaps, less of this and in place of it I would take flax seed meal or oil cake meal, and you car. develop a good calf that way. The calf should have the first milkings of the cow, and should be fed its mother's milk for a few days at least.

Mr. Miller—I understand the speaker advised us not to buy cows that did not give 350 to 400 pounds a year.

Mr. Kingman—I did not say that. I said that no farmer should be satisfied unless his cows produced him 250 to 300 pounds and that many dairymen were getting better results than this.

Mr. Miller—I am keeping about twenty cows and they drink ice water. How much more milk can I get from them by giving them luke warm water?

Mr. Kingman—Well, it is safe to say that you will improve the quantity of the milk and also the quality.

Supt. Morrison-Try it, Mr. Muller, and report at the next institute.

Mr. Miller-I want to try it, but I don't know how. My neighbors have tried putting in little stoves and they give out.

Mr. Kingman—It is a simple method. They are advertised everywhere.

Mr. Gilbert-Are you giving your cows fresh well water, Mr. Miller?

Mr. Miller-Yes, sir.

Mr. Gilbert—That is good enough. Mr. Kingman—If you can give them water warm from the well, or from a spring, I would not be at the expense of putting heating apparatus, but if you have to cut a hole through the ice for them to drink, it is a pretty expensive thing, I have found that out.

Mr. Lindsey-I think it is important to warm the water to the same degree every day. I know that mistake is made in that direction quite often, so I prefer not to warm, and to stick to the well water.

Mr. Gilbert-If the well is about 28 feet in the ground and it is pumped fresh every time I think that is sufficient.

Mr. Kingman-That water will stand about 50 degrees.

Noyes-You say the heifers Mr. should not be fed as much as the mature cows. Do you mean heifers in milk?

Mr. Kingman-I would not feed the heifers so liberally as I would the cows. The danger is of getting your heifer putting on flesh, which starts her in the wrong direction, and the chances are you will never get her back. I feed her on nitrogenous food always; I would feed them all on nitrogenous food, cows and heifers, I never would give them meal. There are two kinds of foods, one is the fat forming, and the other is a flesh forming food, milk forming food. Corn is a fat forming food, and bran, oilmeal and oats are of the other nature, milk forming and flesh forming.

Mr. Arnold-Is there any danger of feeding the heifers too much?

Mr. Kingman-Yes, sir. I advise not to overfeed, particularly if you have that peculiarly shaped cow.

Mr. Gilbert-You can feed her all she can digest and assimilate.

Mr. Kingman-That is safe always, and when you get beyond that you are wasting your food.

Mr. Avine-How long would you feed that you can't turn around in? calves milk?

had the milk.

Mr. Everett-Do you prefer to confine your young calves in the summer time or in winter to close compartments?

Mr. Kingman-That is my practice entirely, in pens, about four feet by eight.

Question-Do you think it makes a better dairy cow to have a calf fed milk until it is eight or ten months old? Wouldn't it be more profitable to feed it to hogs or pigs and make eight dollar pork?

Mr Kingman-One of the beauties of agriculture is that a man must study his own business. He must study principles and apply them as best suits his circumstances. What is good for him may not be good for another man. I live in the city limits and they won't allow me to keep any hogs; I have to use my milk in some way so I give it to the calves. If the man wants the greatest excellence in any domestic animal, he has to breed for that special purpose. You can't get a good dairy cow from a beef type, as a rule.

Mr. Everett-Would you not feed the heifer cows for the dairy on food that would not make very much fat, while on the steer you would force him because you are after fat?

Mr. Kingman-Always. If you want to raise a dairy cow, never allow it to get fat. If you want to raise a steer for beef, never allow it to get poor; keep it growing in the direction of beef production, and if you want a heifer, raise it in the direction of dairy production.

Mr. Ingalls-Please describe the Bidwell tie.

Mr. Kingman-It is made by a man at McGregor, Iowa. It is the most convenient and the simplest tie I have ever investigated, and I have traveled hurdreds of miles to look up this question.

Mr. McKerrow-Isn't it a box stall

Mr. Kangman-Yes, it is a difficult Mr. Kingman-For six months, if I thing to explain. The cow is shut up in a stall with a chain behind her so

BEST COW FEEDS AT LEAST COST.

ward is adjustable so that you can skim milk to calves. Don't you think, shove it in towards the cow or drag Mr. Kingman, that the calf will pay it out, and by this means you make a as good a price for skim milk as pigs, long or a short stall, just as you like, unless it is when they are eight doland you can keep the cow where you lars a hundred? want her and she will never get dirty.

a heifer getting fat on grass?

the sense that I am speaking of on grass. If they are inclined that way, the matter of regularity an important and bound to go that way, they are factor, and also the quantity of milk beef cows, and you will find it out that is fed at once? and let the butcher have them.

of the state want to see the Bidwell applies equally forcibly to feeding fastener they can see it on Mr. King- calves. When a calf is young be careman's farm, or at the University farm. ful not to overfeed it. Err on the side We have the Newton tie and the Bid- of feeding too little and you will save well stall. I have watched this thing yourself much trouble and have lots for twelve years, and that is the first of nice calves. one we can endorse as a good thing. I have used the tie for three years than two quarts at a feed while it with the greatest satisfaction. I have is young, and I feed three times a day never had an accident occur or any until it is about a month old. Oilmeal trouble or breakage in three years' use. and linseed cake has to be fed very There is a patent of fifty cents a stall carefully, or you will get your calves on it.

the can't back out. The manger for- | Mr. Goodrich-About this feeding of

Mr. Kingman-I haven't had enough Mr. Turner-How can you prevent experience in feeding pigs to answer that, but I do think that it pays me Mr. Kingman-They won't get fat in well to feed my calves on skim milk.

Mr. Adams-In feeding calves is not

Mr. Kingman-Whatever I said in re-Prof. Henry-If any of the farmers lation to regularity in feeding cows

Mr. Linsley-I never fed a calf more to scouring.

HOW TO PRODUCE THE BEST COW FEEDS AT THE LEAST COST.

L. H. ADAMS, Superintendent Experiment Farm, Madison.

those with which we are all very from my point of view the knowledge familiar. The advantages that one or of how to lessen the cost of producmore of these crops may have over the tion is the key note to success, not others from the standpoint of eco- only in dairying, but in all lines of nomical food production will depend stock husbandry, for it is the only largely upon the methods employed in means that the feeder has of adjusting the growing, harvesting, and preserva- himself to the conditions he is forced tion of the crop. In the case of the to encounter. It will not do to be concorn crop the silo has aided most ma- tent with success that has already been berially in reducing the cost of cow attained. There must be progress,

The best forage crops are probably feed to our Wisconsin farmers and

conditions are constantly changing. land values are increasing, fertility of our farms is being exhausted, the great wheat fields of the west are giving way to more diversified farming, and the railroads enable the western farmer to place those crops grown on cheap ands in direct competition with our own.

There is but one path for us to follow. It is a straight and narrow one. but very plain. Place all Wisconsin farm products where the Wisconsin potato stands today, at the head of the list at the minimum of expense for production, and success will surely follow.

Home Grown Feeds.

This suggests a line of thought that I desire briefly to call your attention to. You may not appreciate the full significance of it at the present time, but each passing year will bring the problem more prominently to the front. It is the question of supplying our cows wih larger quantities of home grown albuminoids, instead of, as at present, supplying the deficiency by buying heavily of mill stuffs. When a man or company of men contemplate an investment in a manufacturing enterprise, the first thing they do is to study location in order that they may have every advantage in securing cheap raw material. If it is a rolling mill they must be where iron ore and coal are accessible. If a wagon or furniture factory they must be near timber. Since dairying is a manufacturing business, it must be apparent that all raw material the dairyman produces on his farm in the way of cow feeds is furnished him at strictly cost price, but when he goes off the farm and buys his raw material he pays not only the original cost price of the product but a middle man's profit in addition; added to this is the expense of est in them. I have in mind the legucartage to his farm. The fact that minous plants, and particularly the there has been money made in buying clover and pea crop. My idea of the heavily of mill stuffs in the past and question of how to produce the most is yet, to some extent, furnishes no economical cow feed is that we should

otherwise we are losing ground, for ground for the belief that the same conditions will prevail indefinitely in the future.

> I, in my lifetime, can remember when bran was dumped into the river by millers at certain seasons of the year when they had more than they could The wonderful change store away. that has been wrought in the comparatively recent past in respect to this particular food substance has not only relieved our millers of all anxiety of being forced to resort to that alternative, but it has provided the opporunity and temptation to keep pace with the larger demand by increasing quantity at the expense of quality of commercial feed stuffs.

> Prices are apt to rise and fall without any reference to the feeding value of the article in question. We purchase our feed by weight, regardless of quality, which may be likened to the buying of milk by weight, regardless of the butter fat it contains. These variations in the feeding value of mill stuffs must prove a serious obstacle in the desirable introduction of a rational and economical system of stock feeding. It may be a long time in the future before those who are favorably situated cannot afford to supplement the cow feed produced on the farm with the more concentrated mill stuffs to a greater or less degree, but I am satisfied that a great saving can be made by substituting home grown protein for a portion at least of that which is purchased off of the farm.

The Clover and Pea Crop.

The simple fact that the crops which are richest in this expensive element of protein, so indispensable in the feeding ration, are the ones from which our soils derive more benefit in the matter of fertility than all the rest, is sufficient inducement to awaken our interwhich produce the largest bulk of food material per acre at the present,-for For us in this latitude where we have cheap cow feed in the future can only be obtained by adopting methods of find every opening in stack or shock, farming that tend to check the loss of fertility from our soils. There should be a rotation of crops. It need not be a very extended one, as for instance, fodder corn, peas, oats and clover two years, the first year for hay and the second for pasture. If this list of crops was regularly grown on the farm and then placed before the cow in proper quantities and proportions, her ration would not have to be supplemented with so many pounds of mill stuff in order to balance it up, and furthermore, such a rotation with the aid of the barnyard manures would enable the dairyman to go on producing economical cow feed indefinitely in the future.

Nor have we done all that lies in our power to lessen the cost of our cow feed, when we have adopted a rotation similar to the one I have indicated.-there is still a great opportunity afforded us by way of improving the quality.

The Silo.

It is one thing to raise a crop and quite another to harvest and care for it in such a way as to get the greatest amount of feeding value out of it. As to the best way for our Wisconsin dairymen to handle the corn crop, I think we may confidently turn our faces toward the silo, not because we expect the silo is going to add to the feeding value of anything that may be put in it, but all understand that climate, latitude, snow, rain and blizzard, must be taken into account when It is a machine and not a hand labor dealing with this fodder corn and silo crop like corn, roots and grain. Grain few dairymen have question. But barns that would hold one-tenth part them for mere manual labor that adds of the fodder corn they feed in winter, and it must be put into some compact goes to the purely mechanical purpose form as it may be when put in the of a separation of its parts such as silo, or left in the fields in large enough husking and threshing, while clover shocks as not to waste too much from requires seeding but once exposure, or when reasonably dry, be years."

not only rely entirely on those crops | hauled in and stacked in the best way to turn rain, and not heat or mould. snows that pile up in the fields and the advantages that the silo system affords over the other means of saving our corn crop are sufficient to turn the tide in its favor.

The Value of Well Cured Clover Hay.

There is a great opportunity afforded us for economizing in our cow feeds by adopting better methods of caring for the clover crop. It is not necessary for me to go into details of the manner in which this saving may be best accomplished, for Mr. Everett's system of curing clover hay is familiar to all and probably cannot be improved upon. The addition of a liberal quantity of such clover hay as Mr. Everett makes, to every ration of the dairy cow, will reduce the necessity of going off the farm for the necessary protein very considerably. Of the value to the dairyman of good clover hay, an acknowledged authority on animal husbandry has this to say: "Clover hay is the peerless ally of the stock feeder when cost of production and value in a well ordered ration are both considered. These qualities are superadded to the royal one of being the most important crop grown in any system of crop rotation that looks to the economy of soil fertility, and for maximum yield for the completed rotation. In the food rations it fills both the functions of a coarse food for ruminants and the cheapest available source of protein. In the latter respect our farmers of the west cannot give clover too careful consideration. and corn have large expense added to not an ounce to the nutrients, but

Economical Cow Feed.

From my point of view the economical production of cow feed in the future will not admit of the bungling and round-about methods usually employed in caring for the oat crop. it should be cut in the milk and turned into hav by the same system employed in the successful management of clover. By so doing we add one more crop to those that are rich in protein that may be produced on the farm. and furnished to the dairyman at cost price. The mechanical labor connected with the work of separating the grain from the straw adds to the expense but not a cent's worth to the feeding value of the crop. The point that I have endeavored to emphasize in this paper is that the economical production of cow feeds contemplates a system of farming that

First, will enable the dairyman to produce the greatest possible amount of raw material that he uses on his farm.

Second, that will render him,—not wholly perhaps,—but less dependent on commercial food substances.

Third, that will make it possible by a proper rotation of crops to retain the fertility of the farm by growing those foods that are rich in the ingredients most needed in our feeding rations.

And last, that quality has as much to do with the economy of a cow feed as does quantity; it is not sufficient that we simply raise a big crop; the care and preservation of the crop after it is raised is of equal importance.

Discussion.

Mr. Arnold-How would you sow and when to produce pea and oat crop?

Mr. Adams—Sow early, perhaps the first work that you can do. Ridge the ground a trifle with a disc harrow, so as to keep the peas from rolling all in a line in the furrow. Sow the peas on broadcast and plow under about four inches deep. Then sow oats on the

surface, and harrow them in nicely. Harvest for hay; pay no attention to the maturity of the peas; get the crop when the oats are in the milk or dough, and cut them for grain when the peas are in the green state, that is, when they are not quite ripe. The peas and oats will be about the same stage, de pending somewhat upon the variety of oats that you sow. I use the Michigan oat, and the small Canadian pea.

Mr. Everett—If you want hay I would sow more than a bushel or two of oats, but for grain I would sow two bushels of peas to one of oats.

Mr. Gilbert-In cutting that grain would you cut it with a harvester and bind?

Mr. Everett-No, sir; it would be impossible to do it.

Question-Wouldn't it pay to raise your own flax seed?

Mr. Adams-I couldn't answer that; I have had no experience.

Mr. McKerrow—A friend of mine raises a little flax seed in his oats, and he is well satisfied.

A Member-Flax will grow anywhere that wheat will.

Mr. Haskins—Would you plow the peas in, supposing it was spring plowing?

Mr. Everett—I do not sow on spring plowing. I plow them in just as if I was plowing the ground for some other crop, and plow them in very deep.

Supt. Morrison-I think that Mr. Everett ought to explain that he has a rich prairie soil.

Mr. Martin-What do you want to get them in so deep for?

Mr. Everett-Because they are a deep rooting plant. You must get them in deep.

Question-What success had you this year with peas?

Mr. Everett—I had splendid success, and I found that a great many men mude a failure with the pea crop this year, owing, perhaps, to the excessive moisture.

Mr. Briggs-Does a deep rooting

than any other?

get them covered. If you do not they mower, and replaced it with two long will be on the surface of the soil, and arms, about six feet long, and let them there is not moisture enough.

cut them up?

feed as I do clover hay; the grain I for the team to pass, but I had to have thresh and grind.

Mr. Goodrich-Mr. Adams, do you they were down so badly. think it possible to economically pro- Mr. Wallace-All that is the matter duce all the cow feeds on the farm? with Mr. Adam's paper is that he is

at the present time. There some of our dairymen who, favorable location and can afford to buy commercial feeds; to do it. I was down at an agricultural again so situated a long way for a load of bran or oats, peka, without stumbling over sacks of and have to pay for the horses, and it bran to be sent down to New York to equals the difference in price, and the feed to cows to make cheese to send value of the feed and the fertility that back to Kansas. Do you suppose that it contains. We must adapt ourselves is going to last very long? Don't you to the conditions that we are working understand that those people back here under.

to work and cultivate your stubble Wisconsin whether you will not be land before you sow your peas and sow compelled not only to grow your own one bushel to the acre, then plow that feeds, but your own cows. under, you will find you will have just | Another point; with the single exas good results, as to put on two bush- ception of oats every feed that has els and plow under the stubble. The been mentioned here is a legume, like peas will run along, and in the higher clover, and draws its substance from places perhaps not come up, but if the atmosphere. The question for us you cultivate your land loose, they farmers in the west is, What legumes will all come up, every pea; we have grow here, what legumenous grain shall tried it time and time again.

Mr. Phelps-Would it do to sow clover with peas?

Mr. Everett-I have seeded with good results, although clover with I do not depend on it as a crop to seed with.

learn the different values of our feeds, I had some pasture, too, but I saw my I suppose, before they can know whether it pays to sell the stuff on

Question-I would like to ask Mr. Everett how he harvests his pea and they had to go back to the old pasoat crop?

plant want to be put in any deeper | Mr. Everett-I cut it with a mower. They usually lodge badly. Last year Mr. Everett-We sow them deep to I took the arm off of the dividing run way back and fastened them on. Mr. Cole-In feeding these do you giving them the right slant so that the divider would divide the peas and oats Mr. Everett-In feeding the hav I and run off to one side, making a space a man follow with the fork, because

Mr. Adams-I do not think we can just a litte ahead of the times. It is are not going to be a question with you from hereafter, whether you shall raise your otherwise, own food stuffs or not. You will have there are others who are meeting in Kansas two months ago. that they have to go and I could hardly get through to Topropose to sell that cheese at home, A Member-I think if you will go and it will be a question hereafter in

> we raise? Peas for Wisconsin, the western states will have to have beans or something, some legumes to take the place of the grains, and the clover takes in the grasses.

A Member-I want to sav a few words. As an old farmer I used to keep Mr. Linsey-Our farmers have to a large stock of sheep, horses and cows. cows going backwards,-they didn't do well. Now, what shall I do? Well, their farms and buy commercial foods. I went and planted some corn and fed that out to them. Well, that was gone; ture, and I saw one man who was

WISCONSIN FARMERS' INSTITUTE.

was clover in it about six inches high, clover, and also my cows and horses. and thinks I, "How in the world did It didn't cost me but a few dollars. that man get that clover. That is a Then you can go out there and get hay great improvement." I went to work that the stock didn't eat, and what and mixed clover seed with all my you don't get you can plow under, grain that I sowed, and I sowed right and you are sure to have another good with that seed so that it cost no labor; crop next summer, and you keep all it cost a little money, but I tell you the that hay that didn't cost any money. next season I put my stock all in the The money will stay right in your pastures, different places, and when I pocket and right on your farm. That came to harvest I found in front of is what we want. We want to save me plenty of pasture. I harvested my labor, and we want to save money.

growing grain that was nice. There grain and then I put my sheep in the

HOW TO PRODUCE THE BEST COW FEEDS.

C. H. EVERETT, Beloit, Wis.

to succeed unless he pays close atten- sided, rich in carbo-hydrates, a heat tion to the kind and character of the and fat producing food, and he exdifferent products of the soil that enter pects to get milk, a highly albuminous into the cow's ration, as well as study- product, in paying quantities. ing closely the best and cheapest way dairyman should aim to raise those of producing them. While the cow foods which are rich in protein for it will eat almost any plant we may grow is this element in the cow's ration that on the farm, it is not wise to argue makes it expensive. In one hundred that all of them are best suited to her pounds of good clover hay there are wants, or that she should be confined eight pounds of digestible protein. If to any one or two varieties without you can produce three tons of hay to due regard to character, simply be- the acre as an average you have procause they happen to be produced in duced four hundred and eighty pounds abundance on the farm. Many farmers of digestible protein per acre. If we ridicule the idea of a balanced ration, figure protein at three cents per pound and will feed whatever they happen the acre of clover is worth \$14.40 in to have or can produce with the least this one constituent of milk, and anitrouble. The fact that food for any mal life; but this is not all, for the animal and for any purpose becomes a three tons of hay will contain two question of the proper proportions of thousand six hundred and thirty-one protein or carbo-hydrates must not, and pounds of digestible carbo-hydrates and can not, profitably, be ignored. For fat which at one-half cent per pound, instance,

Poor Cow Feed.

hay and corn meal. What kind of three tons. As I was speaking of reasoning do you call that? He is timothy hay but a moment ago let

It is impossible for the dairyman feeding a ration almost wholly oneis \$13.15. This added to the value of the protein gives \$24.55 cents as the feed-I see a man feeding his cows timothy ing value of one acre of clover yielding

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us stop long enough to find the value cost of about \$12 per ton. I find no of one acre of this kind of hay. A difficulty whatever in raising fine crops good average yield of timothy is two of oats and peas. I sow very early, tons per acre. ninety pounds and eight hundred and seventy-five then cross with smoothing harrow, pounds of carbo-hydrates and fat. This after which sow two bushels of peas to gives us a feeding value of \$14 for the the acre and plow under, three or four acre of timothy, worth about half as inches deep, then sow on one bushel much as the acre of clover. I do not of oats and harrow thoroughly. There believe any dairyman can afford to fool are various ways of harvesting the with timothy as a cow food. I have crop. I have had the best success with said nothing about the extra amount of the mower, by bolting two long arms pasture the clover will afford, and the on to divider board, the vines are quite fertility it will add to the soil, all of readily parted and pulled into windwhich is a very great argument in row. It is best to stack direct from favor of raising clover. I can produce swath as the peas will shell some this crop with the most economy by when dry. There is no better cow feed sowing four quarts of seed on rye or raised on the farm than oat and pea winter wheat very early in the spring. hay. As a food I think as much of

A Good C+t h of Clover,

to get a good stand. The following but splendid for all stock. It is the spring sow from fifty to seventy-five best horse hay I ever raised. Sow two pounds of land plaster to the acre, cut bushels of oats and one of peas and cut early, commence as soon as two-thirds the crop with the mower when the oats of the blossoms are out, cock up quite are in the milk or a little before. Do green and let it sweat, protecting from not try to mature the grain; if you do the weather by hay caps, cut second you will lose more feeding value in crop for hay and cure in same way. the straw and pea vines than is gained If it is light, however, I prefer to in the mature grain. I cock up soon pasture. It must be remembered that after it is cut and leave for two or any feed of good quality cheapens the three days to sweat, then open to air cost of the cows' ration as against the for a short time, and draw to the same feed if of poor quality. In clover barn. Such hay has a nice luxurious hay, cut at the right time and properly foliage, will be green, tender and encured, there are most digestible nutri- tirely free from dust. It makes very ments than when such hay is allowed clean hay and has but little waste in to become too ripe and then dried to feeding. I hope you will all try this death in the process of curing.

Oat and Pea Feed.

digestible protein in one hundred as rich in protein as clover hay. pounds of pea meal, or four hundred When you sow your oats next spring, pounds in one ton. There is also, one have a strip four to six rods wide thousand one hundred and sixteen around the outside for oat and pea hay. pounds of digestible and fat in one ton of this kind of feed. small grain. The hay is all cut and out Protein is three cents a pound and of the way before harvest, leaving carbo-hydrates at one-half cent gives the field ready for the binder, no grain a feeding value of \$17 in one ton of tangled and wasted by horses and pea meal. Where peas can be success- machine, but nice clean work all fully grown they can be produced at a , through.

In one ton there is as soon as I can work the soil. First, of digestible protein go over the ground with a disc harrow, it, if not more, than I do of clover By this method I have never failed hay. It is not only good for the cow, crop next year as I have described. I feel sure that you will be more than The chemist finds twenty pounds of satisfied. It is a nitrogenous food, fully carbo-hydrates I follow this practice with all of my

The Value of Corn Silage. It is hardly necessary for me to say they lie in a good seed bed, and not anything about the corn plant and among lumps. silo. You are all well aware that en-| Question-Is not two bushels of oats silage is one of the best cow foods and one of peas rather heavy seeding produced on the farm, and also the for hay? cheapest feed of its nature we can Mr. Everett-No, sir. By sowing the provide for the cow or steer. Being oats thick you get a shorter and finer very rich in carbo-hydrates, it should straw and altogether better quality for never be fed alone or in too large hay. quantities, but must be balanced up with some nitrogenous food. A cow nearly mature and cut with the binder? ration should have a nutritive ratio Mr. Everett-I am glad that question of about one to six or seven. I mean has been asked. It is a mistake lots by that one pound of protein to seven of men make. Oats cut when the grain pounds of carbo-hydrates. Ensilage is in the milk or a little before is a has a nutritive ratio of one to twelve nitrogenous food, if left for the grain so you see that when fed by itself the to ripen and consequently the straw ration would be one-sided. Now sup- to become mature, then you have a pose you feed timothy hay or oat carbonaceous food, as I told you but straw with ensilage, as some men do a moment ago, oat straw has a nutriwith the idea that it makes a good tive ratio of one to thirty. Don't try ration. Timothy hay has a nutritive to get any grain. Remember that you ratio of one to ten, and the ratio in are after hay. Suppose you left your oat straw is one to thirty. It must be timothy or mammoth clover long plain to you that such feeding is not enough to get the seed with the hay. conducive to the best results, as it is What kind of hay would you have? only getting farther and farther away Question-Is the same per cent. of from the mark. When you feed ensi- protein and carbo-hydrates found in lage to the cow or steer, balance it all kinds of clover hay or oat and pea with something rich in albuminoids, hay? like clover hay, oat and pea hay, bran, pea meal oilmeal etc., always taking samples vary in their nature, as there into consideration the market value of would be a wide difference between the the different foods you may have to composition of early and late cut clopurchase. But as I am straying from ver, or mature and unripe corn fodder. my subject I will stop with the re- As the crop ripens the nitrogen seems mark I made at the beginning, study to decrease and the carbo-hydrates inclosely the kind of character of animal foods.

Discussion.

Question-What variety of peas do you prefer?

Mr. Everett-I raise what is known as the Canadian Pea. Have never tried any other variety.

ground so much before you sow the prise such substances as starch, sugar, peas and plow them under?

keep the peas from rolling into the produce heat, energy and fat in the anifurrow, and when the soil is fined mal,

and turned over and the peas with fin

Question-Why not let the grain

Mr. Everett-Surely not. Different crease.

Question-What do you mean by protein and carbo-hydrates?

Mr. Everett-Prof. Henry will tell you that protein includes all parts of food which contain nitrogen and that nitrogenous substances make up the muscular tissue or lean meat, as well as the nerves, the skin, the hair, horns, Question-Why do you work the etc. The carbo-hydrates of food comcellulose, etc., and are composed of Mr. Everett-For two purposes: To carbon, hydrogen and oxygen. They, FEED AND CARE OF COWS FOR BEST RESULTS.

HOW SHALL WE FEED AND CARE FOR COWS TO OBTAIN THE BEST RESULTS.

W. B. STETSON, Vienna, Wis,

This question engages the considerate, | and of every person engaged in dairying. pasture in the daytime on pleasant Location, soil, and perhaps peculiarities days. We feed all of our cows clover connected with different farms have hay in their stables, at least once a an important influence in determining day, whenever the pasture is such the matter. One living near a railway that they will eat, and in this manner station may be able to purchase mill- keep them in good flesh or condition. stuffs to feed advantageously, whilst As the season advances, pastures beto another living eight or ten miles come short, cold and stormy weather from a station, the time and labor ex- prevailing, they are kept in the stables pended in drawing the feed home almost continuously. Our daily mode would market price, cost of production and first thing in the morning they are relative value of different foods as fed clover hay and then milked. After established by chemists employed by breakfast they are turned into the the several states on experimental barnyard long enough to drink water farms, must go a long way in guiding freshly pumped into a trough kept free us toward a proper solution of this from ice, then stables cleaned out and question.

An Exchange of Method.

or outline the best mode of feeding, On the cut cornstalks a ration of five but simply relate the manner in which we keep our own cows. It is generally understood that one of the reasons for which Farmers' Institutes were organized and conducted was for the mutual interchanging of ideas and giving actual results of the different lines of farm industry; that by comparing the different methods of conducting the same business, with the practical results actually resulting therefrom, we may select the best methods of conducting our farming operations.

Feed and Care of Cows.

will endeavor to relate the manner in lasts, generally until about Christmas,

They commence dropping their calves | cornstalks. about the first of October, and as fast lasts a somewhat smaller ration of as they calve are stabled nights, and bran and middlings is given. I have cold windy and They are fed

middlings or sweet COTT deliberate attention and best judgment in their mangers and turned out to . be a serious obstacle. The of caring for them is as follows: The littered, after which they are put back in their places, and fed cornstalks cut as It will not be my purpose to name short as our feed cutter will cut them. pounds of bran, or bran and middlings mixed is given per cow. At noon a feed of cut cornstalks together with two pounds of corn and cob meal is given. Between three and four o'clock in the afternoon they 'are turned out to drink, the stables cleaned out and littered, put back in their places, and fed cut corn stalks, bran and middlings, the same as fed in the morning. After milking they are fed as much clover hay as they will eat. They are salted frequently and given all they will eat. We plant four or five acres to ever-With this understanding in view, I green sweet corn, and as long as it which we feed and care for our cows. it is fed once or twice a day in lieu of While the sweet corn stormy days. gone into minute details in relation clover hay, bran to feeding and watering for the reason

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that in my opinion, it is only by strict attention to minor details in the man- amount produced and we have the sum agement of your herd, such as feeding of thirty dollars placed to the credit and watering regularly, feeding often of each cow, not to be considered as and not too much at a time, and last profit, but as a recompense for labor but not least, keeping them warm performed in caring for them. We do and comfortable that good results can be obtained.

Our Cow Census.

From the first of January, 1892, until the fall, we kept fifteen cows, and from the latter part of September until the first of January, 1893, we kept twenty cows, making an average for the year of cows kept, seventeen and a half. We deduct the half cow for the milk consumed by the family and sold by the quart to persons coming after it. From the seventeen cows during the year 1892 we delivered to the butter and cheese factory, operated by C. B. McCanna at this pace, 99,737 pounds of milk, and shipped seventy-six eightgallon cans to Chicago, 5,066 pounds, making a total of 104,803 pounds,-an average of 6,165 pounds of milk pro-104,803 duced per cow. From the pounds of milk we have received eleven hundred and sixty-five hundredths dollars. From calves sold we have received twenty-six dollars, making in all the sum of one thousand one hundred and twenty-six dollars and sixtyfive cents, an average production of twenty-seven sixty-six dollars and cents per cow. We estimate the cost of keeping a cow for the year at thirtysix dollars and thirty-five cents as per the following statement: Ten pounds bran and middlings, two hundred days at twelve dollars and twenty-five cents equals twelve dollars and per ton, Two pounds corn twenty-five cents. and cob meal per day for same length of time, four hundred pounds at thirteen dollars per ton, two dollars and sixty cents. One-fourth of an acre of sweet corn, sixteen dollars per acre, four dollars. One and one-half tons clover hay at five dollars per ton, seven dollars and fifty cents. One acre cornstalks, four dollars. Pasturing, six dollars.

Subtract the cost of keeping from the not weigh the hay fed, but think the estimate liberal as to the amount. We do weigh from time to time the grain ration fed, and feed ten pounds of bran and middlings and two pounds of corn and cob meal per day-the heavy milkers receiving a larger amount, the light milkers and heifers a lesser ra-While we have no reason to tion. complain we are well aware that others with larger experience and with well bred cows-ours are grade short horns-have done much better. We are but new beginners in the business and hope by a better selection of cows and perhaps by a better method of feeding to largely increase the product.

Not Satisfied With Present Results

The matter of building a silo is seriously contemplated. Before doing so we want to be informed by chemical analysis of the relative feeding value of a given amount of shelled corn converted into meal and a like amount converted into ensilage; also the relative feeding value of a given amount of cornstalks dried by the action of the sun and atmosphere, cut into short lengths by a feed cutter, and a like amount converted into ensilage. The same question to be answered in relation to clover made into hay or converted into ensilage. Then by computing the cost of labor expended in the different methods together with the cost of building a silo, we may reach a satisfactory conclusion in regard to the best methods to adopt. In conclusion allow me to say that in giving a statement of amount produced per cow I have considered only the amount actually received in money; if to this the value of separated milk and whey returned and manure manufactured on the farm is added, the amount is materially increased; how much we will leave for others to determine.

HOW TO MAKE OUR COWS MORE PROFITABLE.

we have been milking four cows that food they consume and a liberal comhave produced but little or nothing pensation thirty dollars per annum, more than pay for their food. This for their care, my object is obtained. has caused a considerable reduction With better milking breeds, much betin the average produce per cow, but ter results ought to be obtained. if it is, as I believe the average ex- Supt. Morrison-Some of the Experiperience of men engaged in dairying, ment Stations are conducting experiit should count for nought. If I have ments upon the very questions prosucceeded in demonstrating by a fairly pounded by Mr. Stetson and probably accurate account of receipts and ex- before the close of the present year penditures that good grade short horn they will be answered. cows generously fed and reasonably

Since the latter part of September well cared for, will pay for all the

HOW TO MAKE OUR COWS MORE PROFITABLE.

CHARLES R. GIBBS, Whitewater, Wis.

able is a question which has always legislative appropriations, that we are and everywhere interested, and now indebted for the fact that Wisconsin interests, both the producers and con- today stands at the front in the quality sumers of dairy products. It is my and value of her dairy products, and purpose to treat it very briefly, in such unless unfriendly legislation cripples a manner as to aid in some degree these beneficent agencies, we shall conthe young farmer already engaged, tirue to advance in spite of the oleoor about to engage, in the most profit- margarine, butterine and their kindred able branch of his chosen business. counterfeits, which now, through the All kinds of farming have greatly im- criminal negligence of our national proved within the memory of most of legislature, crowd the markets in some us, but the last few years have wit- parts of our country. Profitable renessed more changes and greater im- turns from our cows may be secured provements in dairying than any other by selecting the best breed for our purbranch of the dairying industry. I as- pose. For beef, common consent places sume that the majority of this audience in the lead, the Short horn and the is made up of the class for which this Hereford, some add the Devon and paper was written. I do not attempt the Swiss. All may be made to pay to educate the older dairymen who by judicious, careful management. If have "run with the machine" for years, the object is to sell milk, the Ayrshire giving the results of their large experi- and the Holstein are recommended. ence to the attendants upon these in- For the production of butter, the Jerstitutes and receiving in exchange the seys and the Guernseys, in the order best the country affords from the prac- named, are held in the highest estimatical dairy farmers all through the tion. Each has its champions, and the state.

Profitable Returns.

plementing the work of the dairyman's to discuss the subject in a partisan

How to make our cows more profit- associations, and made possible by coming contest at the world's fair will probably fix the rank of the competing breeds for all purposes. It is fair to It is to their labors following and sup- await the judges' decisions, and not add that I prefer the Jersey over all all other times. The importance of a the other breeds, and report the pro- regular system is not realized by those duction of my herd of twenty-seven who never tried it, but it can hardly cows for the year 1892,-301 pounds per be overstated. If I had time and room, cow-of butter, total 8,135 pounds; I would urge it with all the power seld for about 24 cents per pound, I am master of; without it success is \$1,948.10; yielding for butter alone, per out of the question; with it failure will cow. \$72.25.

not shown on my books and cannot so far as butter is concerned. The be accurately stated, nor can the cost cost of separator, power and necessary of keeping, except that the cows were utersils is now in reach of every one fed a daily ration of about ten pounds able to handle a herd of fifteen cows of wheat bran, twenty pounds of clover and upwards and with these provided, hay, and what they would eat up clean it is in the power of every man of ordiof unhusked immature corn in the nary skill to make butter that will stalk-a very unsatisfactory crop to command the "top of the market," notfeed, but when run through the cutter withstanding he may be excluded from it produced good results. Each person competition and membership in the orwill select the breed best suited to his ganized dairy association of the state circumstances. After providing com- and nation. He is, or can be, the fortable quarters for his cows, warm maker of a giltedged butter from the light and properly ventilated, I recom- milk and cream of his herd, fed, mend as the next thing in order (on milked and handled in the neatest the score of humanity to man and and best manner from the cow to beast) to dehorn every one, and the the consumer, with no foreign ingredibull at the head of the herd. I know ents to offend the eye, nostril or palate that some of the "Scientific Theorists" of the buyer. Can the factory or pubwithout practical experience or positive lic creamery, who receive what is ofknowledge do not favor dehorning, but fered them by a whole neighborhood, those who have tried it and can de gathering the cream from divers and cide from actual experience, without sundry sources, not all or a majority exception, so far as I have been able of them unobjectionable on the score to learn, continue and approve the of cleanliness, can they compete with practice and can not be induced to the private dairyman who is up in all abandon it. I do not propose to dis- the new modes and ideas now prevailcuss it. "Facts are stubborn things," ing? Not by any means or combinaplausible, unsustained by proof.

Regularity and System.

milking, and rearing of calves, treat- properly improve their opportunities.

spirit. Here I may be permitted to ment of cows during lactation, and at seldom result. I believe most thor-The profit for milk, or increase, is oughly in private dairying, certainly and will not yield to theories, however tion. But I am extending this paper too much. If what I have written is entitled to a hearing, it will induce a further looking into the subject. The one great obstacle in the way of Grain growing, beef raising, fine wool success among dairy farmers is the lack sheep husbandry, trotting stock, haveof system, regularity and order, and it all had their rise and fall. Dairying applies to nearly everything connected is now in its ascendant and the private with the busicess-food and feeding, dairymen head the procession if they

CARE AND FEED OF THE COWS FOR THE GREATEST PROFIT.

C. P. GOODRICH, Ft. Atkinson, Wis.

men:-Mr. Kingman has furnished us ration for a cow costs twelve cents a the right kind of a cow; Mr. Everett day, and six cents of that is for food and Mr. Adams have been furnishing of support, and she produces a pound the food part of it, and now they want of butter a day, then the cost of a me to put the two together and make the most out of it.

us, the food having been given us, we six cents for support and three cents will try to feed her so as to get the greatest possible return for the food. To begin with, I will state one selfcertain evident truth:--it takes a amount of food to sustain life, that is, replace the waste of the system;and if only this amount is fed nothing can be produced except at the expense of the cow by reducing her weight and vitality. Whatever is produced by the cow comes from the food that is consumed in excess of this food of support. From this it seems clear that the more food a true dairy cow consumes and digests of the proper kinds to produce milk, the greater the product from a given amount of food, and consequently the less will be the cost of a quart of milk or a pound of butter. This simple statement seems so plain, and has been made so often, that it would appear utterly uncalled for to make it again, but every day I see men who do not live up to this principle, but are trying to save money by feeding their cows short rations; therefore I deem it necessary to keep on dinging this truth into their ears.

Feed a Full Ration.

full flow of milk is all the good milkproducing food she can consume and clined to eat more than she can didigest. The food of support is found gest, don't give it to her. Never put by experiment to be more than half before her more than she will eat at of this-sometimes two-thirds. Now, once, but be sure and give her enough.

Mr. Chairman, Ladies and Gentle- | let me illustrate. Suppose the full pound of butter would be twelve cents. Suppose you try to economize in food. A true dairy cow having been given and feed but nine cents worth a dayfor production- which would make but half a pound of butter a day for your nine cents in food, or make the butter cost eighteen cents a pound. Every reduction in the ration adds to the cost of the butter. This is not only true in theory, but is true in practice, for the very good reason that you can get nothing from the cow without first giving her the equivalent in food after supporting her. When you feed your cow don't be stingy with her and begrudge her what she wants to eat and say to her, "Can't you get along with a little less feed? I guess you can." But rather say to her "Can't you take a little more feed? Come now, try it."

Variety of Feed.

A cow should have as great a variety in her food each day as practicable. She loves a variety as do all other animals, man included. Her nature craves it, and she will eat more, digest more, and assimilate it better if she has a variety. Feed her so as to keep her appetite good. Don't surfeit her. After she comes in, feed her sparingly of concentrated food for a few days, increasing gradually for A full ration for a good dairy cow in eight or ten days before getting up to full feed. If she is greedy and inand judgment on the part of the feeder. and investigate, the more I am satis-He must be intimately acquainted with fied there is a great deal in it. If our his cow, and know her capacity. W. H. Gilbert of New York, once said, "There are three things to watch in feeding a cow-watch her when she eats; watch the excrement to see that she digests it, and watch the milk pail to see that she pays for it." This, in a few words, tells the whole story.

A Balanced Ration.

The cow, to produce milk, must have the necessary constituents in her food, and these constituents, to produce milk economically, must be in the right proportions. The scientists tell us that the digestible substances in food are the albuminoids, sometimes called protein, and carbo-hydrates and fat; and that by a long series of experiments it has been found that the ratio between the two should be, to have the best effects, as, 1:5 1-2, though the proportion of the latter may be somewhat larger and still do very well, and perhaps be more economical if protein food is very high. The scientist analyzes the foods and formulates a ration which in his judgment is correct, or is what he calls a balanced ration. But it must be submitted to the cow for her to pass judgment on. It must be palatable to her, easy of digestion and conducive to her health. The chemist may help us some, but the cow and the practical dairyman are, after all, the ones to work out the problem successfully. The results of experiments and conclusions arrived at by successful dairymen all over the country are wonderfully alike; and that is, that a 1,000-pound cow, in full flow of milk, should have, in a ration, to do her best, from 2 1-4 to 2 1-2 pounds of digestible protein and take from 12 1-2 to 14 pounds of digestible carbo-hydrates and from .75 to .80 of a pound of fat. I know this idea of a balanced ratio is sneered at by many farmers, and some persons who are well informed on most subjects say be balanced in another way; that is, that it is a humbug, and there is noth- there should be a certain ratio be-

Here is where it requires great skill, ing in it. But the more I experiment coarse fodder is mainly clover hay, which is the best hay to be had for milk production, the grain part of the ration may be equal parts by weight, of wheat, bran, corn meal, and oat meal, and do well. Still it will be profitable, even then, to feed one or two pounds of oil meal or cotton seed meal a day. If the main part of the coarse food is corn ensilage, which is the cheapest food we can produce, or fodder corn or straw, it is absolutely necessary that we have some more nitrogenous food to balance it up. We must have wheat, bran, oil meal or cotton seed meal. I believe at present prices cotton seed meal for this purpose is the cheapest we can buy. But I would not advise feeding more than two pounds a day per cow. I will give you the ration I am now feeding, and it is the most satisfactory I ever fed.

Ensilage from well eared corn, 32	1bs
Clover hay, 5	lbs
Corn stalks, cut up, 5	lbs
Oat straw, 2	1Ds
Wheat bran, 8	lbs
Cotton seed meal, 2	1bs

Two months ago the ration was the same, except that instead of the cotton seed meal 2 pounds of ground oats and corn were fed. Soon after commencing with the cotton seed meal, the amount of butter produced by the twenty-five cows in the herd increased changing 50 2 pounds a day. By pounds of oats and corn meal, worth 45 cents, for 50 pounds of cotton seed meal, which costs 60 cents, an additional cost of 15 cents, we gained 60 cents. The cows, except a few nearly due to come in, are making fully as much butter today as they were three months ago, and most of them are giving milk six months.

Common Sense Feeding.

In my opinion, cows' rations should

food. I believe the best proportion for are good food for the cow, but the cows in full flow is to have the grain same weight of wheat bran is worth or concentrated food about one-half nearly, though not quite, as much. My the weight of the coarse food. If a cow eats about 20 pounds of hay and other coarse food, she should have to make the exchange. about 10 pounds of concentrated food. Ensilage should be divided by 2 1-2 or 3, according to the amount of moisture it contains, to reduce it to the equal of dry hay or fodder. Towards the latter part of the period of lactation, when the quantity of milk drops off, the grain feed should be decreased accordingly. In short, the grain food should be somewhat in proportion to the amount of milk she is able to produce, because it is necessary to guard, at that time, with some cows, against the liability of taking on too much fat and contracting a beef habit. On the other hand, the cow should be kept in good condition. With the ration my cows are having now, not one of them is getting fat, but it all seems to go to the production of milk. That makes me think that the ration is about as near right as it can be made.

Feed According to Capacity.

Don't think from anything I have ration a little. said that my cows are all fed the same amount. Each cow is fed according to her capacity, meaning that she has all you increase the per cent. of butter she can eat and digest, and at the fat in your cow's mik? same time keep the proportions between coarse fodder and concentrated milk. I have taken a good deal of food as near as may be, as I have said.

good pasture with a variety of good cotton seed meal the first of January. grasses. I have found that it pays to The last part of December the cows feed her,-twice a day when she is were all tested put in the stable to be milked,-what sample taken from ten consecutive little good early-cut clover hay she milkings, and the butter made for five will eat, and she never fails to eat days, and then another test in the some, no matter how good the grass same way has just been completed is, and also if she is in full flow of and the per cent. of butter fat in the milk, about one-half as much grain milk averages almost exactly the same. as in winter. If in the latter part of Some cows have gone up and some summer the pasture dries up, feed her down, one cow has dropped one per green, second crop of clover or fodder cent. Now, if I had only been testing corn. In short, be sure that at all that one cow, I would have said that times she has plenty to eat and don't cotton seed meal makes poorer milk, if I

tween the coarse food and the grain compel her to work hard for it. Oats rule is that if two tons of oats will buy three tons of bran it will pay me

Discussion.

Mr. Gilbert-Do you find that the same nutritive ratio will do for all your cows?

Mr. Goodrich-Well, perhaps not; it is pretty hard to experiment with each cow individually in a herd.

Mr. Gilbert-Still I venture to say that you know individually every cow in your herd.

Mr. Goodrich-I am somewhat acquainted with them. I have been there and talked with them some.

Mr. Gilbert-I have found that in formulating a nutritive ratio I occasionally have a cow that does not get carbonaceous food enough,-I have to give them more carbon, more heat. Opposite her, very likely, will be a cow which, if I feed her the same, will dry up and take on fat, so I change the

Mr. Van Matre-When you added this cotton seed meal in your ration, did

Mr. Goodrich-Not at all; I got more pains on this subject, and I know some-In summer the cows should have thing about it. I commenced on this and a separately,

had been testing some other cow, I would have said it makes richer mills, but with the twenty-five cows it makes no difference.

Dr. Babcock—Have you found any difference in the quality of your butter since you commenced feeding cotton seed meal?

Mr. Goodrich—I have not been able to see any difference; I am inclined to think it is a little harder, because we have been obliged to churn at two degrees higher temperature.

Mr. Bradbury—I was in Arkansas two years ago and a man who had been making butter in Iowa tried to churn his cream in Arkansas at the same temperature, and he got very poor results; he raised the temperature five degrees and got good results. They feed almost entirely on cotton seed meal.

Mr. Goodrich—Last year I experimented carefully with part of my cows with oil meal, and the results satisfied me that the chemists are right when they say that the cotton seed meal has more protein. It costs just the same at Ft. Atkinson, \$26 a ton by small quantities.

Prof. Henry—The Wisconsin Experiment Station recently published a bulletin giving the ration fed last year by Mr. Goodrich, and also some twelve or fifteen other Wisconsin dairymen. We will send that bulletin to all farmers who will send a postal card asking for it.

Mr. Gilbert-What is the average weight of your herd?

Mr. Goodrich—This ration is for a full grown, 1,000-pound cow. I feed the ground feed separately. The cotton seed meal is mixed with the bran. I feed some coarse feed first and the grain dry. I have fed my food mixing the coarse with the grain food, but I could not see any gain in the result, and I don't want to change unless I am pretty certain I am going to make a change for the better.

Mr. Hyatt-Do you milk before parturition?

Mr. Goodrich-Not unless it is absolutely necessary for the safety of the cows.

Mr. Van Matre-What concentrated food do you feed when your cows are on grass?

Mr. Goodrich-I have fed bran and corn meal.

Mr. Gilbert—I suggest that next summer you feed bran and cotton seed meal.

Question-How long do you milk a cow before she is dry?

Mr. Goodrich-My way is to milk a cow as long as she gives a good flow of milk. Some have been milked for several years; they usually go dry six or eight weeks. I never would milk for the sake of the milk they would give just before they were coming in, but for the safety of the cow. I have lost several very good cows that I forced to go dry, and when they came in they had inflamed udders. If a cow is willing to quit milking, I am willing to call it square.

Mr. Favill—Tell us whether you get any money out of those cows kept in that way; it is the money we are after.

Mr. Goodrich-Well, I can tell you what we got last year, and we were not feeding as good a ration as we are this year. We were feeding forty pounds of silage, dry fodder corn four pounds, wheat bran eight pounds, six pounds of clover hay and a little straw. Now, last year I had twenty-four cows on the average, six of them were four year old heifers with their first calves: two of them were only eighteen months old when they came in; three were three-year-old heifers, and the others mature cows. I made 7,848 pounds of butter, that is, 327 pounds to the cow. I sold that butter for \$2,117.80; \$88.20 per cow. Then there was about 5,-000 pounds of skim milk, worth twenty cents a hundred to me last year; then the calves averaged me \$2 apiece. which makes \$12 to the cow, besides the \$88.20, or \$100.20.

Mr. Briggs-Suppose I had all these

I do if I have to hire my help?

Mr. Goodrich-I never run a dairy with hired men without being there myself. or one or two of my sons. They don't do all the work by a great deal, they have hired men, and have just as much fun as any men I know of.

Mr. Miller-Where is poor Mary, that Mr. Terry told us of?

Mr. Goodrich-Now, I will tell you about Mary. You are afraid Mary doesn't have her share, aren't you? Well, now, Mary has it all.

Mr. Forbes-Can you tell us which is the most profitable of your cows, those that are milked continuously, or those that go dry two months in the year?

Mr. Goodrich-One of the most profitable cows I have has never been dry; another one that is fully her equal goes dry from six weeks to two months. My cows are grade Jerseys, some of them fifteen sixteenths.

Question-What was the original stock?

Mr. Goodrich-What you might call native or common cows. In the first place, they are all descendants from an Ayrshire cow. Way back, more than thirty years ago, I had her-then they were graded up with good milking Holsteins, and now graded up Goodrich's salary; is that included in with Jerseys.

Prof. Henry-We recognize that the milk test is a good thing in the creamery. Do you find it helpful to you as a dairy farmer to find the value of that, why I take it, or Mary does. your cows?

Mr. Goodrich-It has helped me a great deal. I have been able to sort my cows out so that they would produce more for the food that they have. I have disposed of some cows that were not paying me a very good manure. prefit, one cow particularly, the Babcock test told me was not a very profitable cow, although at times she that in, for I know a great many men gave fifty pounds of milk, but her say, I can't afford to spend my life milk tested below three per cent. and making manure. There is some other she went dry quite a long while. Come money invested in the fixtures on the

facilities, animals and all, what can to figure the thing all up and taking into consideration that she was a large eater. I thought best to dispose of her.

Mr. Thaver-Wouldn't you rather trust your long experience and judgment than to trust the Babcock test on the cow?

Goodrich-Would you rather Mr. trust your judgment than to trust the scales in buying hogs?

Mr. Monrad-I think Friend Gilbert's suggestion is a good one, that is to supplement the pastures with a little cotton seed meal. I would like to see the experiment made, because it would certainly do our summer butter no harm to have a little better body.

Mr. Apell-Mr. Goodrich, have you figured up what you realized from your cows, net profit?

Mr. Goodrich-Certainly I have, I wouldn't think much of myself if I didn't know what it cost me. The cost of the feed last year per cow was \$20, and taking the work of caring for them and making the butter, it is not difficult to figure that up, but it cost me about \$20 to care for the cow and manufacture the product, although I think it is hardly that now that I have a separator on my farm. That makes the cost \$50; then there is about \$3 besides for packages, etc., making \$53.

Mr. Monrad-What about Mr. C. P. that?

Mr. Goodrich-What work I do I charge just the price that I can hire it for, and if there is any profit over

Mr. Gilbert-He has all of the net receipts for his salary.

Mr. Woodward-I don't think you are fair to the cow. You have charged her for all the food you gave her and haven't given her a cent of credit for the

Mr. Goodrich-I value the manure very highly, but I did not want to put farm, and there is the interest on them. | a long story short, she turned out

about the Babcock test. Isn't it so her. complicated that an ordinary farmer like myself will be unable to use it dairy is it safe for a man to purchase with profit?

Mr. Van Matro-I have run one all winter, and I know it does not take much ability.

Mr. Thayer-Will it pay a small farmer, milking four or five cows, to have the test?

Mr. Goodrich-I think it will. If he only had two or three cows. Whatover cows he does have he wants to know are the right kind. The fact is he needn't use it every day, and half a dozen neighbors could club together and own one.

Mr. Woodward-We have a gentleman down in New York who used to be a farmer, and I heard him relate this incident this winter. He said that he and his wife were both brought up on a farm, and they concluded they would have a cow and try to keep a little end of a farm in town, and he thought he was a good judge of a cow, so he went out and bought a nice, handsome looking cow, saw the owner milk her, and she gave a fine pailful of milk, and he wanted to buy her, but the man didn't want to sell. for she was his wife's favorite cow and she didn't want to spare her. He the farmer has two or three cows that finally persuaded them to sell her, and he drove her home. Everybody was cows? congratulating him on what a splendid cow that was: he paid \$50 for her, and the fifty cows as you do of the one, took good care of her. Well, to make and they will do just as well.

I will throw that in for the manure. very poor milk, and if he had had a Mr. Thayer-I want to find out more Babcock test he would not have bought

> Mr. Hendricks-In starting a butter a cow from a man that uses the Babcock test?

Mr. Goodrich-I want to tell you a little experience in that regard. I do some changing of cows every year. I raise some and let others go, and some that I let go are fairly good cows. but still they are my poorest ones. Last year a friend of mine was at my place with his wife visiting, and we were looking at the cows, and I accidentally said that I wanted to dispose of three cows. He says, "What do you want for them; where are they? I says, "You don't want to buy my poorest cows?" Well, he wanted to see them; he saw them, and concluded to take one for \$30. I showed him just what she had done, the weight of the milk and the test, and that she was one of my poorest cows, but he took her. In a few days he came back, and he says, "Have you any more of such poor cows to sell?" And I had one more to sell. They were my poorest cows, but I had been improving until I think that the poorest one was a pretty fair cow.

Mr. Heminwagen-How is this, if he will do better than if he has fifty

Mr. Goodrich-Take as good care of

FERTILITY IN FEEDING STUFFS.

AFTERNOON SESSION.

The Institute met at 1:30 P. M. Mr. Wallace in the Chair. Singing by Mrs. Blankenburg. Music.

FERTILITY IN FEEDING STUFFS.

Prof W. A. HENRY, Madison, Wis.

ested in maintaining the fertility of potash. While plants require other his farm. All in attendance at this elements, one or all of these three closing institute, I am sure, will be in- are often lacking, and if these terested in following the subject of are supplied with, other conditions fathe relations of feed to farm fertility. Like most others the subject requires tained. In all the states where fertistudy, but I am sure you will follow lizers are handled in large quantities me with interest and patience if I do the agricultural experiment stations my part.

is one of vast importance along the whole trade being closely watched and Atlantic and Gulf states, were com- heavy fines imposed for wrong-doing. mercial fertilizers are sold in enormous quantities. In 1891 farmers and gardeners of New Jersey paid out \$1,300,-000 for commercial fertilizers. A generation or more ago the eastern farmers Nitrogen comes mostly in the form of continued to exhaust the soil, which nitrate of soda or Chili saltpetre from must now be brought up again through South America. Phosphoric acid comes the purchase of expensive plant food from rocks brought from Canada, South ingredients. Wisconsin and other west- Carolina or Florida, which are ground ern states will follow the same way up and treated with sulphuric acid to unless watchfulness leads to high render the phosphorous more available farming, in which case I believe we to plants. Potash is secured from wood can for a long time yet rely upon our ashes and also from a mineral in Gerown resources instead of paying out many. These materials are sold by heavy sums to fertilizer syndicates. the ship load on guaranteed analysis, I believe we can avoid the use of com- the price ranging close to 17 cents mercial fertilizers by growing crops of per pound for nitrogen, 7 cents per clover in our rotations, and by pur- pound for phosphoric acid, and 4 cents way of the manure.

generally three valuable constituents, use commercial fertilizers extensively

Every good farmer is deeply inter-jviz., nitrogen, phosphoric acid and vorable, maximum crops may be obare in control and no fertilizer is sold Already the question of fertilizers without guarantee by the dealer, the As a consequence the prices for nitrogen, phosphoric acid and potash in fertilizers have a very regular and uniform price at eastern shipping ports. chasing stock foods grown in other per pound for potash. In Chicago states which may be fed first to a the prices would be a little higher profit for the animal products secured, owing to the commissions and added and then return to our fields most freights. If the Wisconsin farmer of the fertilizing elements contained by thinks he can use fertilizers profitably, he must pay rather more than these In commercial fertilizers there are prices; indeed, if we are ever going to to our distance from the seaboard.

a certain amount of these fertilizing worth of crops in return for ingredients and build them up into the hav used as a plant structure. Of course, the most at all. It means that in taking a available materials are taken up, leav- ton of hay off the field the farmer has ing the fields with the less available, removed fertilizing elements which and in poorer condition for the next will cost \$5.99 if he buys them in the crop. Animals feeding upon our crops open market at reasonable price. It take out a small portion of the fer- further means that while there are tilizing elements and build them up \$5.99 worth of fertilizing elements in into their bodies. The number pounds of fertilizing elements taken there are \$12.45 worth in a ton of bran. out by some of our leading crops and or that a ton of bran contains more farm animals is shown in the following diagram, which gives the nitrogen. phosphoric acid and potash contained in a ton of farm products, fractions of pounds being omitted. These figures were prepared by Dr. H. P. Armsby, of the Pennsylvania Experiment Station and given in the annual report for 1890.

The diagram on opposite page shows that in a ton of timothy hay there are 20 pounds of nitrogen, 14 of phosphoric acid and 41 of potash. Red clover hay shows much more nitrogen, less phosphorie acid and rather less potash and so on through the list.

We have already been given the price of nitrogen, phosphoric acid and potash in commercial fertilizers. As already shown, our farm products contain these same fertilizing ingredients in greater or less quantity. These fertilizers have all been gathered from our fields. Let us place the same market value on them per pound in our farm products as they cost in fertilizers. This is done in the table given on page 174.

The table is a most interesting one and will bear close study. We learn that the amount of nitrogen, phosphoric acid and potash which a ton of timothy hay contains is worth \$5.99, while the same in a ton of bran is worth \$12.45 and for a ton of oil meal \$21.11. Let us understand clearly what is meant here. Some one in the audience will ask me as soon as

here, we are badly handicapped owing I am through, if a farmer spread ton of timothy hay on his land and Our crops take out from the soil plows it under, will he get \$5.99 the manure? Not of a ton of timothy hav at the same rate than twice as much fertility as a ton of timothy hav.

> Table from which the accompanying diagram was made.

	POUNDS PER TON.		
	Nitro- gen.	Phos- phoric acid.	Potash
Timothy hay	20	14	41
Red clover hay	40	11	37
Wheat straw	11	1	13
Corn stalks	17	11	19
Potatoes	7	8	11
Wheat bran	49	29	55
Oil meal	105	32	25
Cotton seed meal	136	29	56
Wheat	38	11	16
Oats	36	12	9
Corn	33	12	7
Cattle	58	37	3
Sheep	45	25	3
Pig	40	18	4
Mangolds	5	1	8
Wheat middlings	49	7	5
Milk	10	3	3
Cheese	91	23	5
Eggs	· 44	7	8

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FERTILITY IN FEEDING STUFFS.

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WISCONSIN FARMERS' INSTITUTE.

	Pounds per ton.			Dollars per ton.			
	Nitrogen.	Phospho- ric acid.	Potash.	Nitrogen.	Phospho- ric acid.	Potash.	Total.
Meadow hay	20	8	26	\$3.47	\$0.57	\$1.06	\$5.10
Timothy hay	20	14	41	3.35	1.01	1.63	5.99
Hungarian hay	23	7	42	3.92	.48	1.70	6.10
Red clover hay	40	11	37	6.83	.78	1.46	0 .07
Wheat straw	11	4	13	1.88	.81	.50	2.69
Barley straw	18	4	19	2.18	_27	.87	3.32
Oat straw	12	4	18	2.08	.27	.71	3.06
Corn stalks	17	11	19	2.88	.74	.77	4.39
Potatoes	7	3	11	1.19	.22	.46	1.87
Mangolds	5	1	8	78	.08	.33	1.19
Sugar beets	6	2	8	1.04	.11	.31	1.46
Turnips	4	2	7	63	.13	.26	1.02
Carrots	4	2	6	64	.14	.22	1.00
Wheat bran	49	29	55	8.35	2.00	2.10	12.45
Rye bran	49	69	39	8.31	4.80	1.54	14.65
Wheat middlings	49	7	5	8.24	.51	.21	8.96
Brewers' grains	18	8	1	3.03	.57	.04	3.64
Oil meal	105	32	25	17.87	2.25	.99	21.11
Cottonseed meal	136	29	56	23.06	2.04	2.25	28.35
Winter wheat	38	11	16	6.38	.74	.63	7.75
Winter rye	34	11	18	5.77	.78	.71	7.26
Oats	36	12	9	6.21	.87	.35	7.43
Indian corn	33	12	7	5.62	.83	.30	6.75
Barley	40	9	15	6.74	.63	.62	7.99
Cow's milk	10	3	3	1.73	.24	.12	2.09
Uheese	91	23	5	15.40	1.61	.20	17.21
Beef	72	10	9	12.34	.73	.34	13.31
Veal	70	12	8	11.86	.81	.33	12.98
Pork	69	9	8	11.80	.64	.31	12.75
ive cattle	53	37	3	9.04	2.60	.14	11.78
ive calf	50	28	5	8.50	1.93	.19	10.62
live sheep	45	25	3	7.61	1.72	.12	9.45
Live pig	40	18	4	6.80	1.23	.14	8.17
Cggs	44	7	3	7.41	.52	.12	8.05
Washed wool.	189	1	4	32.00	.04	14	32.18
Unwashed wool	108	2	149	18.36	.15	5,96	24.47

culating total value. Nitrogen estimat- I am trying to bring out in the table ed at 17 cents per pound, phosphoric is the relative values, and that if the acid 7 cents, and potash 4 cents.

Let us now take up the second branch of the subject, viz., relations of feeds to manure. Careful tests have shown that animals take out only a small part of the nitrogen, phosphoric acid and potash in the feeds; that is, that most of these elements reappear in the manure. A work horse which neither gains nor loses in weight returns all of the fertilizing elements in the manure. Growing animals take out not over 10 per cent. which is built up into the body in muscle and bone. Dairy cows take out a larger per cent. but still leave fully threefourths of all the fertility that is in the feed in the manure. We must carefully bear in mind that a large part of the fertility in the manure is in the liquid portion which is often wasted on the farm. The stockman who feeds a ton of bran to his work horses will, if all his manure, solid and liquid is saved, have \$12.45 worth of fertility in the manure. If the same is fed to growing stock he will have about 90 per cent. of the fertility, and to a dairy cow, more than 75 per cent. Again, I am sure I will be asked if I mean to say that if a farmer feeds a ton of bran to his work horses and saves all the manure and applied the same to his fields, he will receive \$12.45 worth of crops through the use of the manure. Most emphatically no. When the eastern farmer drives up to the warehouse and buys a ton of phosphate for \$30, he does not think of asking the dealer if his crops will be increased by \$30 any more than when he buys a plow for \$12 he wishes the dealer to guarantee that he will tilizers is one thing; what he will get ter and cheese in the east, when we

The foregoing table shows the fer-; from them is quite another. It is a tilizers in a ton of feed stuffs and the fact that New Jersey farmers in '91 market value of fertilizers contained. paid \$1,300,000 for nitrogen, phosphoric Fractions of pounds omitted in giv- acid and potash, and only did so being pounds in a ton but used in cal- cause they believed it paid. The point fertilizers in a ton of timothy hay cost \$5.99, then the fertilizers in a ton of bran are worth \$12.45, and further, that if these feeds are given to our farm animals from three-fourths to all of the fertilizing elements appear in the excrement which if saved for manure may be returned to the fields. Our table shows the high fertilizing value of bran, oil meal, and cotton seed meal as compared with corn meal, wheat straw, etc.

know that stock-growing We all keeps our farms in better heart than grain growing; that by steadily growing grain and selling it our farms gradually run down, while with stock growing we can keep them up to a high state of fertility. It is for just the reason here shown. The farmer who sells a ton of wheat worth, say, \$20 or \$25 sells \$7.75 worth of nitrogen, phosphoric acid and potash, while the farmer who sells a ton of sheep worth \$80 or \$100 sells only \$9.45 worth of fertility. No further comparisons are necessary. For a dozen years I have been urging the farmers of Wisconsin to feed bran liberally. This table is the best exponent of my reason for doing so. We all know that the grain growers of the west are taking the cream from their land and selling it in the shape of wheat. Our table shows us that the fertility of the wheat grain is largely in the bran portion. By buying bran grown on the wheat farms of the northwest and feeding the same to our dairy cows and other farm stock, we can have at least three-fourths of its fertility to put on the fields. Why will we allow the train loads of bran from the make \$12 out of his crops by purchas- mills of Minneapolis to cross our state ing it. What a man must pay for fer- and be manufactured into mutton, but-

feed the bran on our farms, have but- like \$400, while the fertilizers in it ter, cheese and mutton to sell our- are not worth more than half a dollar. selves, and the fertility to put on our farms? How can I, as the head of the Wisconsin Agricultural College, see this great stream of feed and fertility cross our state to be utilized by other farmers when our own farmers have the animals to which it should be fed. and .our fields are crying out for the fertility. Farmers of Wisconsin. let us study this question, and study it carefully, and may the time be generations ahead when we shall have to compete with farmers in the Atlantic states in the purchase of high priced commercial fertilizers.

Discussion.

Dr. Babcock-Would like to have Prof. Henry state the amount of fertility carried off from the farm by the different crops, comparing especially dairy products with the grain crops.

when the farmers sell a ton of cheese worth say \$160, he sells \$17 worth of the air and hand it over to the soil fertility, while if he sells a ton of ready for the next crop. wheat worth \$20 he sells \$7.75 worth of fertility. The wheat is only worth wheat, barley and oats, which takes an eighth as much as the cheese, yet out the most from the soil? its fertility is almost half that of the | Prof. Henry-Our table shows that cheese. In selling butter almost no wheat takes out \$7.75 worth, oats \$7.43 fertility is sold since the butter is worth, barley \$7.99. They run very nearly all composed of fat and water. close.

can stop these cars within our borders, | A ton of butter is worth something Mr. Selle-How many pounds of ni-

trogen are in saltpetre?

Prof. Henry-Between 16 and 17 per cent. of the weight of saltpetre is pure nitrogen.

Mr. Stevens-If all the farmers raise clover, would it lessen the chance for any of us getting nitrogen from any other man's land?

Prof. Henry-We need not worry about that, because four-fifths of the air is nitrogen.

Mr. Stevens-I also understand there are 38 tons of nitrogen standing over every acre of land every hour of every day.

Prof. Henry-It has recently been discovered that the clover plant takes free nitrogen from the air and adds it to the soil. Often our clover fields add many dollars worth of nitrogen at no cost to us. There is no earthly reason for a Wisconsin farmer thinking of paying 17 cents a pound for nitrogen when a few cents worth of Prof. Henry-Our table shows that clover seed will grow plants which will gather many pounds of nitrogen from

Mr. Ellison-In the three cereals.

HOW TO AVOID LOSSES OF BUTTER-FAT IN BUTTER-MAKING.

Dr. S. M. BABCOCK, Experiment Station, Madison, Wis.

that has been assigned to me is one gun can, and afterwards in the Cooley of the utmost interest and importance system, differing from the other only to every butter-maker, and I think by being submerged and skimmed from I can best show how the losses in butmaking can be ter fat in butter avoided by reviewing briefly the history and the progress of butter making during the past twenty years, and showing how the losses during that time have been reduced. Twenty years ago the losses of butter fat in butter making were over one pound of fat for every hundred pounds of milk, lost in the skim milk and in the butter milk. Today these losses have been reduced to something like two-tenths of one per cent.

Shallow Pans.

Twenty years ago the almost universal method of creaming upon the farm was by the shallow setting in pans. The losses by this system in the skim milk on the average was about ninetenths of one per cent. or nine-tenths of a pound for each one hundred pounds of milk operated with. The method of churning this cream was with the old dash churn, and the losses in the butter milk ranged anywhere from one pound up to four or five or even ten pounds, for each one hundred pounds of butter milk. These losses put together amounted to something over one pound to each one hundred.

Deep Setting With Ice Water.

The first improvement that was made and introduced generally was that of most always greater than where it is the deep setting with ice water, where skimmed from the bottom, or the milk the milk was set in pans of different drawn from the bottom as in the Cooley shapes. The first system was a can system. When the milk is drawn off that was introduced by Prof. Schwartz from the bottom, there should be at and finally was adopted in this country least one inch of skim milk left with

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Ladies and Gentlemen :- The subject | in a cylindrical can, known as the shot the bottom. This system has been for the farmer one of the most practical, and one which gave him very much less loss than the other. The losses by this system where it was carefully conducted, was reduced fully one-half.

Set Milk Before it Cools.

The best results are obtained by this system when the milk is set immediately after milking, before it cools, and set in ice water, the colder the water the more efficient is the creamtemperature of the If the ing. used is as high as fifty water the losses are excessive, degrees amounting to fully as much as under the old shallow system. Whenever the water is below forty degrees, the creaming is generally very good indeed, and on an average the losses are about three-tenths of one per cent. If you are using this system the milk should not be allowed to stand around the stable or elsewhere, even until the whole herd is milked, but just as soon as a can of milk is ready it should be placed in the creaming tank.

Skim from Bottom and Dilute With Water.

There is one other source of loss by this system and that is the method of skimming. Where the shot gun can is used, it is customary to skim it from the top, and the losses are alcream all milks uniformly. Milks that skim milk where this system is incontain very small fat globules usually troduced, may be reduced to practically cream poorly. The milk of the Ayrshire nothing, that is down to not more than and Holstein cows always contains one-tenth of a per cent. of fat, and as very small globules, which will not a general run with engines, I believe cream as efficiently as that of Jersey it does not exceed two-tenths. I beand Guernsey cows. Also, the milk lieve it is possible to skim poorly with creaming, chiefly on account of the any other system, but the chances are diminished size of the fat globules; that where a person has sufficient inalso on account of the fact that there telligence to lead him to purchase has been an increased amount of the a separator, he will have sufficient solids not fat, rendering the milk serum skill to run it in a manner that will more viscous, greater resistance to the movement of cent. of loss in both skim milk and the fat globules. This difficulty may butter milk. be to a great extent removed by diluting the milk with a little water just before it is put into the cans. There should never be added over ten per cent. of water and this should be warm. There is one objection to this system that has not generally been noticed, and that is the consistency of the cream which is obtained, especially where the cream has been set only about ten, eleven or twelve hours; it is quite thin, containing on the average not over eighteen per cent. of fat. Now, cream of this consistency does not churn as efficiently as that which contains more fat, and this is very largely due to the increased quantity of milk which we have.

Centrifugal System.

Following the introduction of the deep setting system, we have that of the centrifugal systems, which were introduced into this country about fifteen years ago. For a great many years the system was only available to creameries and large factories on account of the expense required and the skill necessary in handling the apparatus. Within three or four years, however, there have been a large number of hand separators introduced into the market, which do the work in a very efficient manner, and which have put the means into the hands of the farmers of accomplishing just as good milk before it is put through the separresults as can be obtained in the ator, and of course this is complicating

the cream. Now, this system will not creamery. The losses of fat in the strippers gives less efficient the centrifugal machine, just as by so that it offers a give him not over two-tenths of a per

A Great Advantage.

One great advantage besides this loss in the skim milk is the consistency of the cream obtained. This system puts within the control of the operator the amount of fat which shall be contained in the cream, probably from twenty-five per cent. to thirty per cent. gives the best results. The reasons for First, the easy this are two-fold: churning. Whenever we have a very thick cream the churning is easier. the amount of butter milk is less, and consequently the losses would be very small. But there is a difficulty in churning very thick cream, as cream that contains over about thirty per cent. of fat has such a consistency that it will adhere to the sides of the churn, and the churning cannot be properly made, and the cream is washed out with the butter milk and the losses are very considerable. Anywhere near twenty-five to thirty per cent. of fat will give you a very low loss in the butter milk.

Best Results Obtained.

The best results are always obtained in running the separator, where the milk is creamed as soon as possible after milking, before the milk cools. If it is allowed to stand until it is cooled off it becomes necessary to warm the efficiency of the creaming is never as was shown to be a mistaken idea, good after the milk has been once cooled the globules themselves being free. down. The temperature of separation Now, following this idea that the globshould never be below 70 degrees, and ules must be subjected to sufficient the best results are obtained between force to rupture this membrane has 80 and 90 degrees. In reality warmer the milk the greater quantity those churns containing floats or padcan be put through a separator in a dles of any kind. The modern churn, given time and skimmed down to a which is almost universally used in given per cent. of loss, but practically our creameries, is a simple box churn, between 80 and 90 degrees is the best or a barrel churn, containing no paddles point. The next thing to be considered whatever. is the speed of the separator-the number of revolutions made by the bowl. from the efficiency of churning in this If this is below that recommended, the kind of churning, that it enables the creaming is not efficient, that is, there butter maker to granulate his butter. will be an abnormal loss in the skim In this condition the butter milk is milk. It is better to exceed the number of revolutions a little than to get below that recommended. With a higher speed a little more milk can be run through the machine in a given time and skimmed equally close.

Let us now consider the next point as to the churning of the cream which has been obtained. Until recently, it has been the practice and usually considered absolutely necessary that all cream should be ripened, that is, that it should be soured some before it is churned. This, I believe, as a general thing, will give better results, that is, to ripen the cream until it is mildly acid. It should then be put into the churn and churned until the butter separates in a granular form.

The Modern Churn.

The churn that was used twenty years ago was almost uniformly a dash churn; that was superceded by the churns of the box form, in which were a number of floats, the idea being that the greater the mechanical force that could be brought to bear upon the cream, the more efficient would be the separation of the butter. This idea arose from the prevailing opinion that the fat globules were surrounded by a membrane and that the fat being enclosed in this membrane, the globules could not unite with each other to build up the gran- at a high point and the churning point

the work very greatly; and besides, the ules which appear in the churn. This the been the disappearance of nearly all

There is another advantage aside more readily washed out, giving a much better quality of butter.

Condition of Churning.

Now, as to the condition of churning. The cream should contain about 25 per cent. of fat; it should be as a general thing, mildly acid, and should be churned at a proper temperature. If you will remember that the formation of butter is through the sticking together of the sum of globules which are found in the milk, you will see that the temperature of the fat globules must be such that these little masses of fat would naturally adhere to each other. If the temperature is above the melting point of the fat, they cannot unite with each other, or if they do they will be broken up by the mechanical action of the churn so that if we raise the temperature above the melting point of the fat, we shall churn indefinitely without producing any butter. Now, in such a case, if the temperature is gradually lowered, you will find after a while that you reach a point where butter is the same. That temperature is usually about thirty degrees. The churning temperature depends somewhat upon the consistency of the butter fat and this depends somewhat upon the breed or individuality of the cows. Jersey cows have butter which usually melts

WISCONSIN FARMERS' INSTITUTE.

ter fat of Ayrshire or Holstein cows for the fat loss is absolutely essential. melts at a very much lower temperature, and we must churn at a lower temperature. once been melted it will remain in a liquid form for a very long time.

The Temperature of Cream.

It is only within the last four or five years that attention has been called to the point that sweet cream must be churned at a much lower temperature than sour cream. It is a fact that Cooley cream does not churn at a lower I have churned Cooley temperature. cream at a temperature below 50 degrees, without obtaining any butter at all. I have three churns which were filled with cream from the same milk. the cream being divided into three equal portions. One of these churns was started at 60 degrees, another at 55, and a third at 50. The churn that was started at 60 degrees gave us butter in a little less than half an hour. and the temperature at the end was 63 degrees. The churn that contained the cream cooled down to 55 degrees, was run nearly an hour and a half before butter appeared, and the temperature of the butter milk at the end of churning was just 60 degrees, it had warmed up by the mechanical action of the churn and the temperature of the room, until it had reached the point that churning was possible. Now, the third churning, where it was cooled down to 50 degrees, gave us no butter at all, and it was churned four or five hours before it was abandoned. We are told that centrifugal cream that has been separated up at 80 or 90 degrees may be chilled down as low as 40 degrees, and churned at that efficient temperature, getting very churning, but I believe that is due to the fact that the butter fats do not assume the proper consistency immediately. They have to be held at a certain temperature for a certain time.

A Test Necessary.

In order to get the best results in churning, or to reduce the losses in pass that I do not hear something of

may be correspondingly high. The but- butter making from milk, some test One should watch carefully the per cent. of fat which he finds in his skim When butter fat has milk, and if it exceeds two-tenths of one per cent. there is something wrong in the method he is using, that is, unless he is using some of those methods which usually give more than that. I am speaking more particularly of the centrifugal method, because I believe it is destined in time to supercede all others. If you find on testing that there is more than threetenths of one per cent. loss, I would advise that you lower the temperature at the next churning. It may take a little more time, but the amount of saving will repay amply for the difference. As a rule, the more time that is required for a churning up to an hour, the closer will be the results, other things being equal. It is not the churnings that are made in four or five minutes that will give the least loss.

> I do not wish to leave this subject without referring to some of the methods that are proposed by adventurers throughout the country, for increasing the yield of butter. Periodically some method is proposed by which we can get three or four times as much butter for the amount of milk as is usually obtained. I remember years ago, when I was upon a farm in New York, of a person coming to me and offering a powder for sale which he claimed would make a pound of butter from two quarts of milk. He actually did this on the trial, after mingling a pound of butter with this two quarts of milk and churning them together. It was not butter at all, it was simply a high cheese. This claim is congrade tinually coming up every day, all over the country. This year it is the black pepsin, last year it was a different kind of powder; at the closing Institute at Portage we had a gentleman selling a powder by which that same thing could be accomplished, and few weeks

community. It is impossible for them to do what they claim. I want to warn you also against the different kinds of machines that are introduced, different methods of creaming. Last year it was the Berrigen Separator. They are coming up continually, and always will be, and these systems have always something connected with them, which is, they cannot do what is claimed for them.

Better Cows

One thing has resulted in great benefit to the creamery practice, and that is the quality of cows that are being used. Twenty years ago, I may say that there were no herds where the milk analyzed over four or five per cent. fat. Within the past year we find any number of analysis showing six, seven, eight, and in some cases ten per cent. This results in good breeding. The advantage of good cows is not simply in the increased amount of fat in the milk, but we must remember that the losses in creaming and in churning are independent of the amount of fat the milk contains. Those losses are no more from five per cent. milk than from two per cent. milk, so that we really obtain a higher percentage of butter in proportion to the fat from the rich milks than from the poor milks. The sooner dairymen learn through the test that rich cows are more efficient in their yields than are poor ones, the sooner a great lesson will be learned. If there is any difference the losses are less from richer milks than from poorer ones.

The Separator,

From what I have said about the separator, I would not wish it to be inferred that I would advise every man to buy a separator. Any man contains less than ten whose herd cows had better adopt one of the deep setting systems. Any man who does not take care of his farm machinery generally, should not buy a separator. thorough creaming to set your milk in A separator is a delicate piece of ap- deep cans by setting it longer?

the kind. Any one making the claims paratus; it must be cared for in an they do should be driven out of the intelligent way. It is a machine that, when neglected, will prove very expensive in the repairs involved. I mention this because at the present time there is a great tendency for every one to invest in this kind of apparatus.

Discussion.

Mr. Forbes-Is there ever any difference in the cream from different separators?

Dr. Babcock-The better kind of separators that we have in use give practically about the same amount of cream where the creaming is done by an overflow. Those separators where the skimming is done by means of a knife, give, as a rule, a little different quality of cream.

Mr. Kepner-What is the best method of ripening cream?

Dr. Babcock-I believe that in farms where conditions cannot be readily controlled the Boyd system of ripening cream is one of the best that can be adopted. Those who can control the temperature may do equally good work in an ordinary vat.

Mr. Noves-How do you regulate the time of churning?

Dr. Babcock-By the temperature. By lowering the temperature you can get the churning to take place at any time you desire.

Mr. McKerrow-How about the thermometers we buy; are they all the same?

Dr. Babcock-The thermometers that our dairy students have obtained and tested at the school have often been found five or six degrees from the true temperature at the temperatures recommended for churning. Anyone who is interested in dairy matters should obtain a guaranteed thermometer. It will cost perhaps twenty-five or fifty cents more, but it will pay to pay that extra charge.

Mr. Linsley-Would you get a more

the more efficient will be the creaming hour a week to know how his milk up to the point where the milk begins to sour. It is impracticable to set milk longer than twelve hours, because people generally wish to use the same can for the next milking.

Mr. Monrad-Is it not true that when cows are old milkers the per cent. of loss in the skim milk will often get up to seven or eight-tenths of one per cent.?

Dr. Babcock-Yes, though I believe that by diluting the milk with warm water a better creaming can be obtained.

Mr. Convey-When milk has been held sometime before separation it is arate jar for each patron, and at the

takes considerable time and patience cals can be used to preserve this milk to do it. The milk must be poured from the vessel a good many times and the sample for analysis taken immediately. Aeration would be likely to prevent the creaming to a consider- free from souring for a whole week, able extent in milk that is held over night.

Mr. Goodrich-What do you consider the best method of taking a sample of a patron's milk at a creamery?

Dr. Babcock-With proper care a good sample could be taken either by dipping out with the dipper, or to have a spout leading from the weigh can; the latter is probably the safer way.

Prof. Henry-The cheese factories and creameries are now watching the farmer's milk very closely through the Babcock test. Do you believe it is possible or advisable for the farmer to watch the creameries and factories a little with the Babcock test?

creamery men with the test just ex- to five-tenths of one per cent., to alactly the same as you watch them most nothing. I figured on it a few with the scale. You ought not to trust months ago, and I found that I lost him in one respect any more than the about half an ounce of butter to 100 other. I would advise the patron of pounds of milk. any factory to have scales and weigh then that I would chase down that the milk at home, and test it before half an ounce of butter as long as I it goes to the factory. By a composite lived; I am after it, I have some of it,

Dr. Babcock-The longer it is left test it need not take any man half an stands.

Mr. McKerrow-What is the correct way of taking a composite test?

Dr. Babcock-There are different ways of doing it. In Governor Hoard's creamery he has a pipette from which he takes a sample of milk, placing it in an ordinary test bottle. When three days' milk has been added, making the amount of milk necessary, the test is completed, and he gives a true average of the three samples of milk. Another way is to take an equal quantity of milk each day from the weigh can, placing it in a jar, having a seppossible to get a fair sample, is it not? end of the week making a composite Dr. Babcock-It can be done, but it test for each patron. Certain chemifrom souring, the best I know of at present is bi-chromate of potash. Use about one-fiftieth of an ounce for each pint jar. That will preserve the milk and the samples can be taken in the same way as from the original milk. Another method is to allow the milk to sour, and then by the aid of a little concentrated lye, or caustic potash, dissolve the curd and make the test in the ordinary way.

Mr. Goodrich-I am a dairyman with a few cows, about from twenty to twenty-five. I have used the Babcock test for two years and it has helped me very materially. I have been able to sort out my cows and dispose of those that were of less profit to me. I have been able since I got it to reduce the losses in the skim milk to almost nothing. I have been able to reduce the losses in the butter milk Dr. Babcock-You want to watch the in churning, that used to be from four I promised myself

How the Best and Choicest Butter is Made.

enough. There is as yet a great indif- so. You know in old times when the ference among the patrons of cheese sons of God came together, Satan also factories as to their side of this question. Now, farmers, if you haven't the better service that could be rendered ability to take care of yourselves, the creamery man will take care of you. The Babcock test is just like a pair of scales, if you just throw your milk into a can, and the creamery man knows you don't weigh it he is going to put his own estimate on it. He gives you correct weights every time he knows that you are likely to weigh the milk. Why not have a Babcock test and analyze your milk? When you go to the factory you will say, "My cows are doing better." When a man takes the test he hesitates to put it low at the factory because he knows that you have just analyzed, he knows you are watching your herd and the qualities of your milk, and that factory man is going to give you all there is in it. If you don't do it, the creamery man is going to have the best of you every time.

The Chairman-I cannot close this discussion without making one suggestion. I want to say to you that there is a suspicion among the Iowa creameries that, while the Babcock test norance.

is the best thing yet found, it is not infallible; that it is as honest as Music, Song,

and I will have the rest if I live long the man who handles it, and no more came with them. I don't know of any to the community than for some person to show the farmers how they can be swindled by dishonest men by the use of the honest Babcock test. A man who is supposed to know, said to me, that he believed that eight-tenths of the creamery men in Iowa using the Babcock test, were taking a little more than belonged to them by having the acid too weak or too strong, or having the bottles not just right. We had a case of a man who was brought up by our dairy commissioner and disgraced in the eyes of the whole community on account of his dealings with the creamery. They had a trial, and at the trial it turned out that the man was right and the creamery was wrong. Let me say to you, gentlemen, in this state, that the farmer himself needs more protection than the creamery man; they ought to be educated up to the point that they know when they are getting their own, and when a man knows he is getting his own, there is nobody taking advantage of his ig-

Mrs. Ruepling.

HOW THE BEST AND CHOICEST BUTTER IS MADE.

W. H. GILBERT, Richland, N. Y.

they make fine butter for the New York to her business. We should select a and Boston markets is well understood cow that not only gives us rich milk, by the best dairymen in Wisconsin. but gives us good flavored milk. We I will say to you that the method of must have a healthy cow, a cow of making fancy butter in the east is good constitution, one that can asidentical with that of making fancy similate her food. Those are the essenbutter in Wisconsin. In the first place, tials for a good butter cow. After we

The subject assigned to me of how we have to select a cow that is adapted

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have the cow we must have the en-l vironment, a well ventilated, clean, made into ripened cream butter that should be light stable. and 5t warm if you can keep it warm without will say to you that the demand for its being at the expense of ventilation. A healthy cow must have pure air. After that comes the care. She must was furnishing butter to in New have pure water at all times, never ice water. I prefer well or spring being warmed. to water water Give her good, sweet palatable food, and give it to her regularly. A cow for a butter dairy should always be kept clean, and the stable must be always clean.

Important Points.

regularity is an important Now. feature in making good milk. A cow must not only be fed regularly, but milked regularly, and by the same milker. A change of milkers will always result in a reduction in the quantity and quality both. The care of the milk has been covered very fully here. First, it should be strained from the cow and separated as soon as possible. On the farm I prefer John Boyd's method of ripening the cream. They are doing a good deal of sweet cream churning in the east now, and churning at a low temperature. I have had the best results with holding my cream at a low temperature for 24 hours, then churning at a temperature of 50 degrees. I have churned a good deal of about 200 pounds, at 40 cents a pound. sweet cream as low as 40 degrees,have it cooled down directly after it New York about nine o'clock in the comes from the separator and churn it at 40 degrees. At Vice-president Morton's farm, their method is to churn their sweet cream and at a low temperature. I had the pleasure last fall of handling their milk and watching the operations at their place for several days. I found their universal postponing the churning one day longer method was separating, cooling and churning immediately, churning as low as 36 and 38 degrees, but the rule was and give them what they purchase. usually about 40 degrees, and they If they want sweet cream butter, give churned there in from thirty to forty it to them and do not attempt to fool minutes, and sent their butter into the them either. That was very nicely ilmarket unsalted, perfectly sweet and lustrated to me last fall at Madison fresh.

Another portion of their butter is goes into market unsalted. Now. I that kind of butter is growing rapidly. Four or five years ago, the people I York wanted it salted about as you do in this state; those people are now using sweet butter. You will find at nearly all the first-class hotels in New York sweet butter, no salt; you will also find the same thing in Chicago.

A Growing Demand

There is a growing demand for butter put up in better form, instead of in the old objectionable tub where the merchant has to dig it out. It is put up in prints and nicely wrapped packages. I have some samples here. This package is put up by a gentleman by the name of Hurlburt. These packages cost about ten dollars a thousand, and the labor amounts to but little. It is in one and two pound packages, is carried in a refrigerator, and is in perfect condition. Vice-president Morton's are put up in boxes holding one. five and ten pounds. The people who pay fancy prices for butter are very critical. The slightest variation in your methods of handling or churning are very quickly detected. A few years ago I was sending butter to a hotel-I sent my butter as usual, it reached morning, and before twelve I received this dispatch: "Butter received not up to standard. Shall I send it back or credit you with thirty cents a pound?" There was a loss of nine dollars in that shipment, simply because I had accommodated my dairy woman by than usual. In catering to a fine trade you must make your butter uniform Square gardens. I had churned the cream and the other of cream that was butter in this shape, and get it to the slightly acid, manufactured the same customer so as to get these fancy way and put into pats. The next fore- prices? noon a gentleman came in and wanted a pat of Mr. Morton's sweet cream fancy prices at first, but you can put butter. The girl handed him one that this butter from here in Chicago in was made from our cream; he tasted as fine condition as you can in a tub. it, and says, "This is not sweet cream." I am three hundred miles from the "Oh, yes, it is, it was churned last New York market, and for the past evening." and walked away. She called him back in prints and I have made butter from and says, "Try this." He took one of thirty to one hundred and fifty cows. the other churning that was sweet Mr. Monrad-Don't you think there is

An Attractive Package

the market, put it in some form so more freely in the east? I am told by that it will attract the eye. You take a friend of mine who tried to get up two samples of butter, side by side a fancy trade in Chicago that the richin a store, one put up in a nice little est men there look considerably on paper box will bring five cents a pound ten cents a pound for butter. more from the same churning than Mr. Gilbert-Do not attempt to get a the other put up in the usual way. fancy price. It costs but a fraction to It won't be but a short time before put it up in some attractive style, and Mr. Goodrich will be putting up all in a short time you will get customers his butter in fancy packages.

Here is another sample of butter which is first wrapped with parchment thing clear. Isn't it a fact that the sopaper and then with tin foil. This called sweet cream butter is to a gentleman has a fancy trade in New great extent unsalted butter? York, and he gets sixty cents a pound for all his butter, and he gets about is called sweet butter today is made half of that for doing this nice, fancy from ripened cream, but there is a work. In my part of the country demand in eastern cities for unsalted nearly all of the fine butter is put up sweet butter. The term "sweet" butin this nice shape, where five years ter in New York means unsalted butter. ago nineteen-twentieths of it was packed in tubs or jars. The tendency now is the same as in a shoe store, that shape? or any other line of business, things are put up in a shape to be attractive. The farmer should put up everything that he puts up for the market in some attractive form, and then have his standard of quality and make it uniform.

Discussion.

Mr. Goodrich-Do you think it would be practical for a dairyman at this in northern New York who commenced

night before, one churning of sweet distance from the customer to put up

Mr. Gilbert-I would not look for He says, "I don't want it," ten years I have put all my butter

cream butter, paid for it, and went off. a good deal of difference in the market of Chicago and the eastern cities? Aren't there more retired capitalists Now, in putting up your butter for who are willing to spend their money

that will pay for the extra work.

Mr. Monrad-I want to make one

Mr. Gilbert-Three quarters of what

Mr. Sands-Do you use some kind of machinery for putting up butter in

Mr. Gilbert-You get a cheap print that will cost from three to twenty dollars. I use one in my dairy that will print twelve at a time; it is all done in half a minute.

Mr. Goodrich-I tried this scheme ten years ago, and I could not make it work then. Maybe the time has come; if it has I am glad to know it, because I want that extra price.

Mr. Gilbert-I was one of the first

WISCONSIN FARMERS' INSTITUTE.

that to-day I had rather furnish my cus- ter as dry as I can work it and not tomers good prints at the same price break the grain. than to put it in packages. The only made so that if you break it it will expense is the labor, because the car- have about the grain of steel, a little rving case is returned to me.

to make that kind of butter?

ored any of it. I should color mine. using a corrugated or a smooth roller.

Mr. Gilbert-I can't tell you, but I nice worker.

putting up butter in prints. I know will show you. I aim to work my but-Butter should be finer than the grain of iron. When it Question-Do you use butter color is in that condition it does not have to exceed twelve or thirteen per cent. Mr. Gilbert-This butter is not col- of water in it. I work my butter once Question-How much do you work The Eureka worker, made by the Verthat butter to get the butter milk out? mont Farm Machine Co., is a very

DOES IT PAY TO MAKE FANCY CHEESE?

J. H. MONRAD, Winnetka, Ill.

understand it, it is a cheese not com- ent several manufacturers of these monly made in our own country. Thus who know more about it than I, I an Edam cheese is "fancy" in America, shall confine myself to point out that but not in Holland, and a Young Amer- the very fact of their existence is a ica or Cheddar is "fancy" in Holland, proof that it pays to make them to a but not so in America or England.

how large a production is needed to these cheese. make a cheese cease to be "fancy." It seems to me that in Wisconsin, at are also made in several places, and I any rate, the Swiss, the Brick and the regret to say that the latter is made aromatic Limburger are so well estab- very often of poor skim milk, and even lished as to have lost the right to of filled milk. the name "fancy."

to confine the term ("fancy" to cheese cheese, and that every nation on the made with an addition of cream, but earth is represented in the United that is not the general conception; and States, we cannot doubt but that there we find such cheese as half skimmed is room for the manufacture of a great Edams, Brie, Neufchatel and Parme- many more varieties." san, not to speak of "Whey Cheese" classed as "fancy" cheese, and hence another matter, and is similar to that I believe my first definition is more whether it pays to make butter on the correct.

Swiss, Brick and Limburger.

tainly once deemed "fancy" cheese Nevertheless, I think he will acknowl-

What is a "fancy" cheese? As I here, and as I suppose there are prescertain extent. Ohio and New York The question then arises in my mind, also produce quite a large quantity of

Brie, Camembert and Neufchatel

But "when we consider the fact that Strictly speaking, perhaps we ought Europe is making 148 varieties of

The question, whether it pays is farm. How many have tried it and failed. And yet, a large number have Swiss, Brick and Limburger were cer- succeeded, like friend C. P. Goodrich. are necessary to create a name.

gain its reputation in a year or two. and then for a few hours, leaving it It is the work of a lifetime. And al- there till next morning. The morning's low me to say, that, while it takes milk is treated exactly alike, but only time and patience to work up a private left to drain for two hours, after which butter trade, it will certainly take far the curd is put in a mould in altermore time, far more patience and far nate layers with the evenings, more money to work up a trade in crumpled up with the hands. It is "fancy" cheese.

is that the quality will at once be com- cheese is put in the drying room on pared with the imported article, and shelves with straw, the temperature the price squeezed down by the dealers being kept at 67 or 68 degrees. Here who wish to sell it as an imported it is salted on the outside and turned article at an enormous profit. honest dealers will tell you how a then once a day for eight or ten days, great many families buy the fancy and salted on the upper end only. cheese, not so much because they like After four to six weeks here, it is them, but because they are imported, moved into the cellar which is rather or supposed to be. For this reason, damp, deep and cool, with no draughts. while I believe there is room for mak- Here the blue mould is formed in the ing several of the European cheese, course of four to five months. The I should rather advise the making of sample contains 40 per cent. fat. several new kinds of cheese, modifications, if you please, of the European

I have brought the following imported cheese to show you, and shall give you a short review of their making.

Roquefort.

cheese was made in France only from ewes' milk, fat. Mr. J. H. Hecker, formerly of Roquefort but is now also made from cows' milk. Manitowoc made a few Edams, ex-The green mould is specially prepared perimenting at his own expense, and moulded bread, and its growth and the succeeded in producing the best imitaripening of the cheese is regulated in tion made in this country; and I rethe natural limestone caves, with their gret very much that he was not in a currents of air kept at 60 degrees, with position to persevere. a uniform degree of moisture. The sample which we have here contains about 36 per cent. fat.

cows are old milking. The evening's the 14th century. Last year the exmilk is set with enough rennet to coagu- port amounted to between 1 and 1 1-2 late in 20 minutes at 77 degrees. It million pounds. The manufacture is is then cut with a wooden sword in as follows: large cubes, and later on in smaller, after which the curd is dipped into to boil without curdling is put in a

edge that patience and perseverance linen bags and hung up to drain. When drained for about 10 minutes, The Darlington butter did not even it is put in the mould and turned now and turned repeatedly during the day, and The first difficulty that will be met the cloth changed. The next day the The twice a day for three or four days,

Edam.

Edam. The manufacture of this but more suited to the American taste. cheese I desribed in a paper before your State Dairy Convention in the year 1889.

Lately a culture of bacteria ("Long whey") has been used as a starter. The sample which I have is a good originally one, and contains about 28.8 per cent.

Sap-Sago

"Schabzieger, or Sap-Sago," Switzerland. This little green cheese is made to a great extent in Canton Glarus, Gorgonzola. This cheese is made in and has been exported for several hun-Italy, generally in the fall when the dred years. Indeed it was known in

Skimmed milk which is sweet enough

heated to 130 degrees. Then a cor- straw mat or one made like the comresponding amount of butter milk is mon wash stand splashers. added. It is then heated to boiling again rests on a square board. Five point, when an acid, (sour whey) is of these are placed on top of each other added, the amount of which must be on the drain table. After 12 hours' learned by practice. The swung from the fire, the curd separates, and is dipped out into tubes placed stead of the mould. slanting so as to let the whey run off. turned carefully every 6 or 12 hours It is left there for 12 hours to cool, by placing an extra board and mat and is then filled into barrels, and a weight put on it. There it is left to ferment, generally about three weeks, at an average temperature of 67 degrees. (In the winter the barrel is placed in the cow stable, or the room next to it, to keep warm.) When fermented the curd is filled in bags. It It is then removed to a drying room has then a clean acid, slightly acrid, taste, and a peculiar smell. This curd is then delivered at the "factory." Here it is stacked and left for a week to two months. It is then ground and left for a week to two months. It is then ground and mixed with four to five per cent. salt and one to two percent. stone clover (melilotus coerula) and pressed in boxes or barrels, where it is left for a second fermentation for as much as six months. It is then ground again, sometimes with a second addition of clover and salt. As soon as it is of a plastic consistency. it is formed in cone shaped pieces weighing from 1-4 pound to 5 pounds. They are then dried in a darkened. close room. (They are grated fine and sprinkled on bread and butter.) The sample shown you contains 11.5 per cent. fat.

Brie.

Brie. This cheese is shown you put . up in glass. The manufacture may be outlined as follows:

The fresh milk is set at a temperature of 86 degrees, (though some prefer 67 degrees). No more rennet is used than will coagulate it in three or four hours. It is left till pretty stiff, when it is dipped with an oldfashioned skimmer into the mould, 79 degrees, and rennet added to coaguwithout cutting. The mould is simply late in five hours. The curd is dipped

boiler hung on a swinging crane, and a ring of tin plate which rests on a which boiler is draining it has sunk to its level, and a tin bandage is placed around it in-The cheese is on top of the ring and then turned. When two days old it is salted, and then the ring is removed and the cheese placed on a plate of willow ware. There the cheese is left from two to four days in a temperature of 62 to 64 degrees, being turned twice a day. with a temperature of 55 to 57 degrees. where it is turned every or every other day, and dry mats given. After four or five days a white mould appears, which after six or eight days changes gradually to blue, until after 14 to 20 days it is quite blue, when it is removed to the cellar with a temperature of 51 to 53 degrees. If the turning or changing of the mats is neglected too long, red mould will appear, the cheese will get soft, and smell bad. After a while the blue mould changes to yellow, and then to white again. and when it is from six to eight weeks old, red spots commence showing. These fade again, and after four to five months the cheese has a yellow skin covered with a white layer of mould with spots of red and blue shining through it. Then the cheese is at its best stage. The sample imported-the one in the glass-has not been tested for fat. The imitation contains 28.8 per cent. fat.

Camembert

The arrangement for Camembert. making this cheese is similar to the "Brie," requiring a make room, a drying room and a cellar. The milk is set in stone jars holding from 24 to 40 pounds, at a temperature of 78 to which are of tin plate about five inches and kneading it until it becomes pasty. high and of the same diameter. They If it is too wet, dry clothes are used, are filled four or five times, a little if too dry, some fresh curd is worked at a time. Twenty-four hours later in. The moulding is done in little tin they are turned the first time, and salted on one side while in the mould. and 12 or 24 hours later taken out and salted on the other side and placed on the boards. After two days they are placed in the drving room on shelves made of laths, or covered with clean straw, which is changed often; the cheese is turned once a day at first, every other day later on. If the cheese remains too soft it is a sign that the room is too moist, and vice versa.

Some use an extra room into which the cheese is moved after 15 to 20 days, and left there 5 to 10 days before removal into the cellar. During all this time the growth of mould runs its course. On the third day brown spots commence showing, while after ten days the cheese is covered with white mould. This becomes blue, then yellow, and lastly red. Generally it takes about 20 or 30 days to finish the curing in the cellar.

The imported sample has 29 per cent fat, and the American 22.7 per cent.

Neufchatel.

Neufchatel, also called Bondon. This is made chiefly in the department of Seine, France, from both whole and skim milk. Three rooms are needed, as for the previous cheese. The milk is set as described for the Camembert, at a temperature of about 68 degrees and only enough rennet to coagulate in 24 hours. Hence, great stress is laid on using the most reliable, uniform rennet extract. When coagulated, the whole mass is dumped in a strainer cloth hung up over a drain table, or laid in a wicker basket. After 12 hours draining the cloth with contents is placed in a square box with holes in and pressed with the when reduced to one quarter of its aid of a board with some light weight, original volume the albumen, etc., pressed for 12 hours.

carefully like the Brie, into the moulds, then worked with the hands, squeezing cylinders about two inches in diameter and two and one-half inches high, by placing them on a table and taking a roll of the curd and pressing into it. After smoothing both ends it is at once taken out and rolled between the hands which are covered with fine salt. They are then placed on boards and left to drain for 24 hours, after which they go into the drying room, where they rest on straw and are turned every day, and later every other day. In 5 or 6 days the white mould shows. which later becomes blue. As soon as the cheese is covered with mould. (generally after 2 or 3 weeks) it is brought in the cellar, and when in 3 or 4 weeks red spots commence to appear the cheese is ready for the market. Very few are imported, and I could get none in Chicago. I show two samples, one bought of C. Jevne & Co., analyzing 26.3 per cent. fat, the other one the Lion brand, apparently the hest. bought of Roethlisberger & Gerber. analyzing 29.2 per cent. This is made in Green county, Wis. Payen gives an analysis of the French make as high as 41.9 per cent. and I doubt that either of these samples are fully up to standard.

Myseost.

Whey Cheese. The best is made milk. but from goat whev of also of whey from cow's milk, and sometimes from mixed whey. The whey is drawn as sweet as possible. and at once placed in a kettle and kept boiling lively. The albumen and casein left in it rises to the surface and is skimmed off and put in a jar for further use. As soon as the whey is condensed enough to become like syrup it must be well stirred, and increasing it gradually. Thus it is skimmed off is returned to the kettle, The curd is and one part cream to sixty parts of the original whey is added at the same severance, but I am sure the market time mush it is put in a round wooden such modifications trough and worked vigorously all the sure that it will pay. time with a potato masher until it is Yet I guess my sketches have shown cool. This is essential to prevent it you, that while, as for instance 20 or from becoming sandy. It is formed moulds, from which they are removed is a fearful amount of work and atin a day or two. trimmed, and after drying them under these fancy cheese. Indeed, I venture continual turning for a few days they to say that even my short description are ready for market.

Primost.

The whey cheese sold in Chicago as "Primost" is as a rule of a very poor quality, seemingly made from skim milk whey, with little or no addition of cream. This cheese is cut in very thin slices on sandwiches. The sample shown is made in Illinois and is not a good one; it is not rich enough, and is gritty. It retails for about eight cents a pound, while the imported is twenty-five cents a pound.

I describe this cheese more to show how we may preserve all the nutrient elements of the milk for human food, than in the belief that it will ever become popular. Yet it is liked by a great many people, and where wood is cheap does not cost very much to make.

I trust that none of this audience believes that I have given these loose sketches in the foolish hope that they should enable them to start making fancy cheese. Far from it. But I wish to show how, by controlling the conditions, that is the quantity of water left in the curd, salting and the temperature and moisture in the curing, we may procure different results; and because I wish to impress on you that instead of trying to imitate, it would be far better for an energetic, natient and persevering man or woman, to strike out and by experiment in America. A friend of mine in Wisfix on a new modification of fancy cheese, give it a new name, new shape going to make skim cheese, and he or style of packing, and introduce it wanted to send me one. on the market. It will, as before said, he would sell it for five cents a pound, take money, time, patience and per- and I told him I would take it if he

When of the consistency of is open and ready to receive several and I also feel

then 24 cents a pound for the American in brick shape in wooden Brie may seem a high price, there They are then tention to details connected with all has wearied you a good deal.

> Edam should, while protected by a six cent tax, certainly pay to imitate. but I shall not take the responsibility of advising anyone in particular to follow either of these lines, as the success depends not only on his skill as a maker, but also on his ability as a salesman. That some have succeeded in imitating you know, and also in the making of a new variety, which I illustrate by showing you the "Paragon" made in Canada, and the American Clubhouse cheese made in Cleveland. Ohio.

> In conclusion let me state that we imported foreign cheese as follows:-In 1890, before the duty was increased from 4 to 6 cents, 9.263.573 pounds. In 1891, when the duty was increased in October, 8.703,666 pounds, and in 1892, 8,256,234 pounds.

Discussion.

Question-Do you consider that mouldy cheese a healthy cheese?

claim Mr. Monrad-They in Europe when a man eats a little too much of a good dinner that there is nothing like a piece of Roquefort cheese or old Stilton to aid the digestion. No quick curing cheese will help the digestion. I have seen some of those quick curing cheese made consin told me awhile ago he was He said

SHALL WISCONSIN EXHIBIT DAIRY PRODUCTS?

and I actually had to take an ax and are driven from the farms and our chop it before I cut cut a hole in it. It was more like milk ivory. I don't want any of that kind to help my digestion.

Mr. Woodward-Before this Institute closes I want to express to you, gentlemen, and to the people of Wisconsin, the great gratification it has been to me to attend this Institute. I have attended a great many in the United States, particularly in my own state. and a sort of discouragement comes over me when I think we have so few young men at our Institutes who will and God bless the Institutes and the put the spirit into them that I find in this one. We are so surrounded by

would pay the freight. He sent it, very large cities that our young men Institutes and agricultural gatherings are suffering. I have been astonished and pleased to notice the great number of young men taking part in this Institute, and I consider it a very encouraging feature for the future of the state. You are doing a great work here, and I have great faith in the future of Wisconsin because so many of your bright young men are interested on the farms, and so I say, God bless Wisconsin University and God bless Wisconsin Experiment Station. men who are running them.

SHALL WISCONSIN EXHIBIT DAIRY PRODUCTS AT THE WORLD'S FAIR?

D. W. CURTIS, Ft. Atkinson, Wis.

reputation for her butter and cheese. This reputation has been gained mainly States, went to Waukesha. by a superior article, and made known to the world at large by public expositions. The Wisconsin Dairymen's Association inaugurated the first Dairy Fair ever held in this country. This was in connection with the State Fair held in Milwaukee, 1875. This exhibition brought out 300 cheese, and was of enough importance to bring prominent buyers from all of the eastern cities.

International Dairy Fair.

At the International Dairy Fair, held at the American Institute, New York city, in December, 1878, the special premium for the best cheese made west of the Ohio River, \$125, went Dairy Fair was held in Milwaukee. to Jefferson County, Wis. The pre- The weather was bitterly cold, but the mium for the best butter made in the display of butter and cheese was large, United States, salted with Higgin's and the attendance of Eastern buyers salt, \$250, went to Sheboygan County. to inspect the dairy products of the

Wisconsin today has an enviable A special premium of \$100 for the best tub of butter made in the United

> Again, in December, 1879, at the International Dairy Fair, held in New York city, Wisconsin won the First Sweepstakes Prize on butter against the world: also the Second Sweepstakes on cheese; First Sweepstakes on fancy cheese, besides many other prizes.

> In 1876 the Dairymen's Association made two exhibitions of butter and cheese at the Centennial Exposition, in June and October; six awards on butter and twenty on cheese was the result.

The Centennial Exposition.

In December, 1882, the Grand Union

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fair held since then.

New Orleans Exposition.

It was with misgivings that the Association took hold of the project the great pro rata prize of \$1,000, to of making a display of Wisconsin's dairy products at the Cotton Centennial Exposition at New Orleans, in 1885. The Legislature was not very generous in appropriations, and we were compelled to circulate a subscription paper, and borrow money, with the understanding that it was to be refunded in case the Legislature appropriated the money: and if it did not, the amount subscribed was to be a gift. out and out.

Hon. Hiram Smith, in an address, said: "The Wisconsin Dairymen's Association recognizes the vast importance and deep significance, amounting almost to a necessity, that Wisconsin's dairy products shall be placed as near the front as possible. Avenues of trade, like railroads, will not open up themselves, but both require human aid."

Nebraska had a large display of corn near by, and proclaimed in golden letters, "Corn is King." Wisconsin over her cheese displayed a banner which read: "If Corn is King, the Cow convincing evidence that the dairy is Queen."

Over Half Prizes Came to Wisconsin.

Out of 152 prizes awarded on butter and cheese, Wisconsin obtained 82, including two of the largest prizes for best show of cheese from any state, and the Sweepstakes Gold Medals on cheese and dairy butter.

The Legislature appropriated sufficient funds to pay up all indebtedness. and passed the following resolution, February 6th, 1885:

The World's Exposition, Whereas. now in session at New Orleans, after Senate, concurring, That the Legislaa competition which embraced the ture of Wisconsin herewith tenders to dairy products of England, Denmark the dairymen and dairy women of this and Holland, and, in fact, the entire State its most profound acknowledgworld, has awarded to farmers and associations of Wisconsin work which they have performed, and the following high premiums: Ten im- it hereby pledges itself to do whatportant premiums on butter; ten im- ever is right and reasonable to aid

West has not been equaled by any portant premiums, largely first, on cheddar cheese, together with the grand sweepstakes prize of \$150, and gold medal in this class; besides, in be divided among all exhibitors in this class taking premiums, there were awarded fifty-five premiums, and Wisconsin sweeps the board by taking fifty out of the fifty-five. In the grand prize of \$300, to any dairy association or dairy board of trade, the Wisconsin Dairymen's Association takes the first, and the Sheboygan county board of trade the second, of \$200. In the largest and best display of cheese by any individual manufacturer in the World, Wisconsin takes second. In the display of fancy cheese, Wisconsin takes the first. In the best display of Sweitzer and Limburger, Wisconsin takes first in both. In the best display of sage cheese, Wisconsin again takes first; and

Whereas, the honor of being one of the foremost dairy States in the Union has been achieved by the zeal, industry and enterprise of our own dairymen and dairy women, and

Whereas, we recognize in these substantial awards of merit the most farmers of this State, in the face of many obstacles and with but little State encouragement, have built within our borders a most healthful, honorable and magnificent industry, and have brought wealth, honor and renown to our commonwealth, and in this grand beginning, which now reaches a product of \$20,000,000 annually, have demonstrated the certainty of still greater future success; therefore, be it

By the Assembly, the Resolved. the .dairy ments and earnest thanks for the great ments.

This much in the way of bringing Wisconsin's dairy products before the people of the world has been accomplished, by the aid of the Wisconsin Dairymen's Association.

Annual Dairy Product \$28.000.000. The estimated value of our dairy products for last year was Twentyeight Millions of Dollars. Seven years ago it was Twenty Millions, a gain of over a Million per year. The production is increasing more rapidly each year, as there are more dairymen, more cows and better facilities for the manufacture of butter and cheese each succeeding year. Farmers who are not now engaged in dairying are becoming interested, seeing, as they do, that no branch of farming pays so well as the dairy. Creameries and cheese factories are springing up on every hand. demonstrating beyond a doubt that in Wisconsin the Cow is Queen.

done with all of this future of fine of their goods, Wisconsin may well butter and cheese? We may well ask, hope to retain her proud position at Does the entire country know just the head of the dairy column. Final what is produced in this line here in success depends, not upon the state, Wisconsin? Since 1875, every oppor- not upon the association, but upon tunity has been taken advantage of to the men and women who make the place before the public, in the best butter and cheese. If they will furmanner possible, the dairy products nish their goods for exhibition, they of the state: and with what success will contribute materially to their own you have already learned. Now comes profit and to the honor of Wisconsin, this great Columbian Exposition, ex. whose motto is "Forward."

them in securing still greater achieve- | ceeding in magnitude all past expositions combined, where a sprinkling of all nations of the earth will congregate. Wisconsin dairymen are asked to make a display of their butter and cheese. Foreign nations are sending their cheese productions to this universal exhibition, to show to and educate the American public into eating what they produce.

Wisconsin dairymen must do their best and contribute their finest productions, to inform the world, more elequently than in words, where they can always be certain of obtaining the highest grade of full cream cheese and gilt edge butter, or be content to take second, third, fourth or last place in the dairy markets of the world.

The State Board will furnish the money; the Dairymen's Association will do the necessary work, care for and sell the goods for the owners when the exposition is finished. Now, if farmers, creamery and cheese factory The question arises, What shall be men will supply the necessary samples

13-B.

WISCONSIN FARMERS' INSTITUTE.

SUMMARY TO DAIRY SESSION.

Selection and Preeding. 1. Select the best cows in your herd, might baffle science later. or that you can buy, to keep, and dispose of the others.

2. The best cow for the dairy is after calving. the one that produces the greatest 15. The calf should be permitted amount of butter fat in a year, (for to nurse its mother for two or three food consumed), when being rightly days. fed.

milk of each cow for a year and test- soon as drawn, for a week or ten ing it occasionally with the Babcock days. Milk Tester, and know how much butter fat each one does produce.

4. To renew or increase your herd, stirred into it. raise the heifer calves from your best cows.

can get; one, if possible, that has a until the calf is well started. long line of ancestors and have been first-class dairy animals.

6. In this way you can make each generation better than the preceding one, if they have at all times proper Farenheit. care and feed.

7. It is neither profitable nor neces- thermometer. sary for a cow to go dry more than four to six weeks.

cows be watched and not allowed to ac- and gentleness, is sure to receive the

9. Darken the stable in which the that can be made in dairying. cows are milked, through fly time. It will not only economize the patience of the milker, but the cost of milk production as well.

10. Keep a record of the time when cows are bred, and have no guess kinds of food which, if given the cow, work about the time of calving.

11. Provide a roomy box stall, and to it a week prior to calving.

12. Bulky food should be withheld excessively fat. for a short time prior and subsequent to culving.

13. The udder should receive prompt attention. An obstacle may be re- two years old.

moved from the teat the first hour. that

14. A pail of scalded bran should be given to the cow as soon as possible

16. After separating the calf from 3. Test your cows by weighing the its mother, feed the natural milk as

17. Then begin gradually to substitute skim milk with oilmeal jelly

18. Scald the calf's feed pail daily.

19. Feed three times a day and 5. Use the best dairy-bred sire you not more than three quarts at a time

20. Warm the milk by placing the vessel that contains the milk in hot water.

21. Warm the milk to 90 degrees

22. Don't trust your finger, but a It will save many a calf's life.

23. The man whose ideal of a cow 8. Especially should your young is high, coupled with good care, feed quire the habit of drying up too soon. highest profit in milk and pleasure

Care and Feed,

24. Begin with the calf to develop the cow.

25. Feed the calf liberally on the would be good milk producing food.

26. Such food contains a large proallow the cow to become accustomed portion of nitrogen, and will promote rapid growth without making the calf

27. Feed the calf skim milk, oil meal, clover hay, oats, wheat and bran.

28. Breed the heifer to come in at

29. After calving, feed lightly concentrated food at first, but gradu- walls with ventilating flues running ally increase till in ten days she will from near the floor up and out at the be on full feed.

30. The better a cow is fed, up to her capacity to assimilate, the greater doors in cold, rainy or uncomfortable will be the profit.

31. Feed a variety of good fodders, such as clover hay, ensilage and like to be done by yourself. corn fodder,-all the cow will eat.

from 8 to 12 pounds, according to the think of your cows and put them in. size and capacity of the cow.

more than one-third, or at most, not more than one-half the grain ration; the balance may be a mixture of wheat bran, oil meal or cotton seed meal, and oats, if oats are not too high in price.

34. It will pay to feed a small grain ration in summer when cows are on grass if they are giving milk.

35. It pays better to produce milk in winter when dairy products are higher than in summer.

36. Cows should come fresh in September or October, for greatest profit.

37. It makes very little difference in the cost of keeping a cow, whether she comes in in the fall or spring; she must be fed well the whole year round, anyway.

38. A cow should not be compelled to work hard for food by treading all day over a scanty pasture.

if she can get good food and drink the yard. without it.

water, but have good, pure water con- milk. Lime water and whitewash for venient.

the time and chew her cud, and take stable. comfort.

her best.

43. She should have free access to salt.

let dogs chase her.

45. Give cows a warm, comfortable stable in winter, with plenty of light out irritating or worrying the cow. and good ventilation.

on + 46. The stables should have tight roof to carry off the four air.

47. Cows should not be kept out of weather.

48. Do by your cows as you would

49. If it is too cold and disagreeable 32. Feed a daily ration of grain for you to stand around out of doors,

50. Would you like to get in the 33. Do not feed too much corn, not shade when the sun shines hot? Then your cows would. Provide them shade. They will pay you for it.

51. Do not compel your cows to drink ice water in winter.

52. Give them water as often as they want it, at a temperature that suits them.

53. In winter, if cows have water constantly before them in the stable, at the temperature of a good, comfortable stable, they will drink at least twice a day, and sometimes four times a day.

54. Cows want to drink every time after eating unless sufficient water is contained in the food.

55. Speak to a cow as you would to a mother.

Milking.

56. Always confine cows in the stable to be milked. It is better than 39. She will take very little exercise having them chase one another around

57. Have the stables clean, and have 40. Don't make her travel hard for the cow clean, or you can't get clean walls and posts is a good thing. Land 41. She likes to lie down most of plaster is a good absorbent in the

58. Before commencing to milk, 42. She must be comfortable to do brush all loose dirt from the sides and udder of the cow.

59. After a little manipulation of the teats and udder, the milk is ready 44. Don't drive her fast, and don't to "come down." Then is the time to take it, and do not delay.

60. Milk as rapidly as possible with-

61. No definite rule can be given as

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in milking, as cows differ and hands differ so much; but be sure of one thing,-please the cow if possible.

62. There should always be a friendly feeling between the cow and the milker, and milkers should not be changed if it can be avoided.

63. A cow will not "give down" her milk to a milker she hates or is afraid of, and what she does give will be deficient in butter fat.

64. Always milk a cow in the same manner, at about the same time and speed. Any change will irritate and may find their way into it. tend to excite her.

and at the same time of day.

66. When it comes a cow's turn to be milked, she knows it, and expects it, and wants to be milked.

67. If you disappoint her and milk her half an hour later, the chances are that you will get less and poorer milk than if you milked at the proper time.

68. Always milk a cow dry before leaving her, but do not continue strippirg after the milk is all drawn.

69. If part of the milk is left at each milking in the udder, nature will soon stop providing it, because it is not taken.

70. The last milk drawn from a cow is much richer than the first. The last quart usually contains more than three times as much butter fat as the first quart.

71. Milking should be done with clean, dry hands.

Care of Milk.

72. Milking should be done in clean, dry tin pails. No wooden pails should be used.

73. Milk should not be exposed to foul air.

74. If it is to be set for creaming. It should be set as quickly as possible after milking.

75. If it is to be taken to the factory, either creamery or cheese factory, or temperature and your separator will is to be sold in the market, it should invariably do good work.

to how the teats should be handled be immediately aerated with pure air and cooled.

76. Don't neglect to aerate the morning's milk, even if you are in a hurry. It is often the worst milk delivered at the factory.

77. The milk of a sick cow is not fit for food, and is prohibited by law.

78. Strain the milk as soon as drawn from the cow.

79. As long as milk is warmer than the surrounding atmosphere it is continually giving off vapor, and will not take on odors, but injurious bacteria

80. If milk is cooler than the sur-65. Always milk in the same order rounding air, the impure vapors in the air are rapidly condensed on the milk, thereby causing taints.

81. If carried to the factory, there should be a ventilator in the top of the can, and the can should be protected from the rays of the sun on the way.

82. If all the patrons of the factory do not deliver good milk, the product, whether butter or cheese, cannot be first-class, and cannot bring first-class prices.

Butter Making.

83. Good butter can only be made from good milk, and this can only be had from healthy cows kept in a good wholesome atmosphere, and fed on good, sweet, wholesome food, with pure water to drink.

84. The most effective way of obtaining the cream from the milk is the use of the separator. Indeed, it is very probable that the time is near at hand when the creaming of nearly, if not all the milk used for butter making, will be done by the separator, either on the farm or at the creamery.

85. The separator gets nearly all the butter fat.

86. If a separator leaves over 1-10 per cent. fat in the skim milk it is not doing good work.

87. Keep up the proper speed and

rate well should be as high as 80 degrees.

89. It separates best immediately after being drawn from the cow, before it has had time to cool.

90. Immediately after separating. the cream should be well aired and cooled down to about 60 degrees, and held at that temperature till slightly acid, and then churned.

91. Let the cream get thick, but never let it "whey off."

92. The usual temperature for churning is from 58 to 62 degrees, but no one can tell what temperature is best for his milk until after a trial.

93. The churning, to be most exhaustive should be done at as low a temperature as possible, and not be longer about it than 45 to 60 minutes.

94. Don't be satisfied with your churning if you leave over two-tenths per cent. fat in the butter milk. It don't pay.

95. If the butter is too soft it has probably been churned at too high a temperature. It is easy to overwork such butter, i. e., spoil the grain.

96. Under certain conditions of food, and with certain cows, churning has been done quickly at 40 degrees.

97. Under other conditions it has been impossible to churn at less than 70 degrees.

the size of wheat kernels the churn should be stopped.

a few turns of the churn to make the into cheese. butter float.

100. Draw off the butter milk and wash in two or three waters.

but if your customers are particular grow, so that in the end it will be a about the salting, it can be done more losing business. to a nicety by taking the butter out and salting on the worker.

about an ounce of salt to a pound creameries. of butter.

dry butter, work it once, then let it tice. Me in a cool place from two to three 117. Remember that the most seri-

88. The temperature of milk to sepa- hours, then rework and pack, and you will have no mottled or streaked butter.

104. Make your butter as to salt and color to suit your customers, and put it in such packages as they wish.

105. An uneven distribution of salt makes streaked butter.

106. If you make good butter you can always get a good price for it.

107. Send it to the butter market. 108. If you have no special customers, send it to a good, reliable commission man, and he will soon find buyers.

109. After they have tried it and found it good, they will ask for it again, and after a while, if they find it good every time, they will get to thinking they can't get along without it and can be induced to pay a fancy price for it.

110. A good reputation is a good help in making butter, so when you get it, don't for the world blast it by sending off a package of poor butter when there is a chance of a good customer getting it.

111. If, by accident, you have a poor tub of butter, don't put your brand upon it, but send it off and let it be sold on its merits.

Cheese Making.

112. It is a pretty well established 98. When the butter is in granules, fact that a profitable butter cow is also a profitable cheese cow.

113. It is not wise to take any 99. Throw in some salt, and give cream from milk that is to be made

114. There may be a small per cent. gain by the operation, but it will be followed by a damaged reputation 101. Many persons salt in the churn, that it will take a long time to out-

115. Milk at cheese factories should be pooled on the basis of the butter 102. The average customer wants fat contained in it, the same as in

116. Many careful experiments have 103. If your customer wants pretty proved that this does substantial jus-

contend with is tainted milk.

118. The causes of taint in milk milk may afterwards get and rot. nearly all rest with the producer.

patrons that the cheese maker should on the way to the factory. refuse milk delivered at the factory 130. Do not allow whey to stand in bad condition, but the cheese maker in the milk cans after returning from cannot always tell when milk is bad, the factory. as germs may be in it that will develop only after heating it. Such factory unless it can be obtained sweet. germs get into the milk through uncleanliness.

120. One batch of impure milk contains enough bacteria to contaminate an entire vat of pure milk.

121. Milk for cheese making should not be treated precisely as it is for butter making.

122. Thorough aeration is absolutely necessary before the milk is placed where the temperature would be rap- the factory. idly lowered.

123. A simple way to aerate milk the factory, wash the cans. is to pour it slowly with a long handled dipper, one that will reach to the bottom of the can.

124. Do not use too large cans, for the milk will not be properly in the sun, and have a good circuaerated in such cans.

125. Be sure that the cans are smooth and well soldered and that hand in won't scald a can. there are no corners for dirt to get into.

126. The same thing with the cov- div dends. ers. Don't buy a can where the edge of the cover is turned over and not use it as a friend and counsellor in soldered.

127. Keep milk cans in good repair, but do not try to tinker up a rusty good : friend in the cheese factory old can that mas passed its day of as it has been in the creamery. usefulness, for it may spoil more milk 141. And your ways will be ways of than ten new cans would cost.

128. In repairing cans don't have paths of peace.

ous obstacle the cheesemaker has to a bottom soldered in over the old one or a patch put on under which the

129. Shove the cover down close 119. It is only justice to deserving to the milk, so that it will not churn

131. Better not take whey from the

132. Insist upon your cheese maker thoroughly scalding the whey and scrubbing out the whey tank daily.

133. Sweet whey, when properly fed, may be worth from eight to ten cents per 100 pounds.

134. Sour whey, when overfed, may not only be a positive damage to the animals receiving it, but a course of contamination to the milk carried to

155. As soon as you return from

136. Rinse first with cold water, then wash thoroughly with hot water, rinse last with scalding water, and place cans where they will drain, be lation of air all around.

137. Water that you can hold your

133. Do not rely upon the pump in tin.cs of scarcity of milk and low

129. But cling to the Babcock test, times of doubt and perplexity.

140. It will prove itself to be as

pleasantness, and your paths will be

HOUSEHOLD ECONOMICS AND UNIVERSITY EXTENSION.

Mrs. CHARLES KENDALL ADAMS, Madison, Wis.

Round Table Club in Boston, when Mr. speaks for itself. R. G. Moulton made his first plea in that city for the introduction of the its most ardent supporters will admit. University Extension Movement into Wide as is the field it covers there this country. The distinguished speak- is a preserve or two left either uner of the evening told his story with touched or receiving comparatively his accustomed force and eloquence. small attention. And here is our op-He was answered by men in every way portunity. We, for the present at worthy so important a debate. When least, must make it possible to take up the meeting closed it appeared as some portion of the labor and so imthough the cause Mr. Moulton repre- press others with the need for it that sented was one somewhat alien to they, seeing the good work, shall by American methods, American geogra- and by ask to have a share in it. The phical lines, and, more than all else, first Book that is thus waiting is one to American University Professors familiar to us all, holding for the stuover-worked, as so many of them al- dent a whole university of wisdom and ready are. To one interested listener, the highest culture, yet far from reat least, on the occasion I have alluded ceiving the attention and the study it to, it seemed clear that, notwithstanding all the seeming obstacles presented, the gift Cambridge offered to this side of the Atlantic would one day be regarded as a vitalizing element in our educational work.

University Extension,

The expectation has been more than fulfilled. Today the University Extension Movement is not only a part of our educational system, seemingly as fixed and permanent as the system itself, but its success has far outreached lected. That all our discomforts are the most sanguine hope. The great the result of this neglect I am not dismovement, started a little over three posed to assert; but it is unquestionyears ago, is pushing forward with a ably true that, for some cause, the quiet but steadily increasing enthusi- stars in their courses seem to have asm, carrying with it an inspiring pos- conspired against the house-keepers of sibility, and holding a banner on an America. outer wall that heralds the blessing Go where you will through the length it promises to an ever-increasing mul- and breadth of this land you will hear titude. But this paper is not intended the cry going up from perplexed and

I was present at the meeting of the to sound its praises. It is eloquent and

Still the work has its limitations as deserves.

The Bible and the Cook Book.

But I am not here to plead for this great Book. The book whose cause I am to advocate is of a very different order. And yet, I say it with all reverence-it seems to me if we go forward with the Bible in one hand, it is almost as essential, that we carry a good Cook-book in the other. Among us as a people the latter book has been too long and too systematically neg-

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burden of a slavery that reminds us one woman told me not long since that of the slavery of another and scarcely she had eleven cooks in her kitchen less oppressed people. Of all the mis- in one month: another that she had eries this slavery entails who dare twenty-three in eleven months. Of all venture to tell? But one misery it has that these women endured in these brought that it is full time to remedy; brief days-it would be impossible to for with our dependence upon a class narrate. that is incompetent, utterly ignorant rather than make changes" is, howof every law of health, yet necessary ever, the conclusion too frequently imto provide for us the food on which posed, and distress of mind is in many health depends, we have become al- cases the least, since, too often, the most a nation of invalids.

Poor Cooking-A Dyspeptic Stomach,

If it be true, as one wise man tells us, that a dyspeptic stomach, as well as a lying tongue, is an abomination to the Lord, our plight before Heaven, as well as upon earth, must be pitiful indeed. I am constrained to believe that nowhere in the civilized world is the food prepared so imperfectly and with such defiance of every chemical law as in this land of ours. Go where you will, north or south, east or west, and the ordinary table, publicly or privately served, is often, very often, made up of ill-cooked meat, sour bread, improperly treated vegetables, soup of which a celebrated Englishman was heard to say: "Take it, wife, it's not so nasty as it looks."

Perhaps some one will think this The picture picture is over-drawn. cannot easily be over-drawn. It would perhaps be more correct to say, the half cannot be pictured or told.

The Domestic Problem.

domestic problem in all its least recommendation. The phases-and cooking is but one,-has not vet been revealed at all as it deserves. It does not mean that overburdened women have not found time to wail over their distresses, but what has such wailing ever accomplished? The revealing must be of another sort and let us hope one that will lead to some reform.

The large majority of women have thus far simply endured, believing quently into out of the way places, that their only resource is in the meas- and we stopped usually at three inns ure of their endurance. So they have a day; we never had an unpalatable sped the going, and welcomed the com- meal, during the entire journey. With

weary women struggling under the ing of the new maid-of-all-work. Yet "I put up with anything mistress herself does not comprehend the worst evil.

We all know there is a class that is measurably free from such conditions; and yet who will say that even a full purse purchases entire immunity from them?

Is Cooking a Lost Art?

In the summer of '87 I went with a party of friends from New York to Alaska. We journeyed as comfortably as it is possible to do except in a private car and with one's own chef. From the time we left St. Paul until we reached Tacoma, making a tour of the Yellowstone in the interim and traveling a distance of over three thousand miles, we had not one meal that could be called good. Every one that has traveled far in this country will admit that this experience is not peculiar to the west. In whatever direction we go the same conditions prevail. Occasionally, like an oasis in a desert. one finds a table where palatable meals are provided, but its rarity is not its

The contrast between our own land and Europe in this particular, may easily plead cause for the exodus that fills the pockets of steamboat owners and inn-keepers year after year.

Two years ago I was one of a party of six making a coaching tour on the continent. We traveled a month covering a distance of over twelve hundred miles. Our route took us fre-

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one single exception every meal was deliciously cooked, daintily served, and temptingly prepared. If cooking is not a lost art over there, why should it seem to be here?

Waste and Improper Cooking.

But comparison of another sort comes with an equally suggestive and forceful claim. In no other land than ours is there so much waste. For this reason alone we would appear to want the most fundamental essential to a permanently prosperous people.

To the thrift of the French housewife is largely due the thrift and prosperity of the French nation. I heard a distinguished clergyman say once that after a lengthened stay abroad he returned to the dining room of a metropolitan hotel, only to feel himself sated before he tasted food at the array of over-laden dishes set before him. And then he added .- "our house-keeper in Paris brought home the wing of a chicken to make her nutritious and appetizing soup,-if the house-keeper in America asks for less than a pair of chickens she receives small attention."

No Preparation for Home Economics,

It is needless, I am sure, to enlarge on this topic; we all know the condition, we all feel the resultant evils. We are all conscious that as housekeepers and home-makers our tasks are not all of our own choosing; our toils not all of our own making. And here the question may be asked, What have we done to change the result, to make different the situation? We know that we are at the mercy of a class that is not only ignorant and incompetent but is also absolutely without preparation of any sort for the special labor it professes to perform. The boy from the home spends years learning the trade or the profession which is to give him a living. The girl from the same home goes to your door, offers herself and her ignorance at the highest possible wages, proceeds ing. All this and what has it amounted to break your dishes, mar your furni- to? Not long since a house maid after ture, destroy your peace of mind, to serving for six months one of the gen-

say nothing of your health, and then. when she has exhausted your patience. with perfect composure, she packs her trunk, passes on to your neighbor, to repeat the same performance at the same relentless cost. Do not blame her. She is better than we deserve and if you examine you will find a vour contrast occurs in similar own home. Your sons are carefully trained for the line of work they mean to pursue. It does not enter into your consciousness that any other method is possible. But how is it with your daughter? You expect that some day she will have a home of her own. Do you give to her the same careful training for her work that you give your son? On the contrary, in nine cases out of ten,-yes, in ninety-nine cases in a hundred, the young woman of today enters upon her married life to learn the ways of a household,wise, it may be, in every other form of mathematics .- ignorant of the mathematics necessary to the economy and careful management of her husband's income. It is absolutely true that for the work of the home neither your daughter nor your servant are receiving today any proper preparation.

Educated Servants.

But this contrast, far as it might be carried, must be brief. We must return to the class who are and must be in the nature of things the employes. and we desire to know better our duties as employers. Once again the question comes, What have we done How are we dealing for this class? with their ignorance? Have we as yet done anything to change, to enlighten, to educate, to lift them up in any way from the low plane on which they live, and from which they regard their work?

Have we not been kind to them? O yes, superlatively kind! We give them all we have of home comforts, of home privileges, of churchly teacha home filled with everything that besiege the doors of every girl's school, makes life good and winsome, came every college and every academy where to her mistress to tell her she was Naturally she was about to leave. asked "why?" "I don't find house-work interesting, and I am going back to work in the factory." Back to the factory she went to work from morning until night for three dollars a week out of which she must board herself.

Now I ask of what avail was kindness to that young woman? And she represents a class largely in the majority. Such kindness as we have been bestowing is likely to give painful illustration of the Master's precept, and too often the pearl we gave has been trampled under foot while its recipient turned again to rend the giver.

Far is it from my thought to lose sight of the class of faithful, painstaking and efficient servants found here and there in almost every community. Our daily prayer must be to multiply them, but if we are to have our praver answered we must add work to words -only then can our petition avail. It is one of the places where we must be our own almoners. This leads me to the second part of my paper.

Thus far only a faint presentation of a well-known and painfully felt condition-a condition at which it is easy to complain and for which complaining does nothing. It is also easy at any time to be iconoclastic, and to find fault requires no very great wisdom. To remedy, to build up, requires the force; towards upbuilding of a certain kind my hope is directed. And first, I would change the entire outlook of the domestic, the entire relations of employer and employed by making every branch of house-work educational, and this for the mistress as well as for the maid.

A Course in Domestic Science.

I would ask that a chair of Domestic Science be as much a part of a university course or a college curriculum where women are taught, as a chair of proceed? So much is to be done, where

tlest and loveliest women I know, in Political Science is at present. I would young women enter, until some such claim is recognized. I would teach and preach from this text until the air is filled with a necessity for reform in this direction. How much we could accomplish for the present generation is problematical. Reform is for the present-its fruit is for the future.

> The best illustration that I can give of an attempt of this kind, though not quite analogous, is found in the little Republic of Switzerland. Here about five or six years ago one of the noted men of this wonderful country determined to bend his energies to the lessening of the drink habit. Having concluded that much of the drunken misery is the result of ill-cooked or insufficient food, his most successful venture has been in the establishment of cooking and training schools. Wherever we went two summers ago, in the smallest hamlets we found a successful school in operation; we made inquiries everywhere and found that far beyond the most hopeful vision had been the results already attained, and the promoter of the enterprise told us himself that he was quite sure no other method had ever won such a victory. The girls with whom we conversed showed us their certificates with as much pride as ever a blooming graduate showed her newly acquired The house-keepers college diploma. who are, as a rule, finished in every requirement of the household work, assured us the establishment of the schools had been an inspiration, and it would be impossible to measure their influence on the country at large. Had we time, much could be told of this noble philanthropic enterprise, but perhaps enough has been said to suggest its possibility elsewhere, even though the motive for it rest on other foundation.

What Shall We Do About It?

And now you will ask how shall we

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like this whose accomplishment for wo- share in everything that pertains to men has assumed such grand and noble the advancement of the community in proportion,-who have proven them- which she 'ives. In this she is in conselves ever ready to hear new methods, to heed new calls-surely no appeal need be made in vain; and when that the three great nations of Europe. appeal comes to you in behalf of the most important factor in a woman's a significant lesson-one that we may life-for certainly no woman will at- learn in all its rich suggestiveness. tempt to deny that the first element Perhaps its chief warning is that in in our happiness belongs to the successful administration of the home,-I feel sure in advance of your sympa- take upon us a larger vision and a thy, your support, and so far as is possible, your complete and hearty cooperation.

Some one may deny the statement that our ideals of the home are as yet imperfect; and when we remember the many beautiful homes that give to us of their divine and matchless ministry, it is easy to forget how small a minority they count in our experience as a people. But we must not deceive ourselves by supposing them to be in the majority. The high ideal for the majority is what we want-an ideal based on three great requisites:

First. Careful preparation for the work to be done;

Second. Thrift in its performance;

Third. Absolute knowledge of all detail on the part of the house-keeper.

Where to Begin.

The stream will not rise higher than its source, and the best maid, the most accomplished cook, soon becomes inefficient when she finds that the mistress whom she serves is ignorant of her duties. The work then must begin in this land with the employer and not as has been so mistakenly supposed, with the employed.

Perhaps, as has been intimated, little can be done with the woman who has reached middle life. Even if her desire were great to learn, her duties are, as a rule, too pressing and too imperative to afford the time. Indeed it may be said in passing that it is doubtful if another nation in the world makes greater demand upon its women than the American nation is making croached on the limit of time appointed,

shall we begin? Facing an assembly today. She is expected to have her trast to the women of other nations, in marked contrast to the women of

Perhaps there is in this contrast outside matters we call a halt, and in matters pertaining to the home we deeper sense of its importance.

Train Our Young Ladies.

And now how shall we proceed? I have said that the first requisite is careful preparation for the work to be done. I have also said that we must enter the schools, the well equipped universities public school, even the where young women are admitted. We see to it that manual training is provided for our sons; but here is a training of far greater import, and one upon which the moral well being as well as the physical development largely depends. "The destruction of the poor is their poverty" finds pitiful proof in many more ways than is generally believed."

The first step in our reform must be toward the young women, but it need not end here, nor with them. Something must be put in the air we breathe, some message that shall permeate us all, that shall appeal to us with a potency and a strength worthy of the work to be accomplished.

Perhaps, indeed, the first thing needful here as elsewhere is to appreciate fully its claim upon us. Therefore your first work must be to make clear the claim. We must ourselves be so filled with the necessity for a change that we shall induce others to believe. It must be said to us-not-"almost thou persuadest me," but "thou hast persuaded me."

Summing Up.

And now, as I have already en-

I must hasten and try to sum up briefly the work to be performed.

First. To change the present outlook of domestic service by making every branch of it a part of every young woman's school training, and so far as is practicable, of every older woman's mental equipment. This change sooner than any other will alter the view of your servant. She will come to regard it from a different standpoint and one that will increase her respect for her work. It will also, we believe, induce larger accessions from the more intelligent classes.

this result:- to appoint committees to wait on school boards and petition them to move speedily in this matter. Do not be satisfied with the establishment of a cooking school. That is well, but it is only one step; an important one. it is true, but not far enough, and the establishment of the cooking school has thus far, so nearly as I can learn, not drawn into it the very class we want to reach. Besides, a girl can learn cooking, it is claimed, while she is pursuing other studies. If the chair of domestic science is properly conducted, it should have the entire time of a student for at least six months-& year would be better.

Third. Write on this subject, talk about it, get the newspapers to discuss it with you, present it not alone by precept, but by practice; for one good training school will be more eloquent than all your words, written or spoken. The Boston training school has probably done more to raise the standard of efficiency among servants than any other school of its kind in this country. But its work is among servants, the school that you establish must number among its students, yourselves, your daughters, your sisters, your friends.

True Democracy Essential.

If there is to be one true democracy in this country it must be here. In this training school, or in this branch of your study, every one must be on ordered home depends not only the the same plane. The same condition prosperity, but the life of our nation.

must exist as in the training schools for young men, where it is not at all uncommon to find the son of a millionaire working side by side with a son of the farmer or the son of a mechanic, and these working their way too, yet feeling themselves in all ways on a level with the young man next them. There is no social confusion here; on the contrary, there is every element for true social stability, and this important feature is one equally inherent in your school of domestic science.

I come lastly to the most important Second. To devise ways to bring item of my paper, namely, that in-asmuch as we all learn to be servants, there shall cease to be a separate class known as servants, that we shall all serve in the best sense, by serving each other, and shall hope to eliminate from our house-keeping any distance between the employer and the employed, at least so far as knowledge is concerned.

Education Necessary.

As we come together understanding the work to be done, there must come to the mistress another level on which to meet her assistant; to the maid a more self-respecting view of her employment, and one, let us hope, that shall command from us the respect which everything that conduces to the well-being, the happiness, and the comfort of our home demands.

Thus far the domestic problem is one that has remained unsolved. Let us try what education will do for it; but let us try not in some tentative, . slip-shod fashion, but with all our zeal, all our energy, all our consecration of purpose. Let us give to it ourselves, and those of us who give ourselves to any cause, are sure of success, confident of blessing. No cause of the present appeals to us as does the cause which this paper so feebly presents. It has to do with all that is dearest to every heart, most vitalizing to every life, for on it depends the well-ordered home, and on the well-

PROPER CUOKING.

PROPER COOKING.

Dr. R. C. FLOWER, Boston, Mass.

beginning to be appreciated. Those importance of proper cooking, (not an who have given attention to this sub- explanation and demonstration of the ject have learned that the human art of cooking), and the importance of stomach is a miniature individual, and having proper food to be cooked. should be fed with what it wants. what in nature it calls for and requires. so it will serve you best.

Over thirty-five hundred years ago Niantecz, the great Chinese physician, said. "Good cookee, good stomach; no cookee, bad stomach; bad cookee, no stomach."

Phech-Necho, the fabled medicine man of Egypt, and associate of Osiris and Isis, concisely expressed his ideas when he said, "My soul in this world is dependent upon my body, my body upon my stomach, my stomach upon Teimech." *

Mythology tells us that Goliah of Gath, the Philistine who went down before a stone from young David's sling, was raised upon food prepared by Mitleweth, the charm of the oracle who prepared food for angels, while his six brothers were raised upon food prepared for indifferent mortals, and grew up to be small, poor, lean men, inferior in brain and will power.

Importance of Proper Cooking.

The genius of all ages has recognized the importance of proper cooking, and that with the proper knowledge of the chemical composition of food ingredients and of cooking, man can carry through life, healthful physical and controlable vigorous mental forces through his power and applicable to all the pursuits and events of life as he desires.

I shall only make a few suggestions

*His cook.

The importance of cooking is just in connection with two thoughts,-the

First:-The importance of proper cooking. Food properly cooked. after being properly prepared for the table will digest easily without any artificial aid in ninety-seven out of every one properly hundred stomachs. Food cooked retains all the nutriments it possesses before cooking. These nutriments through the process of assimilation find their way into every part of the human body, making nerve, muscle, bone and brain, increasing the blood corpuscle, stimulating the circulation and dilating the pores, thus building up uniformly every atom of the human organism.

Improper Cooking.

Food improperly cooked becomes a tax or partially deadened mass of chemical atoms and the portion of these atoms thus deadened or destroyed cannot possibly do the person any good, passing through the system as a residue, or they are improperly taken up into the system through the distribution of the normal or healthful nutriments, and forming abnormal fats or fibrous tissue, engorging lobes, weakening functions, disorganizing organs, stagnating circulation, and thus adding additional internal burdens to the brain forces much greater than all the external burdens could ever do.

Now, get the thought clear in the mind,-improper cooking always destroys more or less of the nutriments or the life which the microscope shows are contained in the cells of the food we eat, consequently the body loses the benefit of all these nutrimental germa thus destroyed, while on the other hand, as dead and non-vitalizing atoms they produce numerous diseases, obstructing, engorging and inflaming all tracks, canals and organs, indirectly breaking down the nerve forces, and effecting the brain and disposition; or they irritate, poison and destroy the lining of the mucous membrane, increasing catarrhal troubles, aggravating stomach and bowel difficulties, and weakening the urinal powers of the kidneys and bladder.

Health in Proper Cooking.

On the other hand, food properly cooked retains all the nutriments or life elements, giving the consumer all the benefits of the food he eats, without producing any of the bad effects of non-distributed nutriments, or dead atoms.

The Mikado of Japan, after suffering many years from dyspepsia in an aggravated form, was cured by eating food prepared by a skilled cook when the physicans had all failed to even give relief, and in appreciation of the cook's service in restoring him to health, he conferred upon him the title of D. D.-"Doctor of Doctors." At a banquet given by him to the physicians in honor of the cook's elevation to their honorable ranks, the Mikado, when asked to respond to a toast on the best way to get well, replied in his inimicable and funny way:

"Keep away from doctors, Our wise and good men, For they will give you physic, And then will come your end.

Physic was made for dogs, Food was made for man, Take physic if you would live with Gods.

But food, if you would remain a man.

Give me food cooked well, Every day in seven, If you don't I live in Hell, If you do I live in Heaven.

I am the Mikado of Japan, I take no medicine from any man, I take my food from Serephon,* And am the healthiest man in all the land.

Here's to the Doctors, but they will rue

What with physic they try to do; For when as wise as they are good, They will cure the sick with proper food."

Second:-The importance of proper food. The two essential features in connection with this thought are, first, food free from all impurities, and second, food rich in phosphites. Try to eat only such food as is healthy and well developed for its time of life and growth. This should be observed in the selection of vegetables as well as of animal food. Impure food taken into the system, whether vegetable or animal, will develop in the system a bacteria or microscopical germ cell. In one case we have scrofula in the blood, membranous troubles, catarrh, consumption, each with its attending evils.

You may eat impure, wormy vegetables and fruits for a time, without any marked evil results, but in time they will make your life a veritable hell. You may eat impure meats for a time with impunity, but soon your end will be a nervous wreck, if not the insane spectre.

Phosphite a Necessity.

Not only should food be free from disease and blight, but it should be rich in phosphite. If insufficient in phosphite it may keep up the exterior man, but it will let the nerve and brain forces go to wreck, while food sufficiently impregnated with phosphite will develop and sustain a perfectly beautiful exterior, at the same time developing the brain and nerve forces far in advance of the physical or exterior. I could not attempt the elucidation of this thought in so short an article and I only make the suggestion on account

*His skilled cook.

it out.

have known such a one to give indi- wife prepare the food for him and his ave known such a one to give indi-gestion to a whole family. This is a danger seldom thought of while it fre guently menaces the health of the for the rest of the household.

of its importance and let you study whole family and the happiness of every occupant of the table. The hus-One other suggestion and I am done, band had better employ half a dozen Do not employ a dyspeptic cook. I cooks than have his nervous, dyspeptic



COOKING SESSION.

March 1, 1893.

held by the Farm Institutes at the of the Farmers' Institutes. These In-Court House, Superintendent Morrison stitutes are really an extension of the had secured the services of Miss M. L. Clarke, principal of the Milwaukee ing, and while they are provided es-Cooking School, who gave a cooking pecially for the farmers' education in demonstration at the Armory, each of the three days the Institute was held, for the last two years Supt. Morrison and to which the ladies of Fond du has tried to furnish a cooking school Lac and vicinity were invited. That for ladies. A year ago at Portage there the value of these lessons was appreciated was demonstrated by the large number in attendance, the interest manifested and the intelligent questions asked.

At the first lesson, given Wednesday afternoon, March 1, Miss Clarke was introduced by Mr. A. J. Decker, of Fond du Lac, who spoke as follows:-

Ledies of Fond du lac:-There is an old adage, and I think a very apt one, which says that "a man's heart is reached through his stomach," and if this is true, and I believe it is, it is very fitting that every lady should

Fond du Lac, Wednesday Afternoon, clearly understand what he likes best in the manner that he best likes it. In addition to the exercises being This constitutes a portion of one branch State University in the branch of farmall that pertains to work on the farm, was a cooking school, and it met with such unbounded success that it is to be continued here at Fond du Lac. I am very sure from the large number present, that we are going to have a very wide interest in the lessons to be given here for the next three days.

Miss M. L. Clarke, principal of the Milwaukee Cooking School, for the past seven years, and a lady experienced in all matters pertaining to the culinary art, conducts the cooking school with us, and I take great pleasure in introducing her to you.

DOMESTIC ECONOMY.

MISS M. L. CLARKE, Principal of Milwaukee Cooking School.

would endorse what Mr. Decker has that are good for them in a way that just said, that the best thing for a woman to do is to give man the thing have reached the heart of the cooking he likes best in the way he likes it. If he will allow me I will venture an wholesome things palatable. It is alamendment to that,-That all house- ways easy to make palatable dishes wives ought to give to people for whom | that are unwholesome,-so we are here they provide, their children as well today, and tomorrow, and the next

Ladies :- I am not quite sure that I as the man of the house, the things they will like, and then, I think, we school. It is not always easy to make
day to take up a few of the common, or less of the juices are dissolved and every day dishes, the simple foods, and find out the very best and most attractive ways of serving them.

We will begin this afternoon with a beef stew.

Beef Stew.

of Cut two to three pounds small meat in pieces. dust with pepper, salt and flour, and brown all over in hot drippings. Put in a deep stew pan with water enough to cover well. Brown 2 tbsp. onion in the drippings left in the pan, add them to the meat, with 2 tbsp. dried mushrooms, and simmer 3 hours, or until tender. Parboil 1 quart potatoes for 5 minutes, drain and add them to the meat. Cook ten minutes. Then drop in the dumplings, cover closely and boil fast 10 minutes. Take out the potatoes and dumplings, thicken the gravy with 1 heaping tablespoonful of flour rubbed smooth in a little cold water. Add more seasoning if needed, and serve hot.

Dumplings.

pint One flour. two level teaspoonfuls baking powder. sifted together four times. Mix with milk to a soft dough.

I suppose many of you will recognize the cut of meat that has been selected for this dish. It is what is known as the chuck-rib, cut well forward in the fore-quarter, and has a long, narrow, bone like a piece of gristle in one end. It is a little piece of the shoulder blade, and whenever you see it in a roast, or if your market man sends something that he calls steak in which you find that bone, you recognize a part of there always comes with it a long, the shoulder blade. kind of meat you want for a roast and rather tough, and being very thin or steak. It is good for braizing, pot- cooks more quickly than the rest and roast, which is another form of braiz-becomes dry. It is economy to cut it ing, or stew, but not what you prefer off before putting the roast into the for plain roasts or for a steak.

from the market. I have a clean, wet other excellent piece for this is what cloth, and will sponge the whole out- is known as the "h" bone. This is a side of the piece. Meat should never be part that has a juicy, savory and fine-

instead of being left in the meat for the good of the dish when it is cooked. are thrown away in the water used in washing.

We shall put on the stove in this large kettle, two quarts of cold water and drop into the kettle the bits of meat, bone and gristle as fast as they are cut. Do not be too anxious to get every bit of the meat free from the bone, because it is all going into the stew, and will slip easily from the bones when sufficiently cooked. The pieces of solid. lean meat are to be dusted with pepper, salt and just sufficient flour to dry the outside thoroughly. Brown in a little hot fat, and as I have no pork drippings, we shall use today a little bacon fat and some butter. In preparing your pieces of meat cut them in as even portions as possible, that they may all be cooked at the same time. With a sharp knife it will be quite easy to cut it in very nearly regular blocks.

Question-What is the advantage of browning this meat?

Miss Clarke-There are two reasons: First, because it tastes good, and second, because it sears the outside and keeps part of the rich juices of the meat in. Such small pieces put into water and stewed for so long would lose all of their juices if it were not for this searing process.

This is one of the most desirable pieces of meat. The most economical is the rib end cut from a piece of beef intended for roasting. You know that when you have a rib roast sent, That is not the thin part of the flank. This is hard oven and use it with the remains of This has been left just as received the roast for a stew another day. Anlaid in a pan of water, because more grained portion of meat. It is a threecornered piece lying between the rump | and round. The chuck rib that I am using today retails at from 6 to 8 cents per pound. The "h" bone will be about 10 cents per pound.

Question-Do you use white pepper?

do, entirely. The Miss Clarke-I black pepper is the little pepper-corns ground whole, and all of the acrid oil of the shell is retained. In preparing white pepper the outer rind is removed and consequently it is much more wholesome, as well as delicate in flavor. You see I dust the pieces with flour enough to dry the outside surface a little so that they may fry quickly. It is not necessary that each side of every piece should be browned. We simply expect to do them well enough to give the flavor of browned meat. The mushrooms will be added alternately with the last of the meat.

Question-What mushrooms do you use?

Miss Clarke-These are dried mushrooms, an imported article. These were cut in small pieces and put to soak early this morning. They are not as pretty as fresh ones, but give a very excellent flavor, a far better flavor than you can possibly get from the canned ones.

Question-Can the mushrooms be left out?

Miss Clarke-Certainly. It is simply a matter of flavor. There is no moral law in regard to seasoning our food, except that we must not overseason, because that is suicidal. You may leave out the onion if you choose, you may leave out the potatoes, or the pepper entirely, in fact even leave out the salt, but I think you will find that rather unpalatable.

This should be thickened with flour and water. Over and over again people put in the flour with all the water they want to use, and then try to rub it smooth and get rid of the lumps. Put in very little water at first, making a stiff paste, which will be stiff the potatoes are cooked. All authorienough so that all the lumps can be ties agree in cautioning us to soak beaten smooth. You may now add potatoes in water to take out the poison

water gradually, beating it in until the whole is just as smooth as thick cream and about the same consistency. When through with browning the

meat, I will cut this onion into slices and not let it brown, but cook just long enough in hot fat to take off the raw taste. If cooked it is like fried onion. The fat that is in this pan is now entirely free of water, and we can pour it off; you will see that the bottom of the pan is covered with a thick brown glaze,-pure juice of the meat. That is going to be dissolved in the water from this broth and will make a most delicious addition to the flavor and color of the stew. Have you not seen a stew that had a gray look? That is not appetizing; you want a golden brown, or a deeper brown if you prefer, and this glaze helps give a rich color.

We have here the potatoes for our beef stew. They will be parboiled for five minutes.

Question-Are they parboiled whole:

Miss Clarke-No, I like to cut them into pieces about 1-4 the size of an egg. They are prettier to serve and cook much more accurately.

Question-What is your idea in parboiling the potatoes?

Miss Clarke-Because the water in which potatoes are cooked contains a large percentage of the acrid-alkaloids that are found in raw potatoes, and it is neither wholesome nor palatable. Have you ever tasted of the water that potatoes are cooked in? Try it, and you will not be surprised that we do not wish the water in our stew.

Question-How about saving the water to make bread?

Miss Clarke-If you could get the value of the potato starch without having the first water that they were cooked in you would find you would get as good results in your bread and you would not have that acrid poisonous principle found in water in which through the whole substance of the potato. Then drain away the water very carefully.

Question-I have known hundreds of housekeepers who used this water to make their bread.

Miss Clarke-But don't you see you are putting it into another form of food? I think what you want is not that first greenish colored water, but that which contains the starch that cooks out. If you will let your potatoes cook five minutes first, and then sifting so many times? throw away that water, you will have gotten rid of the objectionable prin- the baking powder, salt and flour. You ciples because they are dissolved in will never find coarse holes in biscuit the first water. Try it and see if you do not get just as good bread, and more wholesome. I have run across a good many people who find that they lings I want to caution you against cannot eat potato bread, because they cannot digest it. Those who are treating it the way last mentioned will secure good results by taking the little twelve minutes, or even fifteen, accordextra pains. I wish to emphasize the ing to their size, but it is not safe poisonous qualities of the potato. You to lift the cover in less than ten or remember that they belong to the they will certainly go down. Solanum family, containing the deadly night-shade, and the alkaloid contained in potatoes is closely allied to the well-known poisonous plants. In the potato it is contained in the shape of an alkaloid which is entirely soluble. In baked potatoes it is driven off with the steam. In boiled potatoes it is dissolved and poured away in the water.

Before starting to put the dumplings together, be sure that all the rest of the stew is going to be ready. Ice cold milk should be used and they should be put together as quickly as possible. I want to call attention to a fact taught to me by one of my classes a little more than a year ago. I had never before been able to make a baking-powder biscuit exactly satisfactory to myself, and I found that a member of the class was in the habit of always sifting the baking powder, salt and flour together four times. thought this took too long, but have package of macaroni. You can very I timed myself, and find that it takes readily measure it with the eye and

under the skin and to a limited degree | less than a minute. I think it pays to spend this time for the sake of securing perfectly even fine-grained biscuits.

Question-What kind of baking powder do you use?

Miss Clarke-I use the star-crystal, and if I can't get this, any standard that I can get. Of the standard baking powders one is very nearly as good as another. Those that are not standard I know nothing about.

Question-What advantage is there in

Miss Clarke-It is to thoroughly mix when the ingredients are sifted together sufficiently.

Before we leave the subject of dumpraising the cover of the kettle in which they are put to cook, under ten minutes. They should cook from ten to

Macaroni.

Break one-quarter pound of macaroni into one-third inch pieces and put into three pints of boiling salted water. Boil 20 minutes or until soft. Drain in a colander and pour cold water through it to cleanse and keep it from sticking. Put in a shallow baking dish and cover with a white sauce made with 2 cups of hot milk, one tablespoonful of butter and one tablespoonful of flour, cooking according to directions for white sauce. Add 1-2 teaspoonful of salt. Mix 2-3 of a cup of fine cracker crumbs with 1-3 of a cup of melted butter, and sprinkle over the top. Bake till the crumbs are brown. If cheese be liked with it use 1-2 of a cup of grated parmesan or any other dry cheese. Put part of it with the macaroni and mix the remainder with the crumbs.

You want to take 3-4 of a pound

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namer first. There is a nice little box left to put away. It should be broken into small bits before putting on to cook, small enough to serve. Now put on water thoroughly salted, and let it be boiling hot to throw the macaroni in as quickly as possible.

Question-Do you ever prepare macaroni by soaking it in cold water?

Miss Clarke-I think if you will remember for a moment that macaroni is one of the starchy foods you will see that it needs to be treated like all starch and put into boiling water to get good results. Did you ever make starch with cold water and did it ever stick? If you want to get a pasty quality to your oat-meal, rice, macaroni, or any other starchy food, treat Otherwise it with cold water first. drop into boiling water and let it come to a boil as quickly as possible. All starchy foods need to be treated in this way.

Question-Is there any particular kind of macaroni?

Miss Clarke-The Italian is a little nicer than the American because of the different quality of their wheat. In southern Europe the wheat is very hard, and contains a larger percentage of gluten than American wheat. Do not cover the macaroni closely.

Question-Why should it not be covered?

Miss Clarke-One thing, it is almost sure to boil over. The starchy matter rises and bubbles, and the bubbles pile up just as milk does, and is sure to go over. For another reason it goes to pieces more, and why I am sure I do not know, possibly because the confined steam raises the water to a higher degree of heat. I never have been able to quite satisfy myself.

When the macaroni is perfectly tender it must be drained thoroughly, put in a basket sieve and cold water poured through it to take off the salty water in which it has been boiled. This leaves it perfectly clear and soft. While the crumbs that go on the top of the

break it off by cutting through the draining we will put together the cream sauce with which it is to be served.

White Sauce

half milk pint milk. or One and half white stock. two tablespoonfuls butter, two heaping tablespoonfuls flour, one-half teaspoonful salt, 1-2 ssp. pepper. Heat the milk over hot water. Put the butter in a granite saucepan and stir till it melts and bubbles. Be careful not to brown it. Add the dry flour and stir quickly till well mixed. Pour on 1-3 of the milk. Let it boil and stir well as it thickens. Tip the saucepan slightly to keep the sauce from scorching. Add another third of the milk. Let it boil up and thicken, and stir vigorously till perfectly smooth. Be sure that all the lumps are rubbed out while it is in this thick state. Then add the remainder of the milk. Let it boil, and when smooth add the salt and pepper, using more if high seasoning is desired.

We have here a pan thoroughly rubbed with cold butter in which the macaroni is to be baked. The cheese we will put through this revolving grater in a short time.

Question-What do those graters cost?

Miss Clarke-These cost \$1.25. It is the "Ida" and is easily kept clean. The handle comes off and the grater comes out, so all portions can be cleaned thoroughly. It can be used for anything about cooking that you wish to grate.-horse-radish, lemons, cocoanut, bread crumbs, etc. I am putting the seasoning this time into the macaroni instead of into the sauce but it could just as well be mixed with the sauce. We have here a layer of seasoned macaroni. I am going to put a thick dust of crumbs of cheese over it and pour on this hot sauce until it almost floats, but not quite.

Question-How much cheese do you use for the macaroni?

Miss Clarke-I like to allow four heaping tablespoonfuls to be mixed with dish, and for the layers between, much or little according to your taste. You want just enough to give it the flavor of the cheese, too much becomes hard in the cooking. This will be ready to serve just as soon as it is boiling hot through and the top browned.

Question—How much cracker crumbs do you use for macaroni?

Miss Clarke—For a dish of this size 2-3 cupful, varied more or less to suit.

Question-Do you ever cook macaroni with tomatoes?

Miss Clarke—Yes, but there are so many people who do not care for tomato that I do not dare to use it for such a large audience as we have today.

Question-Will you please tell me how to do it?

Miss Clarke—All you have to do is to substitute strained tomatoes for the milk in the sauce that you make to put with the macaroni, and leave out all the cheese and celery salt. It is most delicious.

Question-Do you put anything in the tomato?

Miss Clarke—Salt, pepper and plenty of butter, and a few drops of onion juice, if liked.

Question-No sugar?

Miss Clarke—If you want it, just enough to take off the raw taste, but for a pint of tomatoes I wouldn't put in more than a saltspoon of sugar.

Corn Fritters.

Beat 2 eggs well. Add 1 tablespoonful milk, one-half cup flour, one teaspoonful salt, one-half saltspoon pepper, one can of corn chopped fine. Dip by teaspoonfuls into smoking hot fat. Cook two to three minutes.

Question-Do you use any brand of corn?

Miss Clarke-Yes, any standard brand. This is called "Golden" and is recommended by your local grocer.

Question—In season do you use green corn in the same way?

Miss Clarke—If the corn has been slightly scalded you can use it in the same way.

Question-Do your corn fritters turn themselves?

Miss Clarke—They will, if you will drop them into deep fat, when they brown on one side they will turn themselves. These are cooked on a greased griddle and must be turned like pancakes.

Escalloped Tomatoes.

Season one quart of tomatoes with one teaspoonful of salt, one saltspoonful pepper, one teaspoonful onion juice, one teaspoonful sugar. Pour into a buttered baking dish and cover with buttered cracker crumbs. Bake in hot oven until brown.

In preparing the escalloped tomatoes follow the recipe exactly. We have here cracker crumbs which are to be moistened with melted butter, now melting in a hot oven. We put in enough butter to moisten the crumbs. Question—Where do you find a knife

Question—where do you hild a kinto like the one you are using?

Miss Clarke—Every first-class hardware store should keep them. It is called a 5 in. pallatte knife. That means 5 in. long. A 6 in. is too stiff, and a 4 in. too short to reach to the bottom of the bowl. It is made by J. Russel & Co., Green River Works, and no other one made is quite so flexible. It will go down into the smallest cup and take out every scrap from the bottom. It costs 40 cents at retail.

Potato Croquettes

One pint mashed potatoes, one tablespoonful butter, one-half saltspoonful white pepper, speck cayenne, one-half teaspoonful salt, one-half teaspoonful celery salt, yolk of one egg, one teaspoonful chopped parsley. Sift and shape in rolls. Roll in fine bread crumbs, then in beaten eggs, in crumbs again, and fry in smoking hot fat. Drain on brown paper and serve on a folded napkin. Dress with parsley.

May I call your attention to one other point: The frying of the croquettes. They have been rolled in bread crumba, dropped into beaten

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frying is very similar to the method brown much more quickly. that we have been using with the fritters. When the fat is so hot that it smokes blue, lay a croquette on a little egg beater and roll carefully off the spoon into it. Roll it back and forth until brown enough. If the fat as not hot enough the croquettes will If too hot they will go to pieces. scorch before heating through. Watch carefully. If too hot, put in faster, if not hot enough wait a minute.

Question-How many do you put in at a time?

Miss Clarke-As many croquettes as pounds of fat, is a very good rule. In a small kettle of about three pounds I would venture three croquettes. If very hot I might possibly put in four. But if so hot as to be able to put in more than four the fat will be so hot as to become disagreeable. You know that when fat or oil of any kind passes beyond a certain degree of heat it undergoes a chemical change known as carbonization, and the fat may as well be thrown away. You never can get rid of the horrible taste of carbonized fat. There is no cure for it, but the whole kettle of fat is spoiled.

Question-What kind of fat do you use?

Miss Clarke-I prefer beef fat, not suet, but the fat that comes from the top of water in which corned beef has been boiled, mixed with twice or three times its bulk of pure lard. If not convenient you can use lard only. Cottolene will serve admirably for some uses. If carefully used and it is not damaged it can be used over and over again, and is very satisfactory.

Question-Do you not use suet at all?

Miss Clarke-No, it is too hard. I prefer the fat of the meat. Suet, like mutton fat, is too hard.

you prefer bread Question-Do crumbs to cracker crumbs?

Miss Clarke-Yes; cracker crumbs do not brown easily, and soak the grease, making a greasy and white crust. has been discolored by the action of

egg and rolled again. The method of Bread crumbs do not absorb fat and

Parsnips.

scrape parsnips, and Wash and plenty until tender in of boil 1190 sauce salted water. For a one-half as much lemon juice as melted butter.

When scraping be careful not to take off the skin, but be sure that there is none of that muddy, earthy taste left on the outside. Take off the fire the minute they are tender, remove the skin and cut in thin wheel-shaped slices across the root. Pour over them a sauce made by taking one-half as much lemon juice as melted butter. Let your butter and lemon juice boil together, pour quickly over the parsnips and set into a hot oven until the butter and lemon juice has been nearly all absorbed. Sprinkle with salt and pepper to your liking,-just a little more salt and a speck of pepper. The acid of the lemon juice seems just the thing to go with the sweet taste of the parsnips.

SECOND LESSON.

The first article prepared for cooking at the second lesson was roast beef, and while getting it ready for the oven, Miss Clarke explained her method as follows:-

Roast Beef.

Sometimes when a piece of roast beef is cut a stream of the juices of the meat, rich in all its best elements, will run in a fine thread, and it is not at all uncommon to see it flow, drop by drop, almost as rapidly as it can follow the knife. You can see the surface of the meat is full of these rich juices. Great care should be used in preparing the beef. Do not put if into cold water to draw the juices out, but with a clean cloth sponge the outside, until your sense of cleanliness is If when bought it is dissatisfied. colored, take a sharp knife and trim a tiny bit, just enough to take off what the air on the exposed surface. Ask! divide the back bone, removing most utes to a pound. That is the accepted of it, but leaving a thin plate of bone standard, but you cannot always folto keep the meat from drying in the low it, but must use a little judgment oven. All bones should be put in just in the matter. enough cold water to cover as soon will hold heat much more strongly as it comes into the house, and let simmer as long as possible, until you have a pint more or less of strong, good that rule make? Rare or well-done? broth to make gravy for the first serving. Do not depend upon the drip that fills the dripping pan for the first day's gravy. Pour that off and remove the fat, and have the glaze that will be found at the bottom of the bowl for the second day's gravy, but always depend upon stock from the bones for the first day.

The roast is now ready to rub very stingily with pepper, more generously with salt, and just enough flour to dry been heated three-quarters of an hour, your graham bread baked at, or a in order to have a fierce heat at first. The heat of the oven should be something between 400 and 425 or even 450 degrees.-rather 450 than below 400 degrees-and that heat should be kept up for the first 15 minutes. At the end of that time drop the heat to about 350 degrees for the remainder of the time of cooking. It will take a little more time to roast the beef, but you will be a gainer in the quality of the meat. If that intense heat is maintained through the whole time of roasting, the beef will be dried almost to a roast? As Oliver Wendell Holmes says cinder, on the outside, not browned but of training children: "You must bedried hard, and gray, for perhaps twothirds of the distance from the edge have no drippings you may use any into the center, with only a little portion of the pink part of the meat little butter dissolved in hot water. that is most wholesome for food. We as the outside is well seared. Pat your meat lightly all over, to throw off want don't superfluous flour. We burned starch, only a thin dusting of flour to dry the outer surface, and prevent the juices from dripping off.

to roast it?

Miss Clarke-This weighs from 6 to your butcher to take his saw and 8 pounds. The rule is usually 12 minthan at others.

Question-What sort of roast will

Miss Clarke-Twelve minutes to the pound makes a medium, or what most people would call a rare roast. Not really rare, simply a little pink.

Question-How can those who have no thermometers to test their oven tell the degree of heat?

Miss Clarke-It should be as hot as you would have it for baking biscuit, which requires more heat than bread, and when it has been in long enough to sear you may drop the heat to the degree that you would like to have

Question-Do you baste your roast?

very carefully. Miss Clarke-Yes, Baste at first opening, again at 10, 12, or 15 minutes, when ready to lower the heat, and after that every 20 minntes.

Question-What do you baste it with? Miss Clarke-Its own juices.

Question-Will they be there as soon as that?

Miss Clarke-I think so. If not, have you not some drippings from the last gin several generations ago." sweet fat you have on hand, or a This is not the best thing because want to lower the heat just as soon it scorches so easily and we do not want the flavor of burned butter with our roast.

Question-Is there any danger of the pan burning before sufficient juices come to baste the meat?

Miss Clarke-I think the pan would Question-How long will it require not burn if your meat has a supply of fat on the outside. The pan is not on the bottom of the oven and the meat roast beef. Season to suit, with salt is not laid on the pan, but there is a and pepper. meat rack under it. That is absolutely essential for good cooking of roast meat of any kind.

Yorkshire Pudding.

Three eggs beaten light; add 1 teaspoonful salt, 1 pint milk, 2-3 cup flour and rub to a smooth batter.

This batter should be so thin that it is hardly proper to call it a batter. It pours almost like milk or very thick cream. The fat is to be poured from the dripping pan and this mixture is to be poured into the bottom of the pan and bake under the meat for about 30 minutes, until ready to serve.

Question-Is Yorkshire pudding expected to be light?

Miss Clarke-It should be light as an Indian pudding or pop-over is light. This is a modified form of a pop-over. baked in a large cake, and continually enriched with the drippings from the beef, instead of being baked in small cakes to be eaten with butter. It will not be spongy, but it will puff, with a custard-like texture between the two crusts.

Ouestion-How should it be served?

Miss Clarke-As a garnish for the roast beef, on a platter sufficiently large to arrange the pudding and potatoes around it. Cut the pudding in squares, and if you can have some potato pared, parboiled for 10 minutes, and thoroughly browned in the oven and basted with the drippings and put an alternate potato and square of pudding you will find that it will meet with great favor among those who of cream, add more butter to the eat it.

first brown in a frying pan an ounce to moisten it at first, and add more of butter. When that has come to a as needed. Fragments of chicken and light coffee color there is added to it turkey left from the day before come an ounce of flour and the two are in very nicely for croquettes. cooked together until they become s good coffee brown. Then we add to crumbs to dry the surface thoroughly, this very nearly a pint of water in so that the egg will stick to them, which we have simmered for 3 1-2 dip in egg and then bread crumbs

Chicken Croquettes.

Half a pound of chicken chopped verv fine and seasoned with 1 teaspoonful of salt, 1 teaspoonful celery salt, 1-4 saltspoonful of cayenne, 2 saltspoonfuls of white pepper. a few drops of onion juice, 1 teaspoonful chopped parsley and 1 teaspoonful of lemon juice. Make 1 pint of thick cream sauce. When thick add T beaten egg and mix sauce with the chicken, using only enough to make it as soft as can be handled. Spread on a shallow plate to cool, shape into rolls, roll in fine bread crumbs, then dip in beaten egg, then in crumbs again, and fry 1 minute in smoking hot fat. Drain and serve with a thin cream sauce. Many prefer to cut chicken into small dice. If this is done use less of the sauce, or the croquettes will be difficult to shape. The white meat of the chicken will absorb more sauce than the dark. Mushrooms. boiled rice, sweetbreads, calf's brain, or yeal may be mixed with the chicken. Cold roast chicken chopped fine, may be mixed with stuffing, moistened with the gravy and shaped into croquettes.

The chicken for croquettes should be put through an Enterprise chopper which makes the meat finer in five minutes than an hour's chopping. Put all the seasoning into the chopped meat instead of half in the sauce, to save time, being careful not to salt too much, as the taste of the chicken is lost by over-salting.

If stock is used for sauce instead sauce. It is never safe to put all the To make gravy for roast beef we sauce on the meat at once,-just enough

Croquettes should be rolled in bread hours the bones and trimmings of the again and fry. The crust should be to make it more delicate dilute the egg with water, milk or cream, in the proportion of 3 tablespoonfuls to each egg. In this way the egg does not take up more than half as much crumbs as when all egg is used. One egg will dip eighteen croquettes.

Question-Would cracker crumbs do as well as bread crumbs?

Miss Clarke-No, bread crumbs make a more crisp and tender crust. Dry the bread crumbs in the oven and put them through an Enterprise chopper or roll very fine.

Question-How do you keep them? Miss Clarke-The only satisfactory thing I have found is a wooden starch box. In this they will not mould or rancid, but are sufficiently become ventilated to keep in good condition.

Question-Can you put in more than one croquette to frv?

Miss Clarke-This kettle of fat is too small to take more than one or two. An approximate rule is one croquette to each pound.

Thick cream sauce for croquettes and patties. 1 pint cream, 2 even tablespoonfuls butter, 4 heaping tablespoonfuls flour or 2 heaping tablespoonfuls cornstarch. Scald the cream, melt the butter in a granite saucepan, and when bubbling add the dry cornstarch. Stir till well mixed. Add 1-3 of the cream and stir as it boils and thickens. Add more cream and boil again. When perfectly smooth add the remainder of the cream. The sauce should be very thick, almost a drop batter. For croquettes 1 beaten egg may be added just as the sauce is taken from the fire, but the croquettes are whiter and more creamy without egg. For patties warm the meat or fish in the sauce and use the egg or not, as you please.

Fric'seed Chicken.

The fowl should be held over usual. 2 8.5 blaze to singe, and sponged. Do not put your chicken into of butter. You may add more butter water,-this rule holds good in regard if you wish, but do not put it in at

as thin as an egg shell, and in order to all meats. It very seldom happens that anything more than sponging is needed. Cut in pieces convenient for serving and put them in enough hot water to cover, bring it to a boil quickly and skim thoroughly. The gray scum that rises will settle back upon the meat and be unpleasant in appearance, though not unwholesome. It is simply the coagulated albumen of the chicken.

Question-Is it necessary that the water be boiling hot?

Miss Clarke-Better have it boiling, for the chicken will cool it very quickly and a good deal. Cool water coming to a boil takes out flavor which we want to leave in the chicken. Having let it boil from 3 to 5 minutes reduce the heat so that it shall only simmer and remember that simmering does not mean bubbling of the water. It should not break into bubbles, but only move gently on the surface. Continue the simmering process, keeping the kettle closely covered, until your chicken is tender, and you must be your own judge in regard to the time, which varies from 3-4 to 1-2 an hour for chickens, to 2 or 3 hours for old A general rule is, that the fowls. tougher the fowl the less heat, but the longer the time required for cooking. When it is nearly done you may add a level teaspoonful of salt for one chicken, and 1-4 of a saltspoonful of pepper, and if you like, a teaspoonful of lemon juice. A little dash of acid is sometimes considered a great improvement. Remove the larger pieces, dry them with a little flour and brown each side slightly in hot butter. Reduce the chicken stock to about 1 pint and add to it 1 cup of cream. Melt one large tablespoonful of butter in a sauce pan and put in it 2 tablespoonfuls of flour. These proportions are for any kind of sauce, for meats as cleaned well as for sweets,-by measure twice clear as much flour as butter; by weight carefully equal,-an ounce of flour to an ounce first, drop it in afterwards, just long enough to melt before serving. Use flour if you wish to make it thicker, but in that case it must be modified a little. Add more salt, pepper, celery salt, and lemon juice if needed. Beat one egg to a cream, pour the boiling liquor over it and turn the gravy at once on your platter of chicken. Serve as quickly as possible.

Question—Don't you use the butter that you have left after frying the chicken, in the gravy?

Miss Clarke—It rarely happens that it is in condition to use. It is apt to be scorched and will spoil the flavor of the gravy. There should be just enough butter to keep it from sticking. Two tablespoonfuls is sufficient to brown two marge fowls.

Scotch Eggs.

One cup of lean cooked ham very fine, 6 hard boiled chopped eggs. Cook 1-3 cup of milk and 1-3 cup fine crumbs to a smooth paste. Mix it with the ham, add 1-2 teaspoonful of mixed mustard, 1-2 saltspoonful of cayenne and 1 raw egg. Mix well. Remove the shells from the eggs and cover with the mixture. Fry in hot fat 2 minutes, or until a nice brown. Drain and serve hot or cold for lunch or picnics. Cut them into halves lengthwise, and arrange each half on a bed of fine parsley. The contrast between the green, brown, white and yellow gives a very pretty effect.

Cover the eggs by laying a spoonful of the mixture in the palm of the hand, flatten it, and work it around the sides until there is a thin coating all around it that entirely covers the egg.

Question-How long do you boil the eggs?

Miss Clarke-Half an hour.

Question-Would broiled ham do? Miss Clarke-Yes, but use only the

lean. Question—Does the casing ever peel off?

Miss Clarke-Not if it is carefully coated.

Baked Beans.

Des For baking, the small beans should not be chosen, but the larger size of navy beans. Soak them over night in cold water. In the morning add to that water, or you may put it in over night, if it is hard water, a bit of baking soda the size of one of the beans and let them come to a boil in the water that has the soda in it. Strain off this water, add fresh water, either hot or cold, let it come to a boil again and simmer very gently until the beans are tender. Throw away the water in which they were soaked and rinse them off thoroughly to get rid of as much as possible of the rank flavor. Put them into your crock until it is about one-third full, or until you have used one-third of the quantity of the beans. Then put in the bit of salt pork, previously prepared by scraping thoroughly, scoring the rind, and pouring over it scalding water so that the outside shall surely be sweet. The proportion should be 2 ounces of fat salt pork to a quart of beans. You can vary that proportion to have a larger per cent. of fat, if it is desirable. Place the remaining two-thirds of the beans or top of the pork and cover them. You may put in a heaping teaspoonful of salt, 1-2 teaspoonful of mustard, 2 tablespoonfuls of molasses, the whole dissolved in hot water enough to cover the beans thoroughly. Let them bake for hours in a slow oven, not less than 10 and 24 is better. If it is desired to have the pork crisp lift it to the surface with a fork when the beans are nearly done.

To serve with this we should have the old fashioned Boston brown bread, —the bread of the forefathers who settled New England years ago. The nearest we can come to it in these days, without brick ovens to bake it in, is to substitute a steamed loaf for a baked one.

Boston Brown Bread.

1-3 cup of corn meal and 2-3 cup of rye meal, 1 teaspoonful salt, 1-3 cup of mowith 1 pint of thick soured milk. At rice in the center to simulate a core the last add 1 teaspoonful of soda and sprinkle sugar over the whole. dissolved in as little as possible of It should be drawn together and tied hot water.

Do not use rye flour, that is a constant mistake that has to be guarded against, but rye-graham, as your millers call it. Just a word of caution in regard to soda. You will find a very great difference in the quality and strength of baking soda, or that which is sold for it. The best preparation for you to use is the chemically pure bi-carbonate of soda. You can get it practically pure from your druggist at a very low price. It is worth probably 8 to 10 cents per pound. Buying in bulk, that is by the ton it is worth 3 or 4 cents. Insist upon having the You do not chemically pure article. want to have any unwholesome salts left in the food after the chemical action has taken place between the soda and acid. Beat this batter thoroughly, pour it into a greased mold and steam it for 3 1-2 hours, or better still 4 hours, if you can. Uncover the mold and set it into a moderately hot oven for half an hour longer and then serve it with your beans.

The proper dessert to go with baked beans and brown bread is the old which is fashioned Indian pudding, made according to recipe given below.

Indian Pudding.

2-3 cup of Indian meal, 1-3 cup of flour scalded with 1 quart boiling milk, I teaspoonful salt, 1 saltspoonful cin-(or 1 tablespoonful lemon namon, chips). Thin with 1 quart cold milk, 1 cup of molasses and steam 3 hours. Brown the top in a quick oven and serve with cream.

Apricot Snowballs.

cup and have cooked a We small a half Lay of rice. a small over bowl. The rice is spread evenly and means avail yourself of the possibiliof muslin thinly around it. Drop in the bottom ties of a Dover beater. Add flour and a bit of butter as large as a small milk alternately, keeping the milk a bean. Then lay in an apricot with the little in excess and you will be able to two halves closed together and you beat thoroughly with even a small

lasses, Mix these to a soft batter may, if you choose, put a lump of lightly with a string. Lay in a strainer and cook for ten minutes over boiling water. When ready serve with apricot sauce.

Question-Do you use canned apricots?

Miss Clarke-Yes. Dried ones might be used if properly soaked.

Question-Do you tie snugly or allow some space?

Miss Clarke-Allow a little space. Not much, because the rice is already cooked and will not swell any more to speak of.

Question-What is the sauce you use with the snowballs?

Miss Clarke-Drain from the can of apricots all the syrup. Add to that enough water to make 1 pint in all and add more sugar if needed. It is well to taste and try before finishing sauce. Let this syrup come to a boil. Add to it 1 heaping tablespoonful cornstarch or 2 heaping tablespoonfuls flour mixed smoothly with enough cold water so that it will pour, a tiny speck of salt, just enough to accent the flavor, and a little lemon juice, if necessary, to add to the acid. Don't put this in uniess you feel that you must have it, because the more simple the sauce is the more perfect, and we want to preserve the flavor of the apricot as perfectly as possible, and to have any other flavor added changes its character.

Apple Fritters.

For the batter 2 eggs, 1 cup flour, 1-2 cup milk, 1 teaspoonful salt, 1 tablespoonful melted butter. Cut the pared apple in transverse slices 1-3 of an inch thick, mask each with batter and fry about 3 miuutes in smoking hot fat.

In putting together batter by all

sized beater. The batter is not very stiff. Our sections of apple are cut transversely and each section sprinkled with a little sugar. These are to be dropped into smoking hot fat, just as we dropped our corn fritters yesterday.

Lemon Sauce.

A very good lemon sauce is made as follows: 2 cups water and 1 cup sugar boiling; stir in 1 tablespoonful corn starch mixed with cold water and cook 10 miuutes. Add the rind and juice of 1 lemon and 1 tablespoonful of butter. Serve at once.

A Balanced Ration.

Over in the Court House, a square or two away, the topic, "Balanced Rations for Stock," is being earnestly discussed by a score or more of men who have each brought the records of months of careful observation to be compared at this institute. They have noted the result of different foods in increased weight of hogs, better yield of milk and its products from your noble herds, more wool from your sheep or greater capacity for work in your draught cattle and horses. Next year every farmer means to make a still better showing to justify the application of scientific formulas to daily problems. I wonder how many of the It is not necessarily a coarse flour. housekeepers of Wisconsin are balanc- Whole wheat flour may be as fine as ing the rations that they are feeding the finest of white flour. It simply three times a day to the infinitely more means that the whole grain is ground precious human stock under their care., How many of you stop to think anything at all about it? Are the children growing beautiful and sweet-tempered retained in the fine flour, which you can from year to year? Do the grown mem- use very much the same as you use bers of your household carry their your ordinary white flour, the only burdens of care and work more easily difference being that it is a substantial from week to week? Look at these food instead of a luxury, and it is charts borrowed from the Experiment also a little darker in color. You will Station and see if we can find any not have snow white bread, but bread facts for ourselves. Notice the small of a grayish brown color, but it will percentage of starch in proportion to be far more wholesome. Use this at the protein in the wheat, oats, turnips, least part of the time. See how satetc., and compare that with our habit - isfying and good it is and you will ual food. In a fine white flour there not be willing to change for anything are 10 per cent of albuminoids. The else. percentage of bran is 16. Yet we give the bran to our cattle and feed, you ask for to get the kind you speak of?

ourselves on only 10 per cent. of albuminoids. Something is wrong when the children are pale, the mothers thin and tired and the day's work a burden, and everybody has dyspepsia. In fine white flour there is only 1 per cent. of fat. Of the carbo-hydrates, which in the case of fine white flour means starch, there is 75.2 per cent. That gives a supply of muscle power, since it is starch that furnishes the activity of the muscles, but it does not renew them. They are worn out, and there is nothing to replace them. For that you must have albuminoids or nitrogenous foods in some shape. Here is a table of daily rations prepared from statistics furnished by Prof. Dwight who is a recognized authority, and its figures will furnish matter for diligent study during the coming days when we have to plan for breakfast, dinner and supper.

(See table on opposite page.)

The improved process of treating grains, especially wheat, takes off the outer husk, which contains the coating, unfit for human food, removes it entirely, and when once removed the whole grain is ground into flour, as coarse or fine as your taste calls for. together, and in that way you get all the rich glutenous property of the The nitrogenous elements are food.

Question-What kind of flour would

DOMESTIC ECONOMY.

DAILY RATION.	ALBUMINOIDS	Fats.	CARBO-HYDRATES
For Children up to 18 months, For Children from 6 to 15 yrs, For an adult Man, For an adult Woman, For an aged Man, For an aged Woman,	2.5 to 2.9 oz 4.2 oz 3.3 oz 3.5 oz	1.2 to 19 oz 2 oz 1.5 oz 2.4 oz	8.6 to 14.4 oz. 17.6 oz. 14.4 oz. 12.5 oz.

flour. There are two standard grades fore you there is a very large piece of whole wheat flour, one made by the of tenderloin and the whole piece is New York Health Food Co., but very a good illustration of its kind. The expensive, even when its value as a fat is clear, yellowish white, and well food is taken into consideration, so compacted. The meat is fairly well that for many families it is out of streaked with fat. The great defithe question to use it freely. Ferd. ciency in the American diet is fat. Shumacher, of Akron, Ohio, has, with- Physicans say that one of the most in a few years, prepared a whole wheat alarming symptoms of modern pathoflour which is very nearly, if not quite logy is the growing inability to assimias good, at less than half the cost, late fat; and it is because people and since that has been done there take so little of it with their food have been a number of local mills that it has to be administered artifiwhich have done the same thing. I cially in the shape of nutritive medihave found them in Wisconsin, Da-|cines. A lean steak is not the kind you kota, Michigan and Indiana. Those want. I mean, that is not the kind four states will furnish whole wheat you would prefer if you had an eduflour of good quality.

but bread?

mend the use of it for anything but should cultivate the habit of eating bread of all varieties because of the all wholesome fats, such as the fat of dark color. Cake and pastry are bet- beef, veal, mutton, and especially all ter made with the old process white the cream and milk that you can relflour.

THIRD LESSON.

Beef Steak.

best authorities advise the use of only supplying that so much needed element two cuts for steak-the porter-house of nutrition than in the shape of a and the sirloin, or as known in the salad. eastern states, the rump. The latter I have carefully taken off the bone has a large muscle running through it sawdust and shall proceed to sponge near the end of the back, and also it (and lay one side to keep cool until the large end of the tenderloin. In ready to use). Take off the tough or

Miss Clarke-Ask for whole wheat this piece of sirioin steak that is becated palate. A piece well marbled Question-Can it be used for anything with fat is the epicure's choice. In that way you get a large amount of Miss Clarke-I should not recom- fat in almost inperceptible shape. One ish and digest easily, and as much butter as you like. These are all wholesome fats, and the day is coming very fast when the American people demand an increased use of fats with salad, dressing of salads with bacon Our lesson this morning opens with fat, and butter and cream dressings. beef steak. You will find that the There is no more wholesome way of

good to broil, trim off all dried pieces or Maitre d'Hotel sauce. The flank end from the side and remove extra fat, of the sirloin is better when cooked which may be tried out for use in the shape of drippings. One other point to note, is the relation that lies between the cooking of a steak and the cooking of a roast. Roast and stew both, should be subjected to a fierce heat at first,-the stew in a frying pan, and the roast in the oven very much heated. In a steak we have a piece of meat so thin that if it is subjected for a few minutes to such fierce heat as we give to the roast it is cooked enough.

Question-How many is a few minntes?

Miss Clarke-It ranges from 6 to 12 minutes, according to the size of the steak and quality of fire.

Question-Did you season the steak before going on the broiler?

Miss Clarke-Never. Salt draws the juice of the meat. It should be turned regularly once in 10 seconds. It should take about 12 minutes to broil a steak 1 1-2 inch thick. Season with butter, pepper and salt after it is laid on the hot platter from which it is to be served, or serve with Maitre d'Hotel sauce, made as follows:-

Maitre d'Hotel Butter (cold for beefsteak). 1-4 cup butter, 1-2 teaspoonful salt, 1-2 saltspoonful pepper, 1 tablespociful lemon juice, 1 tablespoonful chopped parsley. Rub the butter to a cream, add salt, pepper, parsley and lemon juice. Spread it on the hot beefsteak.

Maitre d'Hotel Sauce (hot). Add the beaten yolks of 2 eggs to the cold Maitre d'Hotel butter, and when ready to serve add 1 pint of drawn butter, made with strong white stock. This is excellent to serve with boiled chicken or turkey.

Broiled Meat Cakes.

Chop raw lean beef quite fine. Season with salt, pepper and a little chopped onion or onion juice. Make It into small flat cakes and broil on • well greased grid iron or in a hot spoonfuls of butter in a frying pan,

flank end of the steak, which is not frying pan. Serve very hot with butter in this manner than when broiled with the other part of the steak.

We want to make our proportion abcut 1-3 or 1-4 fat to 3-4 lean meat. The seasoning for this is in the proportion of 1 teaspoonful of salt, 1 saltspoonful pepper and a few drops of onion juice for each pound or pint of meat after it is chopped.

Broiled Fish.

this fish we shall use The lake trout. It morning is a has been split ready for broiling. It should be washed very carefully and broiled whole, head, tail, and all complete. The scales of the trout are very small, and it is comparatively little work to remove them, but it must be carefully cleaned inside. They come to market frozen at this time of the year and must be thawed in cold water, freezing cold, but not frozen, which draws the ice from the meat. Fish that has been frozen is never quite as good. Rub your broiler with a piece of beef suet so that the fish will not stick to it. The broiling should be done over hot live coals.

of Question-Isn't there danger scorching the fish?

Miss Clarke-There is no excuse for scorching as the heat can be reduced by scattering a few ashes over the coals.

Question-Do you broil your fish all on one side?

Miss Clarke-No, it must be done on the flesh side long enough to cook the whole fish nearly enough, then broil the skin side only long enough to make it brown and crisp.

Tartar sauce to serve with fish is made after the following recipe:

Tartar Sauce.

One tablespoonful of vinegar. - 1 teaspoonful of lemon juice, 1 tablespoonful of Worcestershire sauce made very hot over steam; brown 3 tablePour over broiled fish while very hot.

Sauce for fried fish or fish-balls. 2 tablespoonfuls of dry mustard, 1 teaspoonful flour, 1 tablespoonful salt, 1 teaspoonful of soft butter, 1 teaspoonful sugar, 2 tablespoonfuls of vinegar. Mix in the order given in a granite saucepan. Add 1-2 cup boiling water and stir on the fire till it thickens and is smooth. Add 2 tablespoonfuls finely chopped pickles, and serve it cold.

Cream Muffins.

flour, one-half tea-One pint teaspoonfuls of spoonful salt. two baking powder, yolks of two eggs, beaten lightly, 3-4 cup of cream, or enough to make a drop batter, whites of 2 eggs beaten stiff. Bake in muffin pans and serve very hot.

We have prepared the flour, salt, and baking powder, sifting together four times. The proportion of baking powder to flour is one level teaspoonful to each cup of flour. If you allow this proportion you have a standard from which you do not need to vary except in the use of sour milk, excess of eggs, or something of that kind.

Question-What do you mean when you speak of a cup?

Miss Clarke-1-2 pint or 8 ounces.

For muffins the oven should be very hot, and the muffin pans greased and warmed. The recipe says, use 3-4 cup of cream, or enough to make a drop batter, and it will be more than 3-4 of a cup. The object in beating the whites of the eggs separately is to fold in a larger per cent of air than can be done in beating with the yolks. With milk you want as thin a drop batter as you can manage and with cream as stiff as you dare. Cream is so much richer than milk that the batter can be made stiff.

Cheese Straws.

Rub one and of flour one cup grated cheese. of salt and with liking pepper. Put in about 1-2 saltspoonful one-half. For cream it will be suffiof cayenne, and a full saltspoon of salt. cient to take one-fourth.

and strain onto the other hot sauce. The butter should be rubbed in thoroughly as for baking powder biscuit. The cheese and other seasoning should be mixed in thoroughly with ice water until you have as stiff a paste as possible; roll to 1-4 inch thickness. Mark off into straws and bake in a very moderate oven.

Question-Do you think it better to take a knife than the hand to mix cheese straws, pastry, etc.?

Miss Clarke-Yes. The quality of paste should be so stiff that you can work it into one smooth ball and let is cleave from the bowl. It should not be too soft to handle in that way. You may use a pinch of flour on the board if it is more convenient for working out. A mere dust of flour does not mean a whole tablespoonful. For baking cheese straws use a piece of sheet iron cut to fit your oven.

Frozen Fruit.

into can of peaches Cut one pint of pieces. add one small if needed. juice sugar. lemon and 1 quart of water. Boil the sugar and water together ten minutes, add the peaches and lemon, cool and freeze. When partly frozen, add, if you like, 1 pint of whipped cream, measured after whipping. This is delicious without the cream. Peaches, pineapple, cherries, and strawberries are delicious when frozen. Vary the amount of sugar as the fruit requires.

For our frozen fruit today, peaches were chosen, with a few apricots added. The ice should be made as fine as possible, and the salt as coarse as you can get. The best to use for freezing is the Diamond C Rock salt.

Question-What proportion of salt do you use for the ice?

Miss Clarke-That depends upon what kind of freezing you wish to do. If you wish to freeze ordinary water ice ounce of butter into with no liquor in it 1-3 is sufficient one cup to take. For Roman punch or any Season to your kind of cream or ice that contains any cayenne kind of liquor, the proportion needed is

Question-Should the turned all the time until frozen?

to keep the beater moving easily till soup by itself. An illustration may be nearly frozen, then give 3. 4 or even 5 found in the water used to cook corned minutes of beating as hard and as beef. This is not palatable by itself, fast as possible. That makes it fine but thickened with peas or beans and and light.

Orange Jelly.

Plymouth Rock One box soaked one hour in tine 12 oranges, 2 cups of sugar, and enough method of securing the proteins, fats. boiling water to make 3 pints in all. Strain to cool.

I want to speak of the value of phosphated gelatine. The Plymouth Rock is not a particularly sparkling gelatine, nor is it stronger, clearer or better than any other standard gelatine, but the phosphate contained in it makes it slightly stimulating. It is a very agreeable tonic, allied to Horsford's Acid Phosphate, and is comparatively new. I have found it excellent.

FOURTH LESSON.

Soup.

termed the "soul of the dinner." The foundation of all soup is broth made from juices of meat or vegetables,that made from meat or fish requires only to be made palatable by proper is more palatable as well as more nu-i1 heaping teaspoonful flour cooked till

freezer be tritious if combined with milk, beaten egg or some thin broth that is not Miss Clarke-No, only often enough sufficiently rich to be presented as a properly seasoned, presents not only a popular soup, but one that deserves gela- its reputation as a nutritive. The folone lowing analysis of Count Rumford's the juice of celebrated formula shows another and carbo-hydrates necessary to give proper nourishment and keep the system in a healthy condition.

> Formula:-Soak 1 1-2 pints dried peas over night: put them to cook with plenty of cold water; when they come to a boil add 3-4 pound of salt pork, 1-2 pint of barley, and 1 ounce salt. Cover closely and continue cooking at a point just below boiling until the peas and barley are dissolved. Add four large potatoes, and as soon as they are done rub the whole through a coarse strainer. Reheat the strained soup, which should be rather thick, and add more seasoning, if needed.

(See table below.)

Add the fats to the carbo-hydrates Soup has very appropriately been and they are about four times the proteids, an approved proportion for an average man under normal conditions.

Puree of Lima Beans.

One pint of fresh limas cooked in 2 set soning, or it may be enriched with quarts of water until soft enough to various cereals, rice, barley, macaroni, mash easily through a sieve. Return etc., while soup made from vegetables to the kettle, and when boiling add

NAME.	ALBUMINOIDS.	FAT.	CARBO-HYDRATES
Peas, Barley, Potatoes, Fat Pork, Total,	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	$\begin{array}{cccccccccccccccccccccccccccccccccccc$	76 " 20.7 " 0 "

and pepper to taste. Add to this one large tomato cut in thin slices, and simmer till soft.

Or soak 1 pint of dried lima beans over night in 4 quarts of cold water to which 1 saltspoonful of soda was added. All'strong vegetables, as beans, peas, etc., are better soaked in soft water:-they make a better and milder flavored soup. In the morning drain off the water and put them on to simmer. until soft enough to pierce with broom straw, about 5 hours. Sift them through a coarse sieve, and finish as in the recipe for fresh beans.

Question-How much water do you add to the beans when put to cook?

Miss Clarke-Enough to keep them from sticking to the bottom of the pan. In putting to soak I use eight times the bulk of water, but to boil about twice as much, and keep adding as the water boils away.

Question-Do you think the browned flour is necessary?

Miss Clarke-I do; it makes the liquid part of the soup of sufficient consistency to support the particles of bean, and you have them suspended instead of settling to the bottom, and in consequence a smoother and more even soup. You will notice the large amount of butter used. This soup is made without stock and butter adds the necessary fat. This soup also has about 20 drops of Tobasco sauce, which is very much like pepper sauce, and excellent for soup.

With this soup croutons are used, prepared as follows:-

Croutons. Cut stale bread in slices 1-2 an inch thick, and spread thickly tirely lacking in albuminoids with butter, then cut into 1-2 inch squares and brown in the oven. The butter makes them scorch easily, so after the first five minutes watch them until they are well constantly. browned.

Plain Brown Soup Stock.

pounds of shin of beef in Six 2 pounds of bone, gristle, etc., 6 quarts there are many elements of fat that

vellow in 1 tablespoonful of butter, of cold water, 1-2 a small chili, 2 whole cloves, 1 teaspoonful of mixed herbs. 6 pepper corns, 1 large onion, 1 tablespoonful of salt, 2 stalks of parsley, 1 carrot, 2 stalks of celery. and 1 turnip. Wipe the meat with a wet cloth, and cut from the bone, and into thin slices across the grain. Reserve several of the largest slices with all the marrow. Put the remainder of the meat and bone into cold water with the spices and herbs, and set on the side of the fire where it will be at least 1 hour coming to a boil Broil the reserved slices till very brown before adding: if not convenient to broil, fry them in the marrow, being careful not to let the fat scorch. Brown the chopped vegetables in the same fat before adding them to the soup. Simmer from eight to ten hours and strain. The next day remove the fat and use the plain stock for a beef broth or with macaroni. vermicelli. rice, vegetables, etc., according to taste.

> Question-Why will stock not always thicken?

Miss Clarke-For want of the gelatine obtained from the bones and gristle that is found about the joints. We need all of these in our stock. It has really no food value, but used in connection with fats and carbo-hydrates it prevents waste, gives consistence to the soup, and imparts that smooth. velvety feeling so pleasant to the taste. If you have ever used any of the meat extracts you have noticed that the liquid is thin. This is because it is made principally from the lean meat, which gives a nitrogenous food, rich in extractives, (Mineral salts, etc.) but enand gelatine.

Question-Could you use gelatine to thicken soup?

Miss Clarke-I think the effect of thickening would be accomplished, but gelatine is too refined to secure the Many object best economic results. to using any fat, and remove it carefully the proportion of 4 pounds of lean to before putting the meat to cook, but them if added in the proportion named. | bles "cobble-stone soup."

To clarify stock for consomme add the beaten white and shell of one egg to each quart of liquid, stirring gently until it boils, and simmer carefully for 10 minutes. Then give it a dash of cold water and set to keep hot for 5 minutes longer. Filter through a thick napkin which has been scalded in hot water. Do not hurry it, but let it filter through, drop by drop. The principal ingredient for a clear, sparkling soup is patience.

Ouestion-Does your stock ever burn on the bottom?

Miss Clarke-No, because I always let it come to a boil slowly, and then do not allow it to boil, but simmer. Place a perforated tin sheet on the bottom to prevent gelatinous meats from sticking to the stock-kettle when left to cook for any length of time without being watched.

Question-Do you always cook vegetables with the stock?

Miss Clarke-No. In summer vegetables sour easily and the stock will not keep, so it is better to season it with pepper and salt only. Please do not skim stock, as it removes the coagulated proteids and straining will take out all objectionable particles. together with fragments of meat and bone.

Potage Veloute.

pint of any kind of good One stock, 1 cup cream, season to taste. Pour boiling hot on beaten yolks of 4 eggs, diluted with 1-2 cup of cream.

In pouring this hot upon eggs and cream, remember this principle: That whenever hot liquid and egg are put together, pour the liquid on the egg, not the egg on the liquid, and stir gently while pouring. Do not allow this soup to heat too rapidly, and stir constartly while coming to a boil. Serve bread in the morning so as to watch as soon as it comes to the boiling point, it while rising. I use 1-2 ounce of in cups, like bouillon, for the eggs compressed yeast to each pint of water, will curdle if allowed to stand, and if set in the morning, but if set over instead of having a velvet soup you night so much more time is allowed

are soluble, and we get the benefit of will have what more nearly resem-

With this soup serve Boston butter crackers, split in two, buttered slightly and plut, butter side up, into a pan in the oven, to brown. These are also nice to serve with any vegetable or white soup, and with ovster stew.

White Bread.

pint of milk, scalded and One to sixty degrees, one cup cooled of water, 1-2 ounce of compressed veast dissolved in 1-2 cup of water with 1 teaspoonful of sugar. Set the yeast, sugar and water in a warm place until well frothed (about 10 minutes). Mix yeast, milk, water and 1 teaspoonful of salt well together. Beat in flour enough to make a stiff doughabout 6 cups. Knead hard for 30 minutes and then let it rise for about 4 hours at a temperature of 60 to 65 degrees. When it has doubled its bulk it may be shaped into rolls or biscuit.

This bread should be set, kneaded stiff at once, put in a buttered crock, and allowed to rise until it has doubled its bulk, which will be from 3 to 4 hours. Milk for bread should always be scalded. Besides the fermentation of the yeast there is always more or less lactic fermentation in the milk. and unless scalded, if the bread does not taste exactly sour it may have lost that sweet nutty taste so desirable.

I would like to emphasize the fact that most cooks set their bread too warm. It should not be set at a higher temperature than 60 degrees, and never exceed 70 degrees. The yeast is a plant, and not a tropical plant, either, and for proper growth should be treated as we would our house-plants. Start the slip or yeast at a temperature of 80 degrees; after the growth has begun reduce the temperature and keep it at about 60 degrees. I prefer to set my that I use only half as much, or 14 ounce to each pint of water.

Question-Why do you set your bread in a crock?

Miss Clarke—Because its thick walls will keep a more even temperature than tin or granite.

Question-Why does bread stick to the hands while being kneaded?

Miss Clarke—Because it has not been kneaded enough. When the dough has taken up sufficient flour it will be soft and spongy in texture, but will not stick. And I prefer to add no more flour at the last kneading for the pans. It is better to butter the hands if not kneaded enough, and keep it from sticking that way.

Question-How long do you knead your bread?

Miss Clarke-It is hardly possible to give time. Mrs. Lincoln. of whom I first learned in Boston, kneaded her bread about 20 minutes, and some who have had less practice require 60 min-The kneading serves two purntes. poses .- first, to make sure that every atom of flour is brought in contact with the yeast, and second, to develop the gluten of the flour. The old test of putting the finger through the dough If the finger to the table is good. comes out clean the dough is well kneaded. Others use the better test that when it crackles and is full of bubbles it is kneaded enough. In mixing bread with water, as some housekeepers prefer to do, the sponge should be well beaten and allowed to stand 1 hour, then kneaded stiff and treated as per recipe above, but the bread made of part milk and part water, or of all skim milk, should be kneaded stiff at once.

The oven for bread should be at least 400 degrees. A good way to test it is to put a piece of white paper in the oven and if it turns a light brown in 2 minutes it is hot enough, but as there is a difference in paper this is not an accurate test. The safest way is to have a thermometer. After the

bread has been in the oven 10 minutes drop the temperature to 325 degrees.

Graham Bread.

pint of scalded milk. One of sixty to temperature cooled 8 degrees. one teaspoonful of salt. 1 heaping tablespoonful of brown sugar. (more or less, according to tasta) 1-2 ounce of compressed yeast dissolved in 1-2 cup of tepid water, that is 80 degrees. Stir the dissolved yeast into the milk with the sugar and salt. Add all the sifted graham meal that you can possibly beat into it with a wooden spoon, about 6 cups. It will take just 4 hours to rise, at a temperature of 60 degrees; if it rises in less time you may know that your bread was too warm, and if it takes more than 4 hours it was too cool. Cut down with a knife, put it in pans and let it rise again until it doubles its bulk, then bake. The length of time for baking depends very much on the oven, from 40 to 45 minutes, usually. Take out on a cake dryer and cover with bread cloth till cool.

I would caution the class to use graham meal instead of graham flour, and to have it well sifted. If you wish to make graham gems from the dough, make it a little thinner by adding milk, but it should be very stiff for bread.

Question-Do you use whole wheat flour like graham?

Miss Clarke-No, I treat it like white bread.

Parker House Rolls.

sifted flourquart of Put one pan, make 24 in 8 bowl or into well the center little 'n which put 1 generous teaspoonful of salt, 1 generous tablespoonful of ordinary granulated sugar, 2 generous tablespoonfuls of butter. Then pour in 1 pint of boiling milk, and let it alone. until it has cooled to about 70 degrees. Add the yeast, 1-2 ounce dissolved in 14 cup of water, and stir a smooth batter in the center of the bowl. By being careful you can leave a rim of flour around the edge, and let it stand until

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it smooth, take on the board and knead hard for 1-2 hour, and let rise for 4 hours out to 1-2 inch thick, and cut rounds with a rather large biscuit cutter. Butter them slightly in the center, fold together and lay closely in the pan. Let rise and bake in a very hot oven.

These rolls are all the better for taking a long time to rise. They should be put into a cool place and kept there until fifteen minutes before it is time to serve them, when they should be put in a hot oven, baked and served hot

Bread Sticks.

One cup of boiling milk. butter. 1 tablespoonful ter. of cup sugar, 1-2 teaspoonful salt, 1-4 cake of compressed yeast dissolved in 3 tablespoonfuls water, white of 1 egg, slightly beaten, and enough flour to make the dough very stiff. Pour the boiling milk into the butter, salt and sugar, and cool to 60 degrees. Add the yeast and mix as stiff as you can stir, then take out on the bread board and knead very hard for half an hour and let rise 4 hours. When ready to finish knead again thoroughly, then cut in pieces about the size of an English walnut and roll to fit the pans. Let rise again until they double their bulk: bake slowly in a rather moderate oven until dry and slightly browned.

The pans in which rolls, biscuit, bread sticks, etc., are baked should be made of the best Russia iron, as these will not become rough with use. Never wash nor grease these pans. Have a piece of common vellow laundry wax wrapped in a piece of linen. Heat the pan, and rub this linen lightly over the surface, when enough of the wax will come through the cloth to make a glazed surface to which nothing will over hot water till the cheese is disadhere. When removing the baking solved. Then whisk in 3 eggs well rub the pan well with a cloth, and beaten, and cook till the whole is set, put away till the next time when they but very soft. Serve on toast, or set should be treated in like manner.

Question-Please explain the differ. brown in 5 minutes.

much flour as is necessary to knead ence between finger rolls and salad sticks.

> Miss Clarke-The rolls are made from Then knead thoroughly, roll shortened dough, and are rolled about 4 inches long, as thick as the finger, put in a long tin with a little butter brushed between each so they will cleave apart easily, allowed to rise until they have doubled their bulk and baked in a quick oven. You will see by the recipe that the salad sticks have white of eggs and are made much more short and crisp, and are baked in stick pans. Soup sticks are still more crisp, and are rolled longer and thinner. When put to rise they are about the size of a lead pencil and when baked have no soft center. The 1-4 salad sticks have a soft bread-like cen-This dough may be baked as given below, and will be very much appreciated where variety is desired.

Croustades.

bread stick dough and Take round the make little balls size of an English walnut. Lay them in the pan about 4 or 5 inches apart and bake the same as bread sticks. When cold open and scrape out the crumbs with a sharp knife, brush the shell inside and out with melted butter and set in a hot oven to brown Fill with creamed fish. slightly. chicken, or any filling that you like, and serve hot, garnished with cresses or parsley.

Cheese Fondue.

tablespoonfuls of Take eight cut in small bits about cheese the size of a pea, 12 tablespoonfuls grated stale bread crumbs, 2 tablespoonfuls butter, 1-2 teaspoonful salt, dust of cayenne, 1-4 teaspoonful mustard, 1-2 saltspoonful bi-carbonate of potassa, 1 coffee cup scalding milk. Mix all well together, and cook gently into a hot oven quickly, where it will von use?

Miss Clarke-Any soft full milk cheese. If you are using a hard cheese it should be grated instead of cut into bits.

Fruit Salad.

Make ready four oranges. three bananas, one pint of grated pineapple, 1-2 pound grated almonds, 1-2 cup lemon juice, 2 tablespoonfuls of ilquor, either Sherry or Madeira wine. Put these together with powdered sugar between the layers and set on ice for an hour. Serve ice-cold, with shaved ice on top.

By making ready the oranges we mean pare them, not peal them, as paring takes off the white portion inside the peel, which we do not want. Then slice them lengthways, which does away with the stringy and tough fibre so disagreeable when cut cross-The almonds should be first wavs. blanched and dried, then grated.

Question-Could any other fruit be used for this salad?

Miss Clarke-Yes. Do not limit fruit salad to the recipe given above. Any kind of canned fruits that are tart can be used and their liquor substituted for the wine. The large purple plums, green gages, or the plums from which prunes are made, grown in France and Germany, are particularly nice for this salad.

Question-When do you serve?

Miss Clarke-For dessert, or between courses like punch. It is also nice for tea, but should be served with fancy biscuit, cookies, dnaps, etc., instead of cake.

Mayonnaise.

a bowl the volks Put into and beat with a three eggs, of Dover beater till very light and thick. Add 1 level teaspoonful mustard, 1 level teaspoonful salt, 1 saltspoonful cayenne, and a few drops of oil. Continue to beat till too thick to turn beater easily. Add lemon juice to thin it, alternately with more oil, until 2 tablespoonfuls have been used. After solid

Question-What kind of cheese do that add vinegar to the same amount. It will take about 1 pint of oil to make this amount stiff enough to hold its shape when dropped from a spoon. At last whip 4 tablespoonfuls of cream thick and stiff, and beat into sauce. If the sauce is to be kept any length of time do not add cream till just before using, or omit cream entirely. using just enough oil to make it of the right consistency.

Care should be taken that the eggs be well beaten, and all seasoning added at once, especially the salt. If that be added after the beating is well along the mayonnaise is apt to crack. The oil should be dropped slowly while beating. Tarragon vinegar is preferable for salads. It can be made by putting tarragon leaves in pure white wine vinegar for a few days and filter ing the vinegar.

Sweet Bread Salad.

pair and blanche one Clean breads. (there of large sweet. to make enough 9 should be pint when diced), marinate them with 1 tablespoonful of lemon juice, 1 tablespoonful oil, pepper and salt to taste. and set them on ice for an hour or more. At serving time add an equal bulk of diced celery, enough mayonnaise to moisten well, and arrange it in six portions on a bed of lettuce leaves. Drop a teaspoonful of dressing on top of each, and garnish with olives, cut in spirals.

Ouestion-How many persons will a quart of salad serve?

Miss Clarke-The proportion given by Conroy, the Milwaukee caterer, is one quart to serve ten, where you have other meats, salads, etc. But for a luncheon where you have only salad, with cream and cake it will only serve six or eight.

In measuring lemon juice, vinegar, wine, etc., use a graduated glass, but for all else a tin cup measure will answer.

Oyster Salad.

or 9 can, For a one-pound the pint of oysters use

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add to them 1-4 cup each of cream alternately, lastly the whites beaten and vinegar, 1-2 teaspoonful each of stiff. Beat again thoroughly. Bake in mustard, celery salt, a dust of cayenne, little round cakes and frost them while 1 tablespoonful of butter. Put into a warm. These make a pretty dish when dcuble boiler and cook like soft custard. Parboil oysters, drain them, and and they are best while fresh. add the dressing. Set away to cool, and at serving time add 1 pint diced celery. Serve on a bed of torn lettuce, and garnish with celery tips and parsley.

In preparing dressing for this salad have the butter hot so that the mustard, celery salt and cayenne will be well blended. To these add the beaten eggs, together. In and beat all smoothly this way the cream is diluted, which protects it from curdling when the hot vinegar is added. When set on to cook in double boiler it should be carefully watched, as in making a soft custard, so that it is not cooked too long. The lettuce upon which salad is served should be torn, never cut.

Question-How long do you cook the ovsters?

Miss Clarke-They should be parboiled in their own liquor till the edges begin to curl,-it will take about 3 minutes,-then drain and put on ice. Be sure and do not cook them too much, for if under done the hot dressing will cook them sufficiently.

Question-Did you heat the liquor first?

Miss Clarke-Yes, then add the ovsters. The liquor which is drained off can be saved for fish sauce instead of plain brown butter.

Put no color with oyster salad, but keep it green and white, which makes a very pretty dish.

Madeleines.

One-half pound each of butter, sugar, flour, 4 eggs, rind of 1 lemon, and 1 1-2 teaspoonfuls vanilla.

The butter, powdered sugar, lemon rind and vanila should be rubbed to a cream. We all know how sensitive juice butter is in taking up flavors, so by bananas, sifted, 1-2 can apricots, sifted, putting them with it we put them 3 cups of sugar boiled 15 minutes in where they will

following dressing:-Beat well 2 eggs, [Add the flour and beaten egg-yolk iced in brown, yellow, pink and white,

Orange Charlotte.

gelatine. 1-3 of One-third box cup cold water, 1-3 of CHD cup of water. 1 boiling of sugar, juice of 1 lemon, 1 cup of orange juice and pulp, and whites of 3 eggs. Lane a mold or bowl with lady fingers or sections of oranges. Soak the gelatine in cold water until soft. Pour on the boiling water, add sugar and lemon juice. Strain and add orange juice and pulp, with a little of the grated rind. Cool in a pan of ice water. Beat the whites of eggs stiff, and when the orange jelly begins to harden beat it till light. Add the beaten whites and beat together till stiff enough to drop. Pour into mold.

If Plymouth Rock gelatine is used the lemon juice should be omitted as that gelatine is very acid. In putting into the mold throw in the first few spoonfuls with considerable force so that it will pack, and level the top so that it will not break when turned out. Orange charlotte should be served with soft custard sauce.

Question-How can you tell when custard is done?

Miss Carke-When the white froth on top disappears it is cooked enough for custard sauce. If to be served as custard let it cook till it will mask the spoon.

Question-Do you ever dissolve corn starch when using it to thicken sauce?

Miss Clarke-Corn starch should be either mixed smoothly with cold water, or better, cooked in the butter as in making a white sauce.

Mixed Fruit Ice.

three large oranges. Juice of lemons. three of three do the most good. 3 cups of water. Cool and freeze. 1 cup of cream is a delicious addiiton | but not at all necessary. In making this ice the juice should be taken from lemons and organges, and the bananas and apricots put through a sieve. The sugar and water should be kept hot and poured upon them to help them through the sieve and to help the flavors to blend before freezing It should not be frozen quite as hard as ice cream, but quite soft,-just a little harder than Roman punch.

Peach Mousse

Put one pint of peaches through extension sieve, add one cup an of sugar and let them stand 2 hours (less will do). Soak 1-8 of a box of Nelson's gelatine in 1-4 cup of cold water. Whip and drain cream enough to make 3 pints after draining. Pack a 2-quart mold in a freezing mixture, using twice as much salt as usual. Add enough boiling water to the gelatine to dissolve it, strain it into the fruit juice and set in ice water till it begins to thicken. Then add whipped cream, stirring gently until smooth and evenly mixed. Turn it into the mold, lay over it a sheet of soft, white paper, press the cover down, close and seal with a buttered strip of cloth or paper Add salt and ice to cover the mold and let stand for at least 4 hours. At serving time wipe the mold with a hot cloth to remove any bits of butter and serve on a flat dish. It should be cut in smooth slices and show a mossy texture. All fruit mousses are made in the same way. Coffee and caramel mousses are better if the yolk of an egg be well beaten and added to the hot coffee or hot caramel syrup before adding the gelatine. Allow one egg for each quart of cream.

Do not use a Dover beater to whip cream, but provide yourself with one of the little tin or glass whip churns. In using it strike the dash down hard, and bring back gently, striking down hard again, etc. In this way the cream will be whipped and not churned. With a Dover beater cream will in- coating. As soon as this is thoroughly

crease to twice its bulk, but treated properly with a whip churn it will increase to four times its bulk. Cream a day or two old will whip more satisfactorily than when fresh. For any kind of mousse fold in the ingredients instead of stirring and do not try to have an even mixture. "Mousse" means mossy, and the texture should be soft and moss-like. If the cream is too thick it will not make a light whip and should be diluted with milk. To make the mold of peach mousse especially pretty for the table we color it a peach pink by adding a few drops of pink coloring and line the mold with a sherbet made as follows:-

Sherbet for Peach Mousse. Make a syrup by boiling 1 quart of water and 1 pint of sugar twenty minutes. Then add 1 cup of lemon juice and 2 lumps of sugar that have been rubbed in the rind of the lemon till they are filled with the oil. Flavor with pistachio to make it a light green color. If you want the color and not the taste of pistachio use the juice of spinach leaves which can be obtained by grinding them through a chopper and then straining through a cloth.

Line the mold with sherbet and freeze it very hard. Then fill the mold with the peach mousse and freeze 4 hours at least, though 6 hours is better. When turned from the mold the light green sherbet above the pink mousse is very pretty.

Cases for Swedish Timbales. Prepare a fritter batter as follows:-Break into a bowl 2 eggs, and add 1 cup of flour, 1-2 cup of water, a pinch of salt and 1 tablespoonful of olive oil. If more convenient the same quantity of melted butter can be used, but it does not make as smooth a batter. Beat this mixture with a Dover beater, carefully, to a smooth batter.

Have the fat just as hot as for frying doughnuts and into this put the timbale-iron to heat. When this is hot it should be dipped into the batter and enough will adhere to form a

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hot fat and browned. Care should be well with the milk and add the seasontaken that the batter is well dried ing; pour the mixture into buttered before putting into the hot fat or the cases will blister and look badly.

To prevent fat from becoming too hot and burning drop a raw potato into it. The fat will never rise above 212 degrees, the highest temperature of the water that is escaping from the notato.

Question-What fat do you prefer? Miss Clarke-Better than anything else I like cottolene. This is a mix-

ture of cotton seed oil stiffened with beef fat, and can be procured from your local grocers.

Question-Can it be used more than once?

Miss Clarke-Oh, yes, it can be used again and again. It does not carbonize at as low a temperature as other fats. and is much more wholesome.

For filling for these cases sweetbreads, oysters, fish, green peas, macaroni and tomato sauce may be used, or fruit in season.

Large fruits should be cut, and sugar and whipped cream added. The batter should be slightly sweetened when sweets are used for filling.

Whole Wheat Pudding.

cups whole wheat Mix two soda. teaspoonful one-half meal. one-half teaspoonful salt. Add 1 cup of milk, 1-2 cup molasses and 1 cup of any dried fruit preferred. Steam 2 and 1-2 hours and serve with cream or any pudding sauce.

For this pudding dates or raisins are especially nice. If dates are used take out the stone and cut the date in four pieces.

SIXTH LESSON.

Egg Timbale.

The ingredients are six eggs, 1 1-2 cups of milk, 1 teaspoonful salt, 1 saltspoonful measured level of pepper, 1 suggesting at the same time that the teaspoonful chopped parsley (if you revolving whips of the egg beater can get it), 15 drops of onion juice. should be held as nearly horizontal as

dried it should be dipped again into | Beat your eggs smooth: mix them dishes, (you may use cups and serve one to each individual, or you may use these little pudding dishes.) and bake until set, about twenty minutes. Watch it as you would the baking of custard, and apply the same test that you would to custard to see when it is done. These may be served plain or with tomato sauce or with cream sauce. In breaking your eggs, I want to give a little word of caution, and that is, von will find the white of the egg adheres very closely to the shell, and a little brush with your finger will make the addition of the white of one whole egg in a dozen eggs.

> A question that I am often asked is, "How do you know how much is a teaspoonful, and a tablespoonful?" Allow me to refer you to the table of equivalents in the Star Crystal Cook Book. A teaspoonful is just as exact a measure as an inch or a foot. A teaspoonful is 60 drops of distilled water at a temperature of 60 degrees dropped in a minute, one drop to each second. Three teaspoonfuls make a tablespoonful, just a half ounce in liquid measure. Sixteen of the tablespoonfuls will give you a cup, half a pint of liquid measure. When we are measuring dry materials, the teaspoonful should be rounded just as much above the edge of the spoon as the bowl is rounded below, which, of course, is a little more than a liquid spoonful, but it weighs just about the same. It is a great comfort to know that a tablespoonful of butter, packed down solidly, is just an ounce. Please remember that the three S's, salt, soda and spice are measured level: sugar, butter, flour and all such materials are measured rounding, and of course all lumps should be crushed in sugar and salt.

> Miss Clarke proceeded to beat the eggs vigorously with an egg beater,

next came the onion juice, which was so that I may go on with something extracted from the onion by slicing off else. A hard boiled egg is nicer if a little bit with the grain of the fibre it is dropped into cold water and set and pressing the onion against a grater. on the stove and allowed to come to a Fifteen drops were thus added to the boil without being covered except with mixture.

parsley at your local markets, but there You remember the Frenchman who should be added one teaspoonful of parsley chopped as fine as possible, and then thoroughly mixed, so that it will flavor your dish all through. I might as well confess frankly that it is more for looks than for the taste.

The egg timbale was poured into a buttered dish and set into hot water in the oven to bake.

Boiling Eggs.

The matter of boiling eggs seems to be a perfectly simple one, and yet it is most cruelly abused. An egg that is to be served as a soft egg, should As I told you before, if you want to never be boiled under any stances; it should be treated by the whites of eggs with a Dover beater, process known in cook books as "cod- hold it as nearly horizontal as possidling." For six eggs allow a vessel ble. It makes a world of difference in that will hold two quarts of water. the result. This pan is made of rolled In cooking your eggs fill nearly full steel, stamped into shape; it has been with boiling water, set them to one in use for six years and grows smoother side and cover them; let them stand every year. Pans to for ten minutes for a medium softness, omelets should never be used for fryif you wish to have them very soft, ing meats; they should be kept perso that the white will run, you may feetly clean, rubbed thoroughly inside take them up in eight minutes, and if and out. After they have been used you wish to have them firm, what they should be washed as clean as you is called a "four minute boil" you may can make them with soap and sapolio; take them up in twelve minutes. We then take a handful of common salt and shall not cook six eggs today, but only polish them. Keep your omelet pan for two. In the ordinary way of cooking just such uses, for making scrambled a boiled egg there is a coating next eggs and sauces of different kinds; it to the shell that is not only hard and heats evenly, and is not subject to quick indigestible, but prevents the heat from changes. In handling your omelet, it reaching the inner part of the white must be turned and balanced, especially and the yolk, so that we often see them if the bottom is not perfectly level, so raw, when there is a hard, tough rim that it may brown evenly on all parts just inside the shell. We have often of the bottom. If the fire is not too it with these two eggs, and I will ask spoonful of salt, a dust of pepper, and

possible. The salt was then added and one of the ladies to call time on me. the water, and allowed to cook ten Miss Clarke-I could not secure the minutes after it begins to simmer. laid aside the white of the hard boiled egg and said, "You can't expect me to eat the feathers of the chicken,"

Question-Was there any milk put in the glass with those eggs?

Miss Clarke-No; that is the white of the eggs, perfectly soft, yet perfectly set, and perfectly digestible, as much so as milk would be.

Omelet.

I will now prepare an omelet according to recipe No. 2, which you will find in the Star Crystal Cook Book. circum- get the best results in beating the seen boiled eggs in a glass when there fierce, you may venture to hold the would be some of the albumen that pan directly over, moving it so that all would not be coagulated, and unless parts shall brown equally. While I one likes raw egg, it is not an appetiz- am doing this I will give you the proing way to serve them. We will try portions; for each egg allow 1 salt-

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tablespoonful of some liquid, | was freshly ground this morning. We one usually milk or cream, or if you wish have here a cupful, enough to make to use chicken with it, you may use a three large cups of coffee. For that tablespoonful of chicken broth or any of the other many possible additions, find, and break it, shell and all, into but the proportions do not vary. Having the whites beaten dry, carry a little of the foam over to the yolks to helps very much in clearing the cofhelp them beat up white and fluffy: **b**he the seasoning to the volks and after they have been beaten thoroughly, the liquid to the yolks Lastly fold this whites, cutting and folding till nearly boiling, so that the foam may be sent all has been taken up by the whites. Our omelet is now brown at the bottom it to steep ten minutes at least; it and partly cooked through, and I will does no harm if it steeps twenty minset it into the oven to dry off the top. You see by the recipe that this omelet making coffee, if you have not a thorhas been turned into an omelet pan, in which has been melted a teaspoonful of butter for every two eggs. Do French coffee. I have brought a very not try to make more than four eggs into an omelet at once. Make four and then another four if necessary, but four eggs makes as much as you can handle at once.

To know when an omelet is done. take a palette knife and make a little cut into it; if the knife comes out dry the omelet is cooked enough. If it comes out sticky, it should be cooked a pour through it two cupfuls, not allowlittle longer.

Question-Is it true that 'cooking pepper makes it rank?

Miss Clarke-Undoubtedly so.

Question-Why didn't it with the omelet?

Miss Clarke-Because it is cooking so short a time, and with less heat than meat requires. It will not seriously injure the flavor of the pepper to be cooked in anything that is cooked as lightly as an egg.

Coffee.

our coffee. We have selected from your ordinary family use? local grocer a mixture of one-third Mocha and two-thirds of old govern- guided by her own judgment in the ment Java. He gets it freshly burned matter. There is no law against addfrom the larger dealers, and grinds ing all the water you want. it himself when it is called for. This Question-Don't you lose the good

we will select the largest egg we can the coffee. The lime of the shell is slightly soluble in hot water, and it fee. To this amount of coffee you may add a scant quart of freshly boiling water; let it boil up as quickly as possible three times, giving the coffee mixture into the beaten pot a vigorous shake between each down, then set to one side and allow utes or half an hour. Another way of oughly responsible person in vonr kitchen, is what is known as drip or small coffee pot, just to show the pattern. A little cotton bag hangs on a flexible wire, fitting exactly into the rim. For every cup of coffee allow a heaping teaspoonful of pulverized coffee. It is not sufficient to say finely ground: the coffee must be fine as dust. This coffee pot holds two cups. Put your coffee into the bag and ing the water at any time to overflow the bag. It is ready for use as soon as the last of the water has filtered through. While I do not consider this perfect coffee, still, if you have a poor cook, you can have at least drinkable coffee by making it this way, as it can be done at the table. In making our coffee the coffee pot must be thoroughly scalded, and the coffee will be better if made of soft water. Let me caution you if you cannot have cream to serve it with boiling milk.

Question-Is not the coffee made We are now ready to put together after the recipe given us too strong for

Miss Clarke-Every one must be

the coffee pot open?

Miss Clarke-I will refer that question to you as it is passed around: we do not let it boil any length of time, only to boil up quickly, and I hardly dare take my eyes off it.

Question-Where do you get the pulverized coffee?

Miss Clarke-It is sent out by a firm in Chicago. Your local grocer will be able to supply you if there is a demand for it.

Too

I would like to give you three different kinds of tea. One is known as English breakfast tea; its specific name is Congo, a heavy tea, containing a very small amount of alkaloids in proportion to other kinds. It has a great deal of body and should be treated exactly like coffee. Make it with boiling water, using a heaping teaspoonful to each cup of water; let it stand almost at the boiling point; if it even simmers a little no harm is done. It should steep for a good ten minutes. please, 98 treat it. then and a breakfast cup of cofyou would fee-pour it into a well heated cup and give it a generous allowance of cream or boiling milk and I think you will find it three-quarters of your breakfast. It is not a "nervous" tea; you may drink a cup of it at supper and you will find that you will sleep as soundly as though you had had a glass of milk. The second variety is a popular new tea, known as uncolored Japan. The question is often asked if it is safe to let tea stand to steep? You will find the statement in many cook books that long steeping extracts the tannin. Tannin is one of the most soluble of all known substances, and boilng salted water and let them cook every atom of tannin in tea is thoroughly dissolved within ten seconds but if your tea is made in tin, but in the alkaloids which are ex- allowed to boil unevenly, when you

flavor of the coffee when you leave | tracted by long steeping. Oolong tea should be served in five minutes; Souchong, Himalaya, and other English breakfast teas require from ten to fifteen minutes' time. We have our teapots freshly scalded and boiling, when we put the tea to steep.

Chocolate

Scrape two ounces of unsweetened chocolate; add to this one-fourth of a cup of sugar, and one heaping teaspoonful of cornstarch. Put this inte a granite saucepan or the top of a double boiler and stir it over hot water until mixed. Then add slowly one pint of boiling water and cook ten minutes. stirring often. Add to this one pint of hot milk and set it back on the stove where it will keep hot. At serving time pour it boiling hot into one egg, beaten to a cream. It is necessary for the proper cooking of the cornstarch to let it boil ten minutes after the boiling water has been added.

Boiled Potatoes.

Now. I wonder if I dare talk to you in regard to the cooking of potatoes. Some people put the potatoes in cold water and allow them to come to a boil: others think that they should be dropped into boiling water, and it seems me that the advocates of both to methods have something reasonable to say in that respect. At this time of the year when potatoes are wilted by lying in the cellar the vegetable fibre is tough. I believe the plan that will be most satisfactory will be to pare the potatoes and put them into cold water, let them lie for several hours, until they have re-absorbed the water which has been evaporated; until they are crisp and tender and ready for quick cooking. Then drop them into for twenty minutes to half an hour until they are tender as new potatoes after the hot water is poured upon it; in the fall. You will see then that the the water you pour away from them will tannin will act on the tin, forming tan- be perfectly clear. Every bit of starch nic acid, an extremely poisonous com- will be held in the potato. I think you pound. The danger is not in the tannin will find that where potatoes have been

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pour off the water, it will be thick. They can be kept good in that way for almost ropy with starch that is taken twenty minutes or half an hour. from the potato, and you lose just that much. I have had put on the stove here enough water to cover our quantity of potatoes. They were pared this morning soon after nine o'clock, and they have been soaking in cold water ever since, until they are crisp and tender.

Question-Why do we find potatoes turning black after they are pealed?

Miss Clarke-If you will put them into cold water immediately after neeling, enough to cover them thoroughly, they will keep a pearly whiteness unless they have been damaged in some way.

stopping at a hotel that we have wet, soggy and dark-colored potatoes. We would like to know what is the trouble?

Miss Clarke-I have found potatoes of that kind. There are three reasons for that: one is that the potato is not pared and soaked in plenty of cold water for two, four, six or eight hours before they are cooked. The second reason is that they are allowed to stand without boiling. Starch has a great affinity for warm water, and as soon as thoroughly hydrated it becomes pasty, and there is no possibility of bringing it out again to its proper condition. Starch, when it is cooked as it should be, ought to behave very much like popcorn, every grain breaks open and shows the dry granules within. If these are allowed to stand in hot water after breaking they absorb the water, and the consequence is soggy potatoes instead of dry, mealy ones. The same holds true in baking a potato. The instant the baked potato is soft it should be pinched and cracked to let the steam escape; otherwise the starch in the potato absorbs the steam and we get a pasty potato. If potatoes are cooked, as they some- cider vinegar. Upon the beaten yolks times are, before the meat is ready, pour the vinegar boiling; place the bowl put them in a warm place and put a containing them in a kettle of boiling towel over them that will keep them water and stir with a wooden spoon warm and not keep in the steam. till it thickens stiff; to it then add a tea-

Question-Do you put potatoes in hot or cold water? Do you pour water over the potatoes? Do you put salt in while cooking? We have found the most satisfactory method to cook them in boiling hot water. By far the best method is to have the kettle on the stove with the water boiling in it: drop the potatoes in and they come to a boil again with the least possible delay. Do that rather than pour the boiling water on them, as it cools the water to pour it through the air. Salt should be allowed in the proportion of one tablespoonful to every quart of water. and the water should be deep enough to Question-We sometimes find when stand at least one inch above the top of the potatoes.

Potato Salad.

Bake or boil potatoes according to the directions already given. Dice them when cold and for each quart allow one cucumber, one cup of diced celery, and once the measure of the following dressing.

Salad Dressing, Boiled.

Cook one teaspoonful of flour in one teaspoonful butter for two minutes. Pour into it slowly one-half cup of boiling hot vinegar, beating smooth with a wooden spoon. Cook five minutes; then pour into it one egg and one and one-half teaspoonful each of salt, sugar, mustard, and one-half saltspoonful cayenne, all beaten smooth. Cook one minute and set away to cool. Thin this with thick, sour cream when ready to use. This is particularly nice for cold slaw, and should be poured hot over the chopped cabbage.

Potato Salad No. 2.

Boil the potatoes and when cold slice very thin., For a small salad of about a pint of potatoes take the yolks of two eggs and two tablespoonfuls of good

spoonful butter, mixing well. When | cold add one teaspoonful cayenne pepper and salt (mixed in the proportion of 6 parts salt to 1 of pepper), and onehalf teaspoonful mustard mixed in cold water that has been boiled; enough onion to suit your taste (onion is as essential to this salad as celery is to chicken salad); one cup of cream just commencing to turn sour; a little more vinegar, and something green and fresh: sliced cucumbers in their season, green cabbage, pepper grass or a few celerv leaves. Pour this over the potatoes, stirring as little as possible. These ingredients mixed in proper proportion will give a salad equal to the chicken salad.

Lyonnaise Potatoes.

In preparing lyonnaise potatoes, cut cold boiled potatoes into half inch dice and for two quarts of potato put four tablespoonfuls of butter and one-half an onion, shredded, into a sauce pan, and allow them to cook until they have commenced to turn yellow. Then turn the potatoes into the pan, seasoning with one level teaspoonful salt and a dust of white pepper. When nicely browned they are ready for the table.

Fish Balls.

Cut salt codfish into slices about a quarter of an inch thick, removing out against the popular use of doughevery bone. Do not shred it, but cut it nuts as unhygienic and a source of dysacross the grain with a sharp knife. pepsia. That is a question for the Put potatoes and fish on to boil and let doctors and dyspeptics to settle bethem cook until the potatoes are tender. tween them, but meantime everybody Then drain off every drop of water and is eating doughnuts with coffee for beat all fine with a potato masher, breakfast, and we will see to it that using about half the bulk of fish as of they (the doughnuts) shall be as wholepotato. To one quart of this mixture some as possible. add one saltspoonful pepper, and if too fresh, add salt to taste. Then add two eggs, beaten light. When boiling the allow one pint of light brown sugar, potatoes for fish balls take them up one teaspoonful salt, one-half teaspoon the instant they are done. They will soak the fat in which they are after- eggs. Mix these together and let them wards cooked if allowed to remain in stand while measuring four pints of the boiling water. Drop this fish ball flour (measure after sifting once). Mix mixture by tablespoonfuls into hot fat with this four teaspoonfuls of baking and take out when nicely browned to drain on brown paper.

Question-How do you tell when lard is hot enough?

Miss Clarke-When a slice of raw potato, dropped into it, will rise quickly to the top the lard is hot enough for fish balls.

Sauce for Fried Fish or Fish-Balls.

Two tablespoonfuls of dry mustard. 1 teaspoonful of flour, 1 teaspoonful of soft butter, 1 teaspoonful sugar, 2 tablespoonfuls vinegar. Mix in the order given in a granite saucepan. Add one-half cup of boiling water and stir on the fire till it thickens and is smooth. Add 2 tablespoonfuls finely chopped pickle, and serve it cold.

Asparagus Omelet.

Boil six stalks of asparagus: drain and cut them into small pieces about as large as peas. Dissolve half a teaspoonful of flour into a little cold water. Melt an ounce of butter, whisk the flour into it, and when smooth, add pepper, salt and the asparagus. Make an omelet of four eggs according to directions already given, and before completing the fold add the asparagus: turn it deftly out on a hot dish and serve.

Doughnuts.

It has been the fashion lately to cry

Try these two rules:

For each pint of thin sour cream extract of lemon and five well beaten powder and sift all together four times. Dissolve one level teaspoonful of bi-

ful of hot water, stir it into the cream minutes: then dip a fork in this boiland sugar and mix in the flour as ing mixture, being careful not to stir. unickly as possible. Work with the Hold up the fork, and if, after running hand or a wooden spoon until perfectly off, the liquid only forms a thickish smooth.

heating. Roll only a large spoonful at and if, when holding the fork in the first, kneading as little as possible. Cut air, a long, silk hair hangs from it. into rings with an open cutter. Mix take up a little in a spoon and drop the trimmings with another spoonful; it into ice-cold water or snow to try. work it slightly till well floured and You must make all possible haste while roll again. Roll and cut all out before frying, as that will take the entire time of one person. Remember that the fat should be hot enough for the dough to rise to the top while you can count ten. Drain them first in a wire basket and then on brown paper. A flat egg-beater (the five cent size) is an excellent thing to turn and lift them. Never use a fork, as the slightest prick allows the hot fat to penetrate.

A mixture of one-half or one-third clarified dripping or beef fat is much better than all lard to fry in. If sour milk is used, add one-half cup melted butter; or buttermilk may be used with more or less shortening, according to its richness.

Raised Doughnuts.

One pint milk scalded and cooled, one cup sugar, one saltspoonful salt, one-half cup butter, two-thirds cup yeast, one egg, one-half a nutmeg. Flour to knead like bread but rather soft. Rise six to eight hours, then roll and cut in shape, rise again and frv.

doughnuts Note: The cream for should not be the rich, thick cream that comes from setting milk in pans. If that is to be used, dilute with one cup sour milk.

CANDY LESSON.

Fondant for Candy.

and as much cream of tarter as can be grained candy. Keep the sugar washed taken on the point of a knife, and set down from the sides of the kettle by

carbonate of soda in one tablespoon-1 stirring only to mix. Let it boil 10 drop on the end, it has not boiled Have a board well floured and the fat enough. In a few minutes try again, trying the fondant, for it passes rapidly from one degree to another, and while you are trying, the heat of the saucepan is cooking it more.

> If you want more candy than the pint of sugar will make the recipe can be doubled, or a second lot can be put on to boil while the first is being worked.

Question-What do you consider the best thing to boil fondant in?

Miss Clarke-I prefer a small granite saucepan, but if I cannot have that, a very clean iron, or even a thick tin saucepan will answer, but the latter requires great care.

If you can make a good fondant the rest is easy, but that takes patience and ingenuity. Be careful not to get too much acid in or the fondant will stick.

Do not try to make fondant on a rainy day, or it is sure to be a failure. for dampness seems to affect the action of the acid. If it sticks it is due either to insufficient boiling or an excess of acid. Do not use ordinary cream of tarter, but get Squib's cream of tarter at the drug store. This is made by Edwin R. Squibs of Brooklyn, N. Y., and is absolutely pure.

Question-Should the water be boiling when poured onto the sugar?

Miss Clarke-Yes, the hotter it is the sooner it will come to a boil again. I have found Havemever's sugar the most satisfactory for candy making.

The fondant should not be boiled Take one pint of granulated sugar, very violently, as it makes coarse it to boil with a small cup of water, wetting a brush with water and brushing, so there will be no residue on the sides. Pay no attention to the time it has been boiling, as that is no means of judging whether it is done, but pour a teaspoonful into snow or a cup of cold water. When it will work to a little clear, waxy ball it is done. Then set in an open window to cool. Some persons set it in a pan of cold water but that cools it too quickly, and it is apt to grain. Care should be taken not to jar or shake it and not to set it where the wind will blow too hard.

Question-How cool do you let it become?

Miss Clarke—Till you can bear your hand way to the bottom without burning. Then stir till it turns white. If it stands too long it will grain or be too coarse, and if commenced to stir too soon it will be dark and sticky. It takes considerable strength, but the perfection of fondant depends very much on this stirring. A wooden spoon is the best to stir with.

A sure test to know whether the fondant is all right is to examine the top very carefully as it cools. If there is a crisp, flaky crust it is no good for fine candy, but if there is a thick leathery skin over the top it is just as it should be. After it has been stirred till white take the fondant in your hands, piece by piece, and knead it, which will make it very smooth and creamy.

When the bubbles are continuous and rather large and bright it is time to begin testing. There is no limit to the times required. Twenty times is not unfrequent. Don't try to finish candy the day the fondant is made as it is not so easy or satisfactory to work. It will keep indefinitely if put in a jar and covered with oil paper. When using take out what is wanted and press the rest down level, cover with oil paper again, and set away till next time. This fondant is lovely for frosting. Use it by diluting, flavoring to suit, and warming so as to soften it, over hot water.

Hand Dipped Creams.

One teaspoonful grated orange rind, one saltspoonful citric acid. Add four 'ounces of fondant and work it thoroughly, adding enough confectioner's sugar to work it into little round balls. Shape these, lay on paraffine paper, and let dry over night, as these hearts should be rather hard

For the covering, use confectioner's chocolate which can be bought by the pound and is much superior to the ordinary unsweetened chocolate. Put this in a saucepan and set over hot water. As soon as it is thoroughly dissolved dip the hearts into it, one at a time, till well coated.

Plum Pudding.

Take a piece of fondant and flatten it on a plate. On this put a layer of French candied fruit, consisting of cherries, limes, apricots, pears, plums, green figs, etc., and cover with fondant. Set this in a cold place for 24 hours and it will slice very nicely.

Wafers.

Soften the fondant in tho water till thin enough to drop. Then pour on paraffine paper, drop by drop, and let harden. By adding the following flavorings different colored wafers can be obtained as follows:

Chocolate, dark brown; coffee, lighter brown; maple, still lighter brown; lemon, pale yellow; orange, dark yellow; cinnamon, deep pink; wintergreen, pale pink; rose, paler pink; peppermint, white.

Where a large amount of candy is made this variety of color and flavor will add much to its attractiveness. The flavors should be worked into the cold fondant and then heated. It will make them coarse grained if added after it is heated.

A good formula for making coloring for the different shades of red is as follows:

Carmine No. 40. Tritcherate with glycerine till smooth. Dissolve this in as little as possible of purified ammonia, and then add distilled water Prussian blue with red, but as this till the mixture is thin enough to pour, is a dangerous compound it should be

may be made by taking 10 cents worth drops of coloring to 1-2 pound of fonof Spanish saffron and steeping it dant. for 1 hour in 1-2 cup of water. Strain this and put it into an earthenware nan and let evaporate till nearly dry, Anchovies. Tournades Kitchen Boubeing careful not to let it become too quet, Bells Poultry Dressing, McMondry as that will change the color. To agle & Rogers Fruit Coloring, Extract this add enough alcohol to fill a 1-2 Pistachio, Bitter Almonds, Chartreuse ounce bottle.

by grinding spinach leaves through a cents a cake, Claret Vinegar, India Soy,

A little bottle of yellow coloring used very sparingly-only about 2

Things I Would Recommend.

Worcestershire Sauce, Essence of Cordial, Abricotine Cordial, Maraschino A light green coloring can be obtained Cordial for Peach Mousse, Scourine,5 chopper, and straining through a cloth. Pot-au-feu, Tobasco Pepper Sauce, Tar-A violet or heliotrope coloring can ragon Vinegar, Coffee Extract, D. Fishbe made by using 1 or 2 drops of er & Co., Milwaukee, Wis., Old Maderia.

HINTS TO HOUSEWIVES ON THE FARM.

MRS. J. A. CLARK, Waterloo, Wis.

Fruit for Breakfast.

most of any meal during the day. It plenty of cream, make a good farmer's is not quite so hard to prepare an appe- breakfast, and nearly all raised on your tizing meal for a man who has been own farm. up and about for an hour or two doing his chores, and brings his appetite with him when he comes in, but for the brain-workers it is more difficult. For such I would provide, first, fruit of some kind. In melon season, nothing is better than musk-melons. If these are properly started in the hot-bed, the season is a long one, and we can have them each morning for many weeks. In fall, winter or spring, a baked sweet apple with plenty of cream on it is delicious.

Cream--Bacon--Eggs.

sell his milk to the cheese factory, is this subject closes as follows: one of the things he should be lavish of, and is one of the greatest of edible of the daily food of rich and poor. A luxuries. After this, bacon and fried soup supplies the place of the stimu-

specialties. These, with buckwheat I will confess that I dread breakfast cakes and maple syrup, coffee and

Fried Potatoes--Toast--Cheese.

Fried potatoes and nicely browned toast go well with beef-steak, and milk toast, and scrambled eggs are a temptation to a flagging appetite. Dutch or Cottage cheese, eaten with cream, is a favorite dish at our house.

Soups.

In killing a beef you have to take the good and the poor, and in no way can you utilize the poor beef so well as in soups. The French, our greatest cooks, excel in this respect. A recent Cream, unless our farmer happens to article in the New York Tribune on

"It is so good and cheap, it is a part eggs are another of the farmer's lants, to which too many workingmen

which is so greasy and poorly prepared that it is of little or no food value, and fails to supply the waste of tissues caused by daily work. The good table of a good housewife does more for temperance than a thousand eloquent homilies by a thousand wise men."

Vegetables

I would recommend the using of a greater variety of vegetables. Try one or two new kinds every year. Not every farmer raises "Brussels' Sprouts,' but I think all should. They are a kind of a glorified cabbage, without the objectionable feature of that vegetable.

Puddings and Pies--Cake

Puddings and pies are a good thing to have, especially puddings, and salads are a great addition to any table. Cake is a vanity, and the only kinds called for in a farmer's family are a plain cake with ice-cream, and a wedding cake when the girls get married.

An Abundance of Good Things.

The ordinary every-day farmer has at his command a continued abundance of good things in the eating line. At our house, just now, we are picking the first fruits of our hot-bed, in the shape of deliciously tender radishes. Next week we will have lettuce, and shortly spinach and beet greens. It is astonishing with what little trouble and expense these things are grown. A half-day's work of our man, at a time when his work is of no account, prepares the hot-bed. The only other expense, except the original charge for sash and box, is the seed and an occasional broken glass.

Celery.

In those days, before we had celery all winter long, we used to go to the garden of an old German friend of ours who was so fortunate as to have lettuce fit to eat about the first of June, and none that I ever raised equaled that, mother, in that she sacrifices herself flavored, as it was, with a six month's to one who is under obligation to her, abstinence from a fresh vegetable diet. and to the child, because by thus taking Nature gives its compensation, though her duties from her, you make her

in this country are driven, by food six months for the sake of acquiring an additional zest to our appetites.

Woman's Special Province.

To provide this food and have the proper arrangement of our domestic affairs is woman's special province. Her education should tend to this. Her business in life is to make some one happy, and to do this, she must have a thorough understanding of the needs and requirements of domestic management.

A Farmer's Wife's Education.

I believe in the highest education for woman. There is no danger of any one knowing too much or being too accomplished, but this higher education. especially for a farmer's wife and daughter, must be built on a solid foundation of practical every-day household knowledge. It can detract nothing from the attraction of a farmer's house, if his daughters are good musicians. If they know Latin and Greek, it will do no harm, but rather be a distinction than otherwise in their later days. But, in addition to this. if they are to be farmers' wives, they must know how to take care of a slaughtered hog. They must understand souse, and comprehend cheese, and have a realizing sense of the merits of spare-ribs and pickled pigs' feet, and all the mystery of sausage. In the education of our daughters we make a great mistake if we neglect these things.

Mothers Favor their Daughters.

There is a tendency on the part of some mothers to favor their daughters at their own expense. They will wash the dishes rather than have these young ladies soil their hands; they will take care of the milk and make the butter while the girls sit in the parlor and practice on the piano. This is wrong to both of these parties-to the I hardly think it pays to go without selfish, and render the work that must family-come doubly hard. How will a great convenience and saves many her children fare without a mother steps and much dirt. competent to either help or teach them? is the question that should be asked. I do not think there is much of this, but yet every one must have noticed instances.

Conveniences.

First, the house should be so arranged that she can perform her various duties without too many useless steps. In many houses the cellar is under the "upright," and the kitchen in the farthest end of the "L." The well is apt to be on one side of the house, the cistern pump on the other, and the woodpile far away. Properly, the inside cellar steps should lead directly from the kitchen-and there should be outside stairs for the carrying in of vegetables in the fall, and for milk in the summer, if the milk is kept at home.

The Sink.

Every farmer's kitchen should be furnished with a sink, into which both hard and soft water should be brought by pumps. It is not always convenient to have the well water thus brought, but there is no reason why the cistern water should not be. This sink should connect with a drain for the carrying away of waste water. If water must be brought into the house in pails, it surely is too much to ask that it be carried out in the same manner and thrown on the ground to make a spot offensive to sight and smell, and a breeding place for flies. At one end of the sink a long, broad shelf makes a good place to put dishes as they are wiped, and under this should be drawers for dish-wipers and kitchen aprons, and a cupboard for tea-pot and coffeepot, tea canister and coffee mill, and under the sink a place for pots and kettles.

The Wood Box.

tween kitchen and wood-shed, open- perhaps, but one that the children will ing directly behind the cook stove on remember with pleasant recollections the kitchen side, and so arranged that all their lives through.

eventually-if she marries and has a it can be filled from the wood-shed, is

The Cooking Room.

A small room on one side of the kitchen to be used as a cooking room is another labor-saver. In this a large flour chest, with partitions, can hold fiour. corn meal and rye meal. If of the right height, it makes a good place to rest the molding board upon, while in use. Over it are rows of shelves for spices of all kinds, boxes of raisins and currants, sago and rice and other groceries; near by the sugar bucket, molasses jug, lard jar, baking tins, pie plates-in fact, all and everything that one needs to use in the making of bread, pies and cake, should be in this one room, where it could be reached with scarcely a step.

Cupboard for Dishes.

The cupboard for dishes, built between dining room and kitchen, with door in either room, will be found a great convenience. Underneath the cupboard, drawers should be placed for storing table-cloths, napkins and extra knives, forks and spoons.

The Living Room.

The room for rest and recreation should be on the south side of the house, into which the sun can shine all through the long winter. It should have a coal stove, or a good wood base burner, and a fire night and day, a little less than eight months of the year. This room should be made as pleasant as one's means will allow. There is no need for costly furniture, but let it be comfortable in every way -light, warm, a place where the children can play on the floor, and the older people rest in easy rocking chairs. with pictures, if you can afford them; books, by all means; playthings for the smaller children, games for the older A wood-box built in the partition be- ones-a room hard to keep in order,

Tack Puller--Carpet Sweeper.

the labor of women, which many of and by means of this device the taking you may have, and others never have down and setting up of the coal stove heard of. There are no agents to go becomes an easy matter. Most men around and sell them, probably, be- car lift a good deal, but I notice that cause their cost is so small that they few of them seem to enjoy carrying could not live on the commission they around a coal stove. would get. Many a woman this coming spring will get down on the floor and pull tacks from the carpet with a have tried potato parers, but always screw-driver or a butcher-knife, when return to my little knife. If potatoes there is a little tool made for this are well cleaned with a brush, the purpose, costing twenty-five cents, called "Little Jack, the Giant Tack brushes now made for cleaning vegeta-Puller," which not only pulls the tacks from the floor, but from the carpet. Any small child can use it, and it saves its cost in tacks every two years. be done with a cloth, and is not nearly A carpet-stretcher, costing seventyfive cents, brings the carpet easily to its place, and saves a great many times its cost in lame arms and aching shoulders every year. A carpet-sweeper is as much ahead of the ordinary broom as the ordinary broom is ahead of the hemlock ones I remember seeing one of our neighbors use when I was a child.

The Washing Machine--Ironing.

If any one has a washing machine worth the house room it occupies I wish she would let me know of it. A folding ironing board is very well for children's clothes, skirts, shirts, etc., but I had a little table made, two feet wide, four feet long, set on castors, which is easily moved, and is much better for ironing sheets and long table cloths. The uses to which this little table is put are innumerable, and it is astonishing how much the burdens of life are saved by placing many things on little wheels. Few women are so constituted as to be able to life much, but their ability to push things is something wonderful.

Truck for Moving Stoves.

say, that with five pieces of 2x4, thirty may expect something fine for dinner. inches long, and a set of castors costing A lemon squeezer and a potato masher a dollar, we have a frame upon which are also convenient articles, and cost we put our coal stove, when not in use, but little money.

and a woman or child can push it from There are many things for lightening one end of the house to the wood-shed,

Cleaning Vegetables.

Every one has an apple parer, and I paring is an easy matter. The various bles are good things to have, and an ordinary scrub-brush for wood-work does the work much better than can as hard on hands and arms.

Folding Dish-Rack,

A folding dish-rack, costing twenty- . five cents is for sale at crockery stores. By using this only half the towels are needed that are required when the dishes are drained in the ordinary manner. A wire dish-cloth for kettles and tins is a necessity in every kitchen.

The Lightning Chopper.

For the making of mince pies, plum and hasty puddings, and various other things, many people use the ordinary wooden bowl and a chopping knife; but there is a machine called the which "Lightning Chopper," makes play of these otherwise laborious tasks. The knife is carried up and down, in a revolving pail, by means of a crank, and is so easily worked that a small child can use it. It costs about five dollars and is, apparently, indestructible. Mine, after the use of many years seems as good as new, and has been worth fully the cost of it each year that I have had it. It does not make quite as much noise as a threshing machine, but enough to delight the children, and to let the farmer know, if Speaking of wheels reminds me to he is within easy distance, when he

Necessary Tools.

Many things about the house are often destroyed for want of a skillfully driven nail, or a well turned screw. It is said that a woman cannot drive a nail, but how can you expect her to if she has only a flat-iron to drive it with? I well remember the first shelf I put up. My tools were a wood-saw, a butcherknife and a disabled monkey-wrench. I know more now than I did then, and have a saw, hammer, screw-driver, chisel, two gimlets, a box of screws of all sizes, nails of all lengths, tacks, linen twine, and many other handy and useful things, in a cupboard in my kitchen. I find these a great convenience, as do also the men folks, judging from the number of times they come to the house to ask if they can borrow some of these things, taking care to explain that theirs are laid away under the snow, or in some other equally inaccessible place. They are always careful to return them, and recognize them as belonging entirely to me, and you know it is a comfort to a woman to be absolute owner of something, if it is only a saw or a hammer.

Reserve Supplies.

There are many other branches of domestic economy which I have hardly time to touch upon. The importance of keeping a good supply of reserves can not be too strongly urged. My mother used to say that sheets and table-cloths should never be worn out, but when about half worn new ones should be purchased and the old ones laid away for extra occasions. Unexpected and long-continued company often cause us to need large supplies of table linen, and when sickness comes, there can hardly be too much bedding.

Plan Systematically.

but of good-housekeeping, drudgery need not be. If we will sys- ing water for his stock; that by his tematically plan our work; if we will binder, he now does not have to sweat intelligently plan our houses, life will in the harvest-field; that by his haybe much easier for many of us. I loader and horse-fork, and mower, and know many women complain that they self-dumping rake, he has freed the

cannot rebuild their houses, and cannot procure the conveniences they desire: but I believe that if a woman knows what she wants, and will make her husband know that she knows, in nine cases out of ten she will get it. It is always well to submit to the inevitable with grace and philosophy: but we don't want to get into the habit of accepting as inevitable things which might be changed by a little persistance on our part.

E. and

Too Much Work.

It is said of America, by a recent visitor that here every one works, and it is also said that work without ceasing is making this country one of the most prosperous, but one of the most unbeautiful countries imaginable. No one here has time to be idle: vet it is only in idleness and leisure that the beautiful can be developed, either in the brain or by the hand. We, the farmers' wives, as a class, are true to our work. We will not only do our duty ourselves but we will bring up our daughters to take our places in the next generation. Nature has done her share in giving us a beautiful state. In no other country does the sun shine on a lovelier landscape. Can we then be blamed if we wish to make our homes beautiful and fit for the situation in which we find them placed? To do this we should have leisure, and if by defects in our domestic arrangements we are compelled to spend the time in useless labor which is needed for giving us a higher education and a greater beauty in our surroundings, it is a crime on the part of those whose duty it is to provide for us and for whom we perform our unfailing share.

Buy Your Wife Labor-Savers

Let the farmer, when he congratu-Eternal vigilance must be the price lates himself that by his wind-mill he eternal has saved himself the labor of pump-
saving machinery, use equal energy be-a place of refreshment, a home saving machinery, use equal energy be-a place of refreshment, a nome and wisdom in providing smaller labor-where culture and comfort dwell, where saving implements for his wife, and I will promise, on her part, that she will do her duty, not only in providing for humanity, the Wisconsin farmer.

hay field of its terrors,-let him, I say, the wants of the house, but also in when he contemplates all this labor-making a farmer's home what it should



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The Wolf River Nurseryman,

Has now secured grounds 3⁄4 miles northeast of New London, Wis., 7 miles from his old location. He will continue to grow and sell all leading varieties of small fruit plants, strawberry plants, shade and ornamental trees; also deals in northern grown apple, and other fruit trees. Has special facilities for filling orders for evergreens.

Our motto is, "Best of goods at reasonable prices." A pleased customer is the best advertiser. Write for special prices on large orders.

Address,

W. D. BARNES, New London, Wis.

Box 242.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (259)

C NO

Locations for Factories.

0 0 0 0 0 0 0 0

The trend of manufacturing is Westward, and among all manufacturers there is a latent feeling that the West as a territory for the manufacture of goods presents features unexcelled by any other section in the Union.

The eight States traversed by the 6150 miles of the CHI-CAGO, MILWAUKEE & ST. PAUL RAILWAY'S tracks (Illinois, Wisconsin, Northern Michigan, Iowa, Missouri, Minnesota, South Dakota and North Dakota), possess in addition to the advantages of raw material and proximity to markets, that which is the prime factor in the industrial success of a territory—a people who form one live and thriving community of business men in whose midst it is safe and profitable to settle. Many towns on the line are prepared to treat very favorably with manufacturers who would locate in their vicinity.

In addition to the vast agricultural resources, its territory comprises forests of hard and soft woods, mines of iron and other metals, coal and other minerals, quarries, clays of all kinds, tanbarks, flax and other raw materials. Water-powers (both river and artesian) are also still available.

A number of new factories have been induced to locatelargely through the instrumentality of this Company-at towns on its lines.

The central position of the States traversed by the CHICAGO, MILWAUKEE & ST. PAUL RAILWAY makes it possible to command all the markets of the United States. Nothing should be permitted to delay enterprising manufacturers from investigating. The Industrial Department promptly furnishes practical information to manufacturers. As it is to the interest of the Road to secure the location of industries at places where the surroundings will insure their permanent success, the information furnished a particular industry is pertinent and reliable.

LUIS JACKSON,

Industrial Commissioner, C. M. & St. P. R'y., 106 Adams St., CHICAGO, ILL.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (260)

CHICAGO, MILWAUKEE & ST. PAUL R'Y

THE-

With its 6,100 miles of thoroughly equipped road reaches all principal points in

Northern Illinois, Wisconsin, Iowa, Minnesota, South Dakota, North Dakota and Northern Michigan.

THE ONLY LINE

Running Electric Lighted and Steam Heated Vestibuled Trains.

All Coupon Ticket Agents in the U:vited States and Canada sell tickets via the Chicago Milwaukee & St. Paul R'y

GEO. H. HEAFFORD,

Gen's Pass. Agent, Chicago, Ill.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (261)

J. I. CASE Threshing Machine Co., RACINE, WIS.



MANUFACTURERS OF

Ironside Agitator Separator

For Threshing all kinds of Grain, Clover, Rice, etc,

20 TO 40 INCH CYLINDER.

Capacity from 400 to 3000 Bushels of Grain per day.

Our Illustrated Catalogue Sent Free to any Address.

Mention "Farmers' Institute Bulletin," when writing to advertisers.

J. P. CASE Threshing Machine Co.,

RACINE, WIS.



MANUFACTURERS OF

Portable, Traction, Skid and Stationary Engines,

From 6 to 30 Horse Power. 8, 10, 12 and 14 Horse Dingee Woodbury Sweep Power.

AUTOMATIC SWINGING STRAW STACKER.

1 and 2 Horse Tread Power and Saw Frames, 5 ton Wood Derricks, 12 ton Iron Derricks.

Single and Double, Portable, Friction Feed and Belt Feed Saw Mills. Send for our Illustrated Catalogue.

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The North-Western Line.

THE DIRECT ROUTE

Chicago * and * Milwaukee

BETWEEN-

APPLETON, WAUSAU AND ASHLAND,

-AND-

The Gogebic, Penokee and Montreal Iron and Mineral Ranges, Hurley Ironwood and Bessemer, and the manufacturing and lumbering districts of Central and Northern Wisconsin.

Sheboygan, Manitowoc, Kaukauna, Appleton, Wausau, Marshfield and Rhinelander.

Special Inducements and Facilities offered for the location of Manufacturing Establishments.

STO SPORTSMEN S

The most celebrated fishing resort for Bass and Muskallonge in the Northwest are all reached by this line.

Gogebic Lake, Rhinelander, Tomahawk Lake, Manitowish, Trout, Twin Lakes, Lake Vieux Desert, the Eagle Waters, Pelican Lake, the Ontonagon, Brule and other Trout streams.

Guide Books, Maps, Time Cards, and full information furnished on application to Ticket Agents CHICAGO & NORTH WESTERN RAILWAY and connecting lines.

W. H. NEWMAN.	J. M. WHITMAN,	W.A. THRALL,
3d Vice-President.	Gen'l Manager.	Gen'l Pass. & Tkt Agt.

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MINNESOTA, SOUTH DAKOTA, NORTH-ERN WISCONSIN AND MICHIGAN,

-FOR SALE BY THE-

Chicago & Northwestern Railway.

Some of the finest agricultural, timber and cleared lands in the Northwest are now for sale by this company at

EXCEEDINGLY LOW PRICES

AND ON THE MOST LIBERAL TERMS.

Title Perfect, Plenty of Good Water.

Farm lands adapted to all kinds of farming. First class market facilitie and everything necessary to make

FARMING EASY AND PROFITABLE.

Maps, prices, terms and all information furnished on application to

C. E. SIMMONS,

Land Commissioner C. & N. W. R'y, CHICAGO, ILL.

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MERRILL & ELDREDGE, Commission,

126 South Water Street, Chicago,

Guarantee highest market prices and prompt returns at all times for consignments of

BUTTER.

Refer to National Bank of America, Chicago.

N. B.-Have sold C. P. Goodrich's Fine Butter for years.



Stock fed and bred for Breeding purposes only. Prices reasonable, according to quality of stock.

Also grower of Probsteir Rye, German Vetches and Selisian Clover. Correspondence solicited, and visitors always welcome.

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-<0XFORDS>>

OWNED BY GEO. MCKEBROW, OF SUSSEX, WAUKESHA COUNTY, WIS.,

Carried off two-thirds of all First and Sweepstakes Prizes offered in the class at the World's Columbian of 1893 at Chicago.

1st on 2-yr old ram, 1st on yearling ram, 1st on ram lamb, 1st on 2-yr old ewe, 1st on yearling ewe, 1st on ram and three ewes over 2-yrs old, 2d on 3-yr old ewe, 4th on ewe lamb. Sweepstakes on ram any age. Cooper Dip Cup for best ram, the English Oxford Down Association's Silver Cup for best Oxford ram, and the English Oxford Down Association's Silver Cup for the best collective exhibit of Oxford Downs made at the World's Fair of 1893.

Another exhibit of

Oxfords, Southdowns and Shropshires,

from the same flocks won 121 prizes at Iowa State, La Crosse, Kansas City and St Louis Inter-State, and Waukesha County fairs, including eleven sweepstakes and 53 firsts at Iowa, winning the Mutton Flock Prize over all breeds with an Oxford flock.

My CHESHIRE SWINE won several prizes at Waukesha County and the World's Fair.

Sxford Down. Southdown, and Shropshire Sheep.

Cheshire Swine and White Holland Turkeys

of the best strains and individual merit are on hand and for sale at moderate prices. (No scrubs at any price.)

Inspection and Correspondence solicited.

COOPER SHEEP DIP FOR SALE.

Address. GEO. McKERROW, Sussex, Wis.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (267



000



AND BREEDING FARM.

Is the home of some of the very best young Percheron Stallions and Mares to be found in France or America. And all ages of stock for sale at very reasonable prices and reasonable terms.

Come and examine my stock before buying and I will make it to your interest.

Catalogues ready.

FC. M. & St. P. R. R.]

H. A. BRIGGS, Elkhorn, Walworth County, Wis.

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30.8

· BARLEY PRIZES. 接

The Pabst Brewing Company,

OF MILWAUKEE, WIS.,

The Largest Brewery in the World,

Owes its rapid growth, importance and popularity largely to the excellence and purity of the materials used, and the care employed in their selection and preparation.

To encourage the cultivation of high grade barley, and to become better acquainted with the farmers of Wisconsin, The Pabst Brewing Company will offer prizes for Wisconsin grown barley of 1894, as follows:

First Prize, -			\$10.00.
Second Prize, -	-	-	5.00.
Third Prize, a case	e of th	e "Be	st Tonic."

Samples should be sent to "Advertising Department, Pabst Brewing Company, Milwaukee, Wis.," in two pound bags, with card marked "Prize Barley," and giving name of grower, town and county where grown, number of acres cultivated, and number of bushels harvested. Entries and samples will be received until October 1st, 1894, but no later. Awards will be made and prizes given as soon as possible thereafter. Names of winners will appear in Wisconsin Farmers' Bulletin in fall of 1894.

The Pabst Brewing Company has a reputation equalled only by that of its famous beers, which are known to every farmer, and will carry out its promises as above.

If you raise good barley, send a sample of it to the Pabst Brewing Company, and try to secure a prize on it. "Hide not your light under a bushel."

PABST BREWING CO.,

"Advertising Department."

MILWAUKEE, WIS.

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(269)

⇒FRUIT TREES,

Small Fruit Plants,

Ornamental Trees and Shrubbery.

ANCIENT BRITTON BLACKBERRY PLANTS AT WHOLESALE.

THOUSANDS OF THE FAMOUS

Jessie, Bubach, Warfield and Lady Rusk Strawberry Plants.

LONG BUNCHED HOLLAND CURRANTS, ETC., ETC.

- 洲GRAPES. 嵌

God's Elixir of Good Health.

Two-year-old vines of the two wonderful Red Seedling grapes, *Tromania* and *Bentzilla* both originated in this county and have been tested over 40 years. Early, Hardy, Sweet, and Prolific. Very large berries and fine clusters.

Thousands of the famous Wolf River, Northwestern Greenings and Bessie Apple Trees.

ALL originated in this county. Many other FINE seedlings named and unnamed. Also a large stock of other leading varieties of apple, crab, cherry, and plum trees, ALL grown on NEw land. SCIONS all cut from BEARING trees. (Scions and cuttings from these new and old seedlings for sale to nurserymen.)

old seedings for sale to unservmen.) NOTE.—I am growing VARIETIES especially ADAPTED to WISCONSIN and the NORTHWEST, for which my stock is especially qualified. Knowing that Adaptation and Acclimation with a good site and good cultivation will insure success.

My Wolf River, Northwestern Greenings and Bessies at the WORLD'S FAIR and other fairs, prove beyond a doubt the point for adaptation.

Send List of Wants for Special Prices.

Order early and direct from me and save agents' commissions. Correspondence cheerfully answered. Personal inspection cordially invited.

PLANT ADAPTED STOCK.

A. D. BARNES, Proprietor,

Waupaca Arctic Nursery and Fruit Farm, Waupaca, Wis.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (270)

ALEX. A. ARNOLD, Eastville Farm, Galesville Wis.,



SHORT-HORN CATTLE

→ BERKSHIRE HOGS.

OF ALL AGES AND SEX. CONSTANTLY ON HAND.

Stock Kept Constantly Thriving,

MILKING QUALITIES MADE A SPECIALTY

IN BREEDING SHORT-HORNS.

The Short-horn is standard for beauty and utility and the most valauble 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.

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(271)

500,000 PLANTS. Big Berries!

AND LOTS OF THEM

CAN BE GROWN

By procuring plants at

∗RIPON FRUIT FARM, **∗**

C. H. HAMILTON, Prop., Ripon, Wis.



Who cultivates and has for sale plants of the following varities:

Palmer, Kansas, Older.

Marlboro. Best Red Raspberrie, Large Stock. The Queen Gooseberry, Large, Very Productive. Will be offered Fall of '94.

Downing, Industry, Triumph, Houghton, Gooseberries,

Fay's Prolific, Victoria, Cheery, White Grape. La Versellare, Red Dutch, and Lee's Prolific, Black Currants, 1 and 2 yrs. old. Grapes-All the leading varities.

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.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (272) Established 1854.

J. Obermann Brewing Co.,

Cherry St., from 5th to 6th St.,

MILWAUKEE, WIJ.,

OFFER THE FOLLOWING

To become better acquainted with the Hop Growers of Wisconsin, we shall offer the following prizes for samples of Wisconsin

grown hops:



st Prize, -		-		\$15.	V
cond Prize,	-		-	10.	X
ird Prize, -		-		5.	×1

Prizes will be paid by W. H. Morrison, Supt., as soon as awards are made.

Send to J. Obermann Brewing Co. One lb. sample with name of grower, where raised, Town, County, Etc.

Mention "Farmers' Institute Bulletin" when writing 'to advertiser. (273



THE POPULAR. ROUTE TO AND FROM

Kewaunee.

Green Bay.

Grand Rapids, Winona,

Stevens Point.

La Crosse.

St. Paul and Minneapolis.

KEWAUNEE-FRANKFORT ROUTE.

>THE SHORT LINE

New York, Boston, Philadelphia, Buffalo, Detroit, Toledo,

Ann Arbor.

AND ALL POINTS IN THE

WEST AND NORTHWEST.

8. W. CHAMPION. General Manager. GREEN BAY, WIS.

J. B. LAST. Gen'l Freight and Pass. Agt.

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THE S. FREEMAN & SONS

MANUFACTURING COMPANY



FEED and ENSILAGE CUTTERS and CARR ERS.

Broadcast Seed and Fertilizer Sowers, Sweep Horse Powers, Feed Grinders, Corn Shellers Upright Engines and Boilers for Farmers' Use Wood and Pole Saws.

COMPLETE ILLUSTRATED CATALOGUE,

Containing "A Treatise on Ensilage," to all mentioning "Farmers' Institute Bulletin."



"Atlantic Limited"

IS THE FINEST AND FASTEST TRAIN BETWEEN

St. Paul,

Minneapolis,

and the East.

Ghrough Sleeper to Boston.

New Train Service between St. Paul, Minneaplois and Menot, N. D., Short Line.

THE FINEST TIMBER SECTIONS

OF NORTHERN MICHIGAN AND WISCONSIN, AND

SOME OF THE RICHEST FARMING LANDS

OF MINNESOTA AND NORTH DAKOTA,

ARE LOCATED ON THIS LINE.

GOVERNMENT RESERVATION LAND

Located on Soo Line northwest of Valley City, N. D. Now open to the public, subject to existing homestead laws.

For rates, maps, time tables, etc., apply to ticket agents, or write

F. D. UNDERWOOD,

General Manager.

MINNEAPOLIS.

C. B. HIBBARD,

Gen'l Pass. Agt.

Mention" Farmers' Instisute Bulletin" when writing to advertisers (276) Soo-Pacific Line

MINNEAPOLIS, ST. PAUL AND SAULT STE MARIE

And Canadian Pacific Railways,

Is now open for travel, forming the SHORTEST and MOST DIRECT LINE from ST. PAUL and MINNEAPOLIS to all points on the

North Pacific Coast, Puget Sound, Alaska, Japan, China and Australia,

-> SCENERY UNSURPASSED, *

Making it the Popular Tourist Route

SHORT LINE TO

Oakes, Valley City, Carrington, and Minot, N. D.

Through First Class and Upholstered Tourist Sleepers Daily between St. Paul and Minneapolis and New Whatcom, Wash.

1,000,000 ACTES Government Reser-

Located on Soo Line northwest of Valley City, N. D. Now open to the public, subject to existing homestead laws.

For rates, maps, time tables, et	c., call on or write	
F. D. UNDERWOOD, { GENERAL MANAGER. }	MINNEAPOLIS.	C. B. HIBBARD, GEN'L PASS. AGT.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (277)



Mercantile Exchange, New York

Mention "Farmers' Institute Bulletin" when writing to advertisers. (278)

SPECIAL OFFERS. Freight Paid to Wisconsin Farmers and Planters.

On receipt of the amount named, I will deliver freight paid at any railroad station in Wisconsin, the following special lots: In ordering, be sure to give the lot numbers. Remember that on these special lots I stand all cost of baling and boxing, and freight charges. My reason for making special offers freight paid on these particular varieties, is that I find them very popular, and generally called for by the planters of the Northwest; and because some people hesitate to order from a nursery at a distance, on account of the freight charges which are usually much less than most people imagine.

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							1 1		0								
Lot N	io. 1—	100	Norw	ay Sp	ruce,	fine,	stock	y, tra	nspla	nted	, 12	to 18	in		\$	7	00
**	2-	50	66	• •		"	"			2	e ft. (a bar	gain))		II	00
**	3-	50	Scotch	Pine		**) in.					6	00
**	4-	100	Am. A	Arbor	Vitæ.	fine	for he	edge (or scr	een,	15 in	n				8	00
**	5-	50		"	**	**	66	"		16	2 ft					6	00
**	6-1	000	White													2	50
**	7-		Moun													3	
"	8-		Catalp													5	00
**	0		Am. V													3	00
**			Silver													6	50
**	11-1						2 to		66	66	- 66	-				15	
**	12-						3 to		**	**	**					4 0	00
"			Sugar	Maple	e. 6 to	8 ft			or la	wn	plant	ing.				20 1	00
**	14-						"	**		"	" "					4 0	00
**	15-		Ash L				Box	Elder	. 4 to	6 f	t					70	00
	16-	10		66			**	**	8 to	IO	ft					4 !	50
**	17-	10	Lomb	ard Po	plar.	IO to	12 ft									4	
**	18-		Silver													2 0	
**	19-	2	Kilma	rbrock	W.V	Villos	v. 2 G	olden	Will	ow. a	and 2	Wis.	W.W	illow.	6 ft.	2	50
**	20-		Cut L													2 0	
**	21-	2	Lilac,	2 Pur	ple F	ringe	2 SI	pirea.	2 Sn	owba	all					2 (00
**	22-		Hydra													2 (00
**	23-	6	Roses,	large	. 2 to	3 ft.	. vou	r sele	ction	from	my	list.				2 .	40
**	24-	6	Vines	or Cre	epers		66		6	66	"	" .				2 .	40
	25-	TO	Summ	er. IO	Wint	er ar	of to	Autu	mn A	Apple	es. 5	to 6 t	t			5 0	00
**	26-	10	••	IO	**		4 10	**			3	to 4 1	t., li	ght		2 0	00
**	27-		Cherri			and	2 Pe	ears								2 (00
**	28-	6	Red, 6	5 Whit	e Cu	rant	s. and	16 G	oseb	errie	s					2 0	
	20-	25	Red R	asp.	25 Bl	ack H	Rasp.	and	25 Bl	ackb	errie	s				3 0	00
**	30-	-2	Concor	rd. 61	Viaga	ra. 6	Dela	ware	Grap	es						3 0	
**	31-	EO	Sharpl	ess. S	Bub	ach.	50 W	arfiel	d Str	awbe	erries					2 0	
4.	51-																nd

As a further offer for the convenience of those who wish to have me pay the freight, and who would like to make a more general selection from the catalogue lists than these special lots cover. I would say that I will prepay the freight charges on all shipments where the order is not less than \$25 in amount. Two or more neighbors may club together and thus avail themselves of this offer. Each man's tree will be separately labeled and tagged, and all packed together in one box. It costs but little more for me to pack \$25 worth than it does to pack \$5 worth of trees. It is a great advantage to customers to club together in this way, as they save themselves the cost of boxing and the freight charges. This offer applies to all trees, plants and seeds listed in my catalogue. Send for one.

> W. D. BOYNTON, NURSERYMAN, Shiocton, Wis.

Mention "Farmers' Institute Bulletin" when writing to advertisers.



RAILROAD,

With its Northern and Eastern Terminals at Chicago, has through car lines

From the Great Lakes

With connections from the North, West and Atlantic seaboards.

South to the Gulf of Mexico

Reaching direct such important points as Springfield, Ill., St. Louis, Mo., Memphis, Tenn., Vicksburg, Miss., and New Orleans. La., with connections to all principal points in Florida, Georgia, Alabama, Mississippi, Louisiana, Texas and Mexico. It also has through car lines

West to the Missouri River,

Reaching direct such important points as Rockford and Freeport, Ill., Madison, Wis., Dubuque, Cedar Rapids and Sioux City, Iowa, and Sioux Falls, Dakota, with connections for all principal points in Nebraska, Idaho, Utah, Nevada and the Great West.

🔊 PULLMAN SLEEPING CAR SERVICE. 🎼

See that your Tickets read via the Illinois Central Railroad. They can be obtained of any ticket agent of its own or connecting lines.

J. T. HARAHAN, Second Vice President. M. C. MARKHAM, Assistant Traffic Manager.

T. J. HUDSON. Traffic Manager. A. H. HANSON, General Passenger Agent.

Mention "Farmers' Institute Bulletin" when writing to advertisers.






RAILROAD IS THE FAVORITE LINE FOR

Winter Excursions South.

BY ITS SOLID VESTIBULE TRAIN, THE

"Chicago and New Orleans Limited,"

YOU CAN REACH QUICKLY AND COMFORTABLY

NEW ORLEANS,

BAY ST. LOUIS, PASS CHRISTIAN, MISSISSIPPI CITY, OCEAN SPRINGS, BILOXI,



MEMPHIS, VICKSBURG, NATCHEZ, BATON ROUGE, HAMMOND,

Central

And all the well known resorts on the Mexican Gulf Coast, Mexico, Florida and Texas.

ITS SOLID VESTIBULE TRAIN,

"THE DIAMOND SPECIAL,"

RUNNING DAILY BETWEEN

CHICAGO AND ST. LOUIS,

IS THE VERY BEST TRAIN BY WHICH TO REACH

-> Arkansas Hot Springs,

AND THE RESORTS OF THE SOUTHWEST.

For further particulars, address A. H. HANSON, G. P. A. Ill. Cent. R. R., CHICAGO, ILL.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (281)

F. C. Edwards' Fruit Farm.



Jessie.

Cut Leaf Weeping Birch.

SHFRUITS.

Strawberries, Raspberries, Dewberries, Blackberries, Currants, Gooseberries, Grapes, Apples, Crab Apples, Plums, Cherries, Pears, Apricots, Asparagus, Pie Plant, Potatoes, Etc. Shade and Ornamental.

Cut-Leaved Weeping Birch, Horse Chestnut, Catalpa, Norway, Maple, Hydrangea, Yucca, Purple Fringe, Clematis, Honey-Suckle, Gladiolas, Roses, Evergreens, Linden, Etc.

Small Fruits and Ornamentals a Specialty.

Great Care Given to Cultivating.

Everything Strictly First Class.

Any questions cheerfully answered. Please state what stock you want and all particulars, and I will see that you get it.

Yours very truly,

Citizens' State Bank. F. C. EDWARDS, Ft. Atkinson, Wis.

Mention "Farmers' Institute Bulletin" when writing to advertisers



W. D. HOARD, IN HOARD'S DAIRYMAN.

Last March we paid a visit to the Wisconsin Experimental Station and inspected the Bidwell cow stall in use in the barn. We were very vavorably impressed with the very comfortable and cleanly appearance of the cattle and we found Prof. Henry enthusiastic as to the value of the stall. MaDISOS, Wis., May 12, 1382. Dear Sir:-Last fall our attention was directed to your cow stall by Mr. R. S. Kingman, of Sparta, who was using it. An examination of the stall in Mr. Kingman's stable led us to adopt it. We completed the stalls about th first of January, at wolch time you were with us. At the time of your leaving I told you that I could not then give an opinion regarding the stall, but we would test it, and if found satisfactory I should write you. Sufficient time has now elapsed to permit of a correct opinion I think, and I wish to say to you at this time that we are more than pleased with this method of fastening cows, or rather confining them, for their is no fastening about it. The strong points in this stail are: 1. It is perfectly adjustable. Half a minute suffices to fit it to any cow or even to a ten months call.

calf.

In this stall the cows can lick themselves, swing their heads to one side when lying down's stretch out their legs and be perfectly comfortable standing or lying.
 The fastening is such as to keep the cows even cleaner than when kept in the rigid stanchion.

The fastening is such as to keep the cows even cleaner than when kept in the right standard with standard with standard with the right standard with standard wit

For milking it is a very convenieniend system. Our men report very favorably in this par-5.

6. Cowstake up no more space than when in stanchions.
6. Cowstake up no more space that we are entirely satisfied with your method of fastening, and I Let me say in one sentence that we are entirely satisfied with your method of fastening, and I believe your system will come into general adoption by dairyman who are willing to incur a little expense to provide comfort for their cows and desire to keep them entirely clean.
Palleging that the more widdly your stalk are introduced the better it is for our dairyman.

Believing that the more widely your stalls are introduced the better it is for our dairymen, 1 gladly authorize you to make any use of this letter you may choose

Very respectfully, W. A. HYNRY, Director.

Mention "Farmers' Institute Bulletin" when writing to advertisers. (283)

Every Day in the Week Every Week in the Month Every Month in the Year All the Year Around

DOUBLE DAILY TRAIN SERVICE

CHICAGO, MILWAUKEE

ST. PAUL, MINNEAPOLIS, ASHLAND WEST SUPERIOR, DULUTH,

And all Points in Eastern, Western, Northern and Central ______ Wisconsin. _____



THE POPULAR ROUTE

To the delightful Cool Summer and Fishing Resorts of Illinois and Wisconsin, as described in our Tourist Book named "Along the Line."

JAS. C. POND, Gen'l Pass. & Ticket Agt. CHICAGO

Mention "Farmers' Institute Bulletin" when writing to advertisers. (284)







Mention "Farmers' Institute Bulletin" when writing to advertisers.

The Queen of England,	The Prince of Bulgaria,
The President of France,	The Sultan of Turkey,
The Czar of Russia,	The Khedive of Egypt,
The Emperor of Germany,	The Shah of Persia,
The King of Italy,	The Amoor of Afghanistan,
The Grand Duke of Baden,	The Bey of Tunis,

and other Dignitaries of State and Church, usually travel on special trains, run at large expense, but

The American Citizen

can travel on just as fine trains every day of the week at the cost of a single ticket, and tickets come cheap these days. No foreign potentate has anything better than the Palace Buffet-Library Cars, Diners, Sleepers, Family Tourist Cars and Coaches in use on the Great Northern's Trans-Pacific Route, between St. Paul, Minneapolis, Helena, Butte, Spokane and Seattle.

The Vice President of the United States,

the Hon. Adlai E. Stevenson, came from the Pacific Coast in July on the Great Northern, and in a talk with a St. Paul reporter, said: "I consider the road one of the most remarkable in America, new in construction, but perfect in accommodations, equipment and management. We were delighted with the service; the Buffet Car, with its bath room, barber shop, library, easy chairs, writing and card tables, smoking rooms, observation windows, etc., was a regular club house on wheels. The scenery is magnificent, and the track, having rock ballast, is free from dust."

The Secretary of the Interior,

the Hon. Hoke Smith, went to the Coast on the Great Northern, and speaks in high praise of the superior accommodations and wonderful scenery.

The Papal Ablegate,

Monsignor Satolli, traveled over the Great Northern, to make an official visit to the Catholic dioceses in the Pacific Coast states, and on his return expressed in eloquent terms his pleasure with the excellent train service, and his delight with the variety and impressive character of the mountain scenery along the road.

Address F. I. WHITNEY, G. P. & T. A., ST. PAUL, MINN., for publications and information about rates, routes, localities, business chances, etc., or

S. L. WARREN, General Agent, W. H. ROMINE, Traveling Agent, 95 Wisconsin Street, Milwaukee, Wis.

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A Few Pointers

TITTTIN Paragraphs.

The country can never be any larger unless an earthquake lifts up the bottom of the sea.

There is no more land in the United States than there was when Columbus discovered it, except a little made ground at the mouths of the rivers.

¶ Our population is increasing very fast and the hunger for land will become greater every year.

¶ Land is increasing in value every day. In time it will be as high priced as it is in England.

Land is the basis of all wealth.

It cannot be stolen.

¶ It cannot run away.

¶ It cannot burn up.

It produces the food of man and animals.

It is the safest investment on earth.

It can still be had in the Northwest at very reasonable prices.

It can still be homesteaded in some parts of the Northwest.

The only cheap or free land of any agricultural value remaining untaken in the country is along the line of the Great Northern Railway.

In the Devil's Lake and Turtle Mountain districts of North Dakota free farms produced in 1891 and 1892 from 20 to 40 bushels of wheat to the acre.

In the Red River Valley renters often pay for improved farms from a share of a single season's crop

Land on the crop share plan can still be had.

¶ Why do men live on high priced rented land back East, which they can never own, often paying for fertilizers per acre more than virgin soil can be bought for in the West?

Fine ranges invite the attention of stock raisers in Montana.

Minnesota, Montana, Idaho and Washington contain the only forests of valuable timber remaining in the republic.

The Northwest invites everybody. There is a good deal of everything to be found there.

The new transcontinental line of the Great Northern gives transportation facilities to large areas of new farming, grazing, lumbering and mining country.

The Great Northern is the line from St. Paul, Minneapolis, Duluth and West Superior, to Puget Sound and Pacific Coast points.

For publications and information about rates, routes, localities, etc., in the Northwest, address

F. I. WHITNEY, C. P. & T. A. ST. PAUL MINN., OR

S. L. WARREN, Gen. Agent, W. H. ROMINE. Trav. Agent, 95 Wisconsin St., Milwaukee, Wis.

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Combination Cows won Highest Hono's at the World's Fair in the greatest test ever conducted, securing 2d place in cheese test, 1st and 2d place in 90 day test, 1st and 2d place in 30 day test, 1st and 2d place for best cow of each breed, 1st and 2d for best cow of any breed, and 1st sweepstake cow.

My cow, Brown Bessie 74997, won the 90 day butter test and 30 day butter test, scoring 3¹/₂ lbs. in one day, and proving herself to be

The Best Cow in the Test!

Brown Bessie's son, Recorder 29239, is now at the head of my herd. 60 head in herd, all strong in blood of the

Great Combination,

Out-crossed to Toltec's Signal 29501.

Prime Young Animals for Sale.

Correspondence solicited.

H. C. TAYLOR,

ROCK CO.

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ORFORDVILLE, WIS.

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THE CORN FODDER PREPARED BY THE "KEYSTONE" CORN HUSKER AND FODDER CUTTER

Can be baled in an Ordinary Hay Press and Sold the same as Hay. Sell the Fodder, or Feed the Fodder and Sell the Hay.



TWO BALES OF THE FODDER. SOLD THE FODDER FOR \$8 A TON.

JACKSONVILLE, ILL., Feb. 20, 1893.

KEYSTONE MFG. CO., Sterling, Ill .: GENTLEMEN:-In regard to your Corn Husker and Fodder Cutter I will say that it puts GENTLEMEN:—In regard to your Corn Husker and Fodder Cutter I will say that it puts the fodder in fine condition and it stays that way. I am feeding my horses fodder now that is two years old, and it is just as good as when put in the barn. I have not fed any hay for three years that I have had the Husker. My horses do better on it than hay, there being no dust in it to make them cough. I have frequently made more clear money out of the fodder than the farmer made out of his corn, counting the rent of the ground as cost of raising the could prepare, which was 60 to 75 shocks per day. My patrons who have bought it claim that the advantages of having dry fodder to feed in bad weather more than pays for the invest-ment, besides making the fodder go a great deal farther. It does splendid husking, taking off the husks and silks and never forgets the nubbins. Yours respectfully, S, B, GRAY.

Address. KEYSTONE MFG. CO., Sterling, III.

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For list of Summer Homes, address GEO. H. HEAFFORD,

General Pass. Agent, CHICAGO, ILL,

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CONDENSED OUTLINE MAP OF THE CHICAGO, MIL-WAUKEE & ST. PAUL RAILWAY



PASSENGER STATION OF THE CHICAGO, MILWAUKEE & ST. PAUL RAILWAY AT MILWAUKEE, WIS.

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EIOWEIS, Wholesale and Retail Dealers in Farm and Garden Seeds. Plants for Lawn and Parler Decoration. Flowering Buibs. - Farm and Garden Implents. CURRIE BROS., Seedsmen & Florists, Milwaukee, Wis. STORES: 108 Wisconsin St., 312 Broadway. GREENHOUSES: Cor. State and 27th Sta. ILLUSTRATED CATALOGUE FURNISHED FREE ON APPLICATION.

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Seeds, .:. Seeds!



OF NEW AND LEADING VARIETIES.

DWARF OSSEX Rape,

Selected Stocks of Sugar Beets, Mangels, Turnips, Etc., for Stockmen.

FARM AND GARDEN SEEDS.

CURRIE BROS.

STORES: { IOS WISCONSIN ST. 312 BROADWAY. Seedsmen and Flerists, MILWAUKEE, WIS,

Send for Catalogue.

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THE NORTHWESTERN 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 Chicage. PULLMAN PALACE SLEEPING CARS between

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PARLOR CHAIR CARS ON DAY TRAINS between Minneapolis and St. Paul, and Duluth and Ashland.

RECLINING CHAIR CARS ON DAY TRAINS between Eau Claire and Ashland.

FREE RECLINING CHAIR CARS between

Minneapolis, St. Paul and Tracy.

PRINCIPAL TICKET OFFICES:

ST. PAUL, 159 East Third St. DULUTH, 405 Messaba Block. MINNEAPOLIS, 13 Nicollet House Block. CHICAGO, 208 South Clark st. WRITE FOR MAP FOLDER OF THE LINE.

F. W. WINTER. General Manager. T. W. TEASDALE,

Gen'l Passenger Agent, St. Paul.

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The North-Western Line. (C. ST. P. M. & O. Ry.)

This is the Only Line

Running both Pullman and Wagner Private Compartment Car; and New Style 16 Section Pullman and Wagner sleeping cars between Minneapolis, St. Paul and Chicago. It was the first line to introduce these triumphs of car-architecture west of Chicago.

This is the Only Line

Running Buffet-Smoking Library Coaches between Minneap olis, St. Paul and Chicago. These coaches are luxurious clut rooms on wheels.

This is the Only Line

Running fast Limited trains between Duluth, the Superiors and Chicago equipped with both Pullman and Wagner Vestibuled Buffet Sleeping Cars.

This is the Only Line

Running Pullman sleepers from Minneapolis and St. Paul to Sioux City, Omaha and Kansas City; also to the Superiors and Duluth.

This is the Only Line

With through train service between Minneapolis, St. Paul and East Superior, Superior, West Superior, Duluth and Ashland.

For information as to through rates and routes call on or address agents

In ST. PAUL, 159 East Third St. In MINNEAPOLIS, 13 Nicollet House Blk. In CHICAGO, 208 South Clark St.

E. W. WINTER, General Manager. T. W. TEASDALE, Gen'l Passenger Agent, St. Paul.

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Barley Prizes! Hop Prizes!



TO ENCOURAGE GROWTH AND CULTIVATION OF

Hopsand Barleyin Wisconsin,

We shall offer the following prizes, which will be paid by Supt. W. H. MORRISON, as soon as we make award.

Barley Samples 2 lbs., Hop Samples 1 lb.,

must be sent to VAL. BLATZ BREWING CO., Milwaukee, Wis. Winners' names will appear in Wisconsin Farm Institute Bulletin No. 8.

BARLEY.	HOPS.					
1st Prize, \$10.00	1st Prize, \$10.00					
2d Prize, - 5.00	2d Prize, 5.00					
3d Prize, - 1 case beer	3d Prize, - 1 case beer					

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COE & CONVERSE. Nurserymen?Fruit Growers



Fort Atkinson, Wis.,

Have the Largest and Most Complete Assortment of

Fruit and Ornamental Plants, vines and trees in wisconsin.

Our illustrated descriptive thirtytwo page Catalogue tells all about it, and gives right prices. Send for one t_{Ω} -day. We send it free.

WeHave

Strawberries new and old varieties. Large stock of strong heavy plants from new beds. Raspberries, 13 varieties, i cluding the Wonderful Older's Seedling, the best Black Cap grown. Blackberries, Dewberries, Juneberries, Gooseberries, Currants, Grape Vines, etc. Fruit Trees of all kinds.

Ornamental Trees, Flowering Shrubs, Evergreens and Roses.

If you want plants for your family garden, send for our Catalogue.

- If you want to plant largely for market, send for our Catalogue.
- If you want fine trees and flowers for your lawn and border, send for our Catalogue.
- If you want to grow the BEST small fruit an i do not know just what to plant, tell us what your soil and location are and we will tell you what we think will be th best for you to plant. We have been growing fruit here in Wisconsin for a living for nineteen years and ought to know something about it.
- If you want I plant or 100 plants or 1,000 plants or 100,000 plants, send for Catalogue.

COE & CONVERSE, Fort Atkinson Wis.

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THE SMALLEY TREAD POWER OUTFIT.

A FIRST-CLASS TREAD POWER, with governor or speed regulating attachment such as we furnish, is not only the best power in the world for operating ensilage and fodder cutting machinery, but is well adapted to all kinds of farm work. grinding grain, sawing wood, shelling corn and even pumping water or operating creamery implements, separators, etc. In fact, it is impossible to enumerate the many uses to which they can be successfully adapted. The demand for them ought to increase a hundred fold. We can only add that the possession of a Smalley even lag Tread Power, with speed-regulating attachment, on your farm will prove a **POSITIVE LUXURY** as compared with any other power in the market. The increased cost over other or common powers will not be noticed after a few hours' use.

PRICES OF TREAD RIGS:

No of	Intfit	includes	No.	9	Cutter,	One-horse	Tread	Power	and Belt.		\$150	00
" 10	"	"	**	10			**		**		195	00
" 12	**	**	**	12		Two-horse		"				
" 14	**	**	**	14	"	200		"				
" 15	**	**		14		Three-horse	"	**				
" 18	**	**	"	18		Steam Power		rrespon	ding Price	es.		
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Commission & Merchants,

For the sale of all kinds of

FARM and DAIRY PRODUCTS.

157 South Water Street, Chicago, Ill.



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A.J. Decker&Co.

FOND DU LAC, WIS.,

Manufacturer of Creamery Goods



CREAMERIES BUILT AND EQUIPPED COMPLETE IN ANY PART OF THE STATE

We are now building a Creamery gine that is perfect in every respect, and will sell it separate or with other creamery goods, *cheap*.

We are general agents for the

United States Cream Separator, BOTH FACTORY AND FARM SIZES.

These Separators have the latest improvements and have many points of excellence over other separators. We guarantee every claim we make for them. We want to place a sample Farm Size Separator in every town in the state. The first order in every town where no agent has territory we will make special figures. So send in your orders.

Our specialties on

Our Improved Babcock Milk Test, IS A 4-BOTTLE TEST COMPLETE FOR \$5.00.

We will need to sell 1,000 of them the coming season to make it pay. But we believe we can do it. So send your \$5.00 for a 4-Bottle Milk Test, and if on inspection it is not satisfactory, return it to us at our expense and we will return the money.

We also make a full line of BABCOCK MILK TESTS for both hand and steam.

Send for prices on any dairy article, and if we don't win your trade by low figures, it will be our fault.

A. J. DECKER & CO., Fond du Lac, Wis.

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FREE RECLINING CARS

-BETWEEN ----

CHICAGO AND ST. PAUL, MINNEAPOLIS, ASHLAND, COUNCIL BLUFFS,

OMAHA, DENVER AND PORTLAND.

SUPERB DINING CARS

ON THROUGH TRAINS.

All Agents sell Tickets via. the Chicago & North-Wostern Ry.

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IN CONNECTION WITH THE

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RUNS DAILY

FAST TRAINS

BETWEEN CHICAGO AND THE RICH MINING REGIONS OF THE

BLACK HILLS,

AND THE PRODUCTIVE OIL FIELDS OF

CENTRAL * WYOMING.

THE DIRECT LINE TO THE

GREAT SIOUX RESERVATION!

-WITH ITS----

Millions of Acres of Free Land.

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A Medal and Diploma, (The Highest Award,)

AT THE WORLD'S FAIR!

The Sharples Russian Separator



Received the highest honors at the great fair, the judges saying that it excelled all others in mechanical ingenuity, simplicity

The Bowl Alone Revolves.

This machine will run with one oiling a day, and it skims as clean at the end of the run as at the beginning.

Send for circulars to

P. M. SHARI Chester, Pa.,

VANAVAVAVAN AVAVAVA Mention "Farmers' Institute Bulletin" when writing to advertisers (308)

SHOOTING AND FISHING

ALONG THE LINES OF THE

Chicago, Milwaukee & St. Paul Railway,

IN WISCONSIN, PENINSULA OF MICHIGAN, IOWA, MINNESOTA AND DAKOTA.



No. of States

descriptive of some of the best localities for Shooting and Fishing sent free on application to

GEO. H. HEAFFORD,

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gions of

NEBRASKA, COLORADO,

WYOMING,

UTAH, IDAHO, MONTANA,

NEVADA, OREGON,

WASHINGTON and CALIFORNIA,

are most conveniently reached by the

CHIGAGO, UNION PACIFIC and NORTH-WESTERN LINE

Exceptional facilities in the way of through train car service.

* NO CHANGE OF CARS *

BETWEEN

CHICAGO_____

AND THE

⇒ PACIFIC COAST.

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GRASS SEEDS

TIMOTHY, CLOVERS, HUNGARIAN, MILLETS RED TOP, BLUE GRASS, LAWN GRASS, ORCHARD GRASS, BUCKWHEAT, FIELD PEAS, POP CORN, SIRD SEEDS, *LAX SEED, ENSILAGE CORN,

THE ALBERT DICKINSON CO.

OFFICES, 115 KINZIE ST.,

CHICAGO, ILL.

THE BUTTER TUB COVER FASTENER.



THE

ACME CLASPS

Are the **best** and **cheapest** device for securing the covers to **Butter Tubs**, **Palls**, &C. Look neater, more secure and better everyway. Easily and quickly applied. No tacks to drive-no fingers to pound. They

are used and endorsed by **Creameries**, **Dairymen** and **Butter Shippers** throughout the country. Send for samples and prices.

ACME FLEXIBLE CLASP CO. MANUFACTURERS, Cor. Clark and 17th Sts., CHICACO, ILL.

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T. A. CHAPMAN CO. MILWAUKEE. WIS.

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We are now showing a larger and finer assortment of

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.

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