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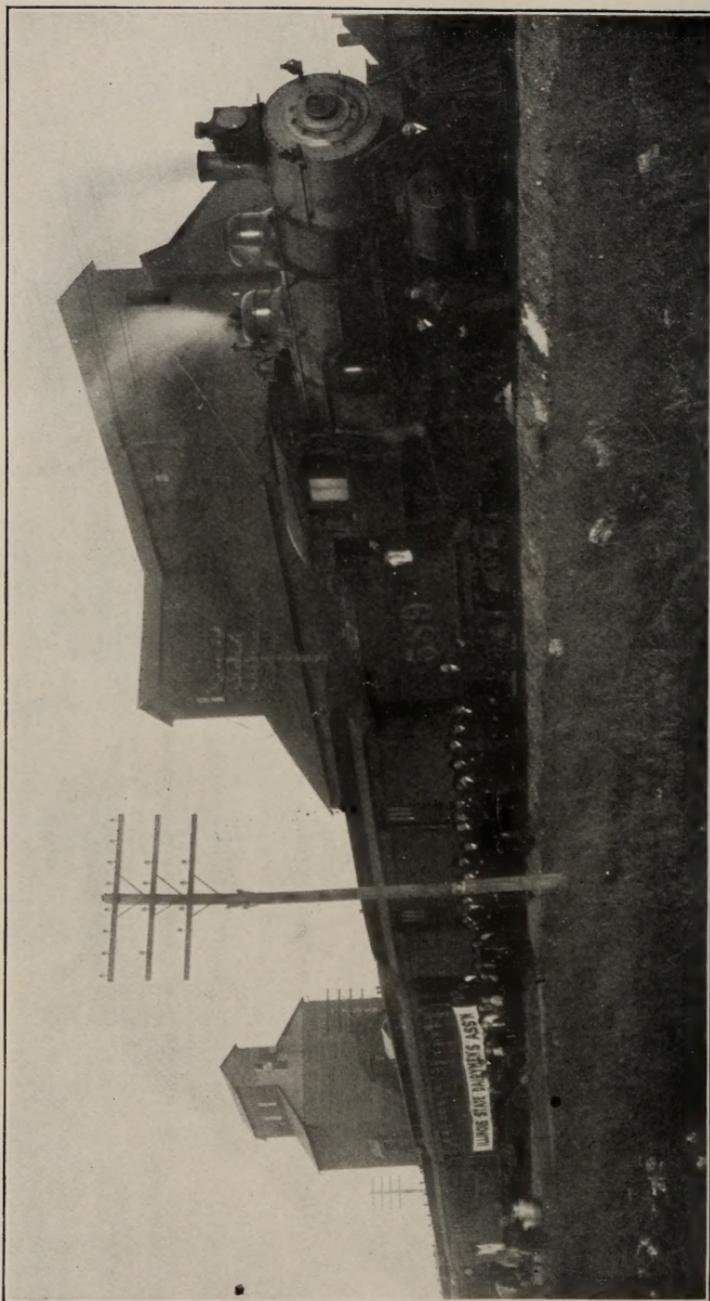
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Picture of Dairy Train run over the main line of Santa Fe in Illinois and its Pekin Branch March 25-30, inclusive. Picture taken at Mazon, Ill.

Thirty-third Annual Report of the Illinois State Dairymen's Association

Compiled by
GEORGE CAVEN, SECRETARY
Stenographic Report by Emma N. Higinbotham

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Convention Held at Joliet, Illinois,
January 16, 17, 18, 19, 1907

Letter of Transmittal

Office of Secretary,
Illinois State Dairymen's Association,
Chicago, Ill., 1907.

To His Excellency, Charles S. Deneen, Governor of the State of
Illinois:

I have the honor to submit the official report of the Illinois
State Dairymen's Association, containing the addresses, papers,
and discussions at its thirty-third annual meeting, held at Joliet,
Illinois, January 16th, 17th, 18th and 19th, 1907.

Respectfully,

GEO. CAVEN, Secretary.

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List of Officers

President—

L. N. WIGGINS, Springfield.

Vice President—

J. P. MASON, Elgin.

Directors—

J. P. MASON, Elgin.

M. S. CAMPBELL, Genoa.

A. F. JANSEN, Effingham.

W. E. JANES, Hinsdale.

W. R. KIMZEY, Tamaroa.

L. N. WIGGINS, Springfield.

E. L. WILSON, Manhattan.

Secretary—

GEO. CAVEN, Chicago.

Treasurer—

ADOLPH MEYER, Greenville.

By-Laws of the Illinois State Dairymen's Association

Officers.

Section 1.—The officers of the Association shall consist of a President, Vice President, Secretary, Treasurer and Board of Directors, composed of seven members, of whom the President and Vice President of the Association shall be members and the President ex-officio Chairman.

Duties of the President.

Sec. 2.—The President shall preside at the meetings of the Association and of the Board of Directors. It shall be his duty, together with the Secretary of the Board of Directors to arrange a program and order of business for each regular annual meeting of the Association and of the Board of Directors, and upon the written request of five members of the Association it shall be his duty to call special meetings. It shall be his further duty to call on the State Auditor of Public Accounts for his warrant on the State Treasurer, for the annual sum appropriated by the Legislature for the use of this Association, present the warrant to the Treasurer for payment, and on receiving the money receipt for the same, which he shall pay over to the Treasurer of the Association, taking his receipt therefor.

Duties of the Vice President.

Sec. 3.—In the absence of the President his duties shall devolve upon the Vice President.

Duties of the Secretary.

Sec. 4.—The Secretary shall record the proceedings of the Association and of the Board of Directors. He shall keep a list of the members, collect all the moneys due the Association (other than the legislative appropriations), and shall record the amount with the name and postoffice address of the person so paying, in a book to be kept for that purpose. He shall pay over all such moneys to the Treasurer, taking his receipt therefor. It shall also be his duty to assist in making the program for the annual meeting and at the close of the said meeting compile and prepare for publication all papers, essays, discussions and other matter worthy of publication, at the earliest day possible, and shall perform such other duties pertaining to his office as shall be necessary.

Duties of the Treasurer.

Sec. 5.—The Treasurer shall, before entering on the duties of his office, give a good and sufficient bond to the Directors of the Association, with one or more sureties, to be approved by the Board of Directors, which bond shall be conditioned for a faithful performance of the duties of his office. He shall account to the Association for all moneys received by him by virtue of said office and pay over the same as he shall be directed by the Board of Directors. No moneys shall be paid out by the Treasurer except upon an order from the Board, signed by the President and countersigned by the Secretary. The books or accounts of the Treasurer shall at all times be open to the inspection of the members of the Board of Directors, and he shall, at the expiration of his term of office make a report to the Association of the conditions of its finances, and deliver to his successor the books of account together with all moneys and other property of the Association in his possession or custody.

Duties of the Board of Directors.

Sec. 6.—The Board of Directors shall have the general management and control of the property and affairs of the Association, subject to the By-Laws.

Four members of the Board shall constitute a quorum to do business.

The Board of Directors may adopt such rules and regulations as they shall deem advisable for their government, and may appoint such committees as they shall consider desirable.

They shall also make a biennial report to the Governor of the State of the expenditures of the money appropriated to the Association, and arrange the program and order of business for the same.

Election of Officers.

Sec. 7.—The President, Vice President and Board of Directors shall be elected annually by ballot at the first annual meeting of the Association.

The Treasurer and Secretary shall be elected by the Board of Directors.

The officers of the Association shall retain their offices until their successors are chosen and qualify.

A plurality vote shall elect.

Vacancies occurring shall be filled by the Board of Directors until the following annual election.

Membership.

Sec. 8.—Any person may become a member of this Association by paying the Treasurer such membership fee as shall from time to time be prescribed by the Board of Directors.

Quorum.

Sec. 9.—Seven members of the Association shall constitute a quorum for the transaction of business but a less number may adjourn.

Annual Assessment.

Sec. 10.—One month prior to the annual meeting in each year the Board of Directors shall fix the amount, if any, which

may be necessary to be paid by each member of the Association as an annual due.

Notice of such action must be sent to each member within ten days thereafter, and no member in default in payment thereof shall be entitled to the privileges of the Association.

Amendment of By-Laws.

Sec. 11.—These By-Laws may be amended at any annual meeting by a vote of not less than two-thirds of the members present. Notice of the proposed amendment must be given in writing, and at a public meeting of the Association, at least one day before any action can be taken thereon.

Proceedings of the Thirty-third Annual Meeting of the Illinois State Dairymen's Association

Held at Joliet, Illinois, January 16, 17, 18, 19, 1907

The Illinois State Dairymen's Association met in annual session in Universalist Auditorium at Joliet, Illinois, January 16th, 1907, at 1:30 p. m.

President Lewis N. Wiggins in the chair.

The President:—

The meeting will please come to order.

We will open this thirty-third meeting of the Illinois State Dairymen's Association with an invocation by Rev. Odges.

INVOCATION.

Rev. Odges, Joliet, Ill.

Let us all stand, shall we?

We thank Thee that Thou art interested in all our lives and in the lives of all Thy children. We rejoice that we belong to Thee, and that Thou art interested not only in our spiritual lives

but in our earthly lives as well; in those things which are for the comfort and blessing of the physical and mental life.

Thou holdest the ends of the world in Thy hands, and art He on whom the children of men depend.

We thank Thee this day for life and all the blessings Thou has given to us. We rejoice in the times in which we live; in the freedom that is ours, and in the blessings which come to us in all the largeness of life.

We thank Thee for the fields that laugh with plenty and for barns that are filled to overflowing, and for the inventions and the progress of man which makes life richer. And as we gather this afternoon, as we meet here representing this Association, grant Thy guidance and blessing upon these men who shall gather.

Let Thy blessing rest upon the officers of the institution and upon all the people who shall gather here from their homes, and upon the work in which we are engaged.

Let Thy blessing rest upon our State Governor, who guides our laws; upon the great nation, and all the children of men everywhere. May the world become richer and better in things material, and may we so learn to enjoy them that we learn of the things eternal which is for the time to come.

May Thy blessing rest upon us, and Thine be the honor and the glory for ever. Amen.

By the President:—

We were to have an address of welcome by his Honor the Mayor, but Senator Barr is in Springfield on business, but he is ably represented by Mr. Lager, of Joliet.

ADDRESS OF WELCOME.

By Mr. Lager, Joliet, Ill.

Mr. President, Ladies and Gentlemen:—

It is as the chairman has stated, Senator Barr is out of the city and necessarily absent from this meeting. I was hurriedly

prevailed upon to make a few remarks and welcome this convention to Joliet today.

It certainly affords me pleasure to do so, and we will give you all the encouragement we can as citizens and officials to help your worthy cause along. I think myself there is no better object, no better undertaking than the cause that you now are working for—purity of milk. Also the care and manner in which you are now bringing up stock and care of material so as to get the best results.

We have had a great deal of trouble here in Joliet and I think if they would take some of the precaution that you can advise we would be much better off. The milk dealers have given us lots of trouble, and we have had to instruct our health officer from time to time to investigate the quality of the milk, and the amount of water used, and the result was that we found a great excess of water and not so much milk. I think the position our health officers here and in larger cities is taking will be a much greater protection for our citizens.

While I am not so familiar with your organization, what little I have learned is that you have been in session thirty-three years, which is news to me.

I follow a different line of business, which requires a lot of water, more than the milk dealer requires, that is the brewery business. If you want a little change, and want to see something different, you will be welcome at any time to call at the brewery and see our product.

I don't want to take up much of your time. I say, gentlemen, the doors of our city are open to you. Our merchants and officials will be glad to extend a welcome hand, and any advice, anything we can show you or help you in any way, we will be only too glad to do it. If any of you wish to see the prison, you can do so and I will go with you. We have the largest wire industry in the United States right here. We have the controlling works which is a very great engineering problem.

If you wish any assistance in any of our departments, I will be at the city hall mornings and can be easily reached.

I thank you for the honor of being with you and having the pleasure of addressing you and giving you the freedom of our city, both day and night. Our homes and our factories are open to you and we welcome you. May you go on with a good spirit, and we wish you a hearty welcome from our citizens.

RESPONSE TO ADDRESS OF WELCOME.

By Mr. E. Sudendorf, Clinton, Ill.

Mr. President, Ladies and Gentlemen:—

Quite a few of you people here are known to me, and a great many are not. If any one expects a speechmaker to answer His Honor's warm welcome, he will be mistaken and disappointed. I suppose I could learn to make a speech, but I have looked over your programs and see so many good things, that for me to make an elaborate response, you would not have time to hear all the good things coming.

Therefore I will merely cut this short, the way I always do, and on behalf of the Dairymen's Association of Illinois thank His Honor for his cordial welcome. I hope the boys will take advantage of his kind invitations to visit the penitentiary and the brewery, but don't stay at the brewery too long.

Again I thank your Honor on behalf of the Association.

By the President:—The necessary president's address is next in order I suppose. I have a few remarks here pertinent to the business of the Association.

PRESIDENT'S ADDRESS

ILLINOIS STATE DAIRYMEN'S ASSOCIATION.
THIRTY-THIRD ANNUAL MEETING.

Joliet, Ill., Jan. 16-19th.

Ladies and Gentlemen:—

It is nearly two years since the State Farmers' Institute held its annual "round-up" in this hospitable and enterprising city.



L. N. WIGGINS.

I have never attended a more enthusiastic Institute than the one referred to. It seemed to be almost a Dairymen's meeting so great was the interest in the dairy topics discussed. When the officers of the Will County Institute invited the State Dairymen's Association to hold their annual meeting in conjunction

with their meeting, it seemed altogether proper and a very desirable arrangement. When we consider the magnitude of the dairy interests in this County, all will agree that it is all-important to the farmers of Will County. The leading topics of interest to the land owners of this section will naturally be along dairy lines.

In behalf of the State Dairymen's Association I wish to thank you for your cordial invitation, your hearty welcome and your boundless hospitality.

The past year has been a very satisfactory one to the dairymen of this state. The prices of milk and butter have been very good. Have we been able to make the most of the opportunity to sell our products for the high prices prevailing this winter? How many of our dairy farmers plan to have more cows freshen in the fall, so as to realize the best prices of the year?

Our creamery men in the past year, have done a large business and obtained satisfactory prices for their products. They have found it necessary to be constantly on the alert to prevent the unlawful competition of oleomargerine factories. We must all be united in this matter and be constantly on the alert to protect our dairy products.. We should not neglect a single opportunity to impress upon Congress and the Legislature, the importance of protecting pure butter against the counterfeit products of cotton-seed oil and packing house fats. Congress provides for the manufacture of oleo and we cannot restrict the output, but we can consistently insist that it be sold as oleo and not as pure butter. We must see that it is properly labeled and stamped.

Our School of Agriculture.

There are now enrolled in our school of Agriculture, in Urbana, about 450 students. Twelve years ago there were eight, six years ago there were 159. The school has advanced rapidly in numbers and stands today, in point of equipment and course of study, the foremost agricultural college in this country.

The dairy department of the college is worthy of our attention and support. The educational work done by this department in

instructing the general public to know pure dairy products and how to manufacture the same, is to be especially praised. I believe firmly that the best way to develop the dairy business and lift it out of the prevailing slavish methods, is to educate the general public how to judge and appreciate good dairy products. The housekeeper will demand a better quality of cream, milk and butter when advised of the importance of sanitary methods in the care of high grade dairy products. The city milk supply men will have to provide the educated customer with a much higher grade of milk. The butter maker can best advance his interests by an aggressive campaign of education concerning the poorly handled hand separator cream. Let us all endeavor to obtain better prices for dairy products and make them well worth the money to the consumer.

Prof. Frazer is conducting some valuable and much needed experiments in the feeding of dairy cows and calves, at the Agricultural College and at several points in the state. He expects to get more good men in the field as instructors to aid the farmer in improving dairy conditions. The men he has now employed in the field are excellent men and are doing efficient work, but he needs more of them. Let us urge the necessity for more field work in every dairy neighborhood and use all our influence as an Association and individuals to send to the farmers' door the practical instructors, who can demonstrate how to make the dairy farm a more prosperous business proposition and a better manufacturing plant.

At the State Dairymen's meeting in Rockford, two years ago, we instructed our President not to appoint an advisory committee, as heretofore provided for in the Experiment Station appropriation bill. I hope this Association will, at this meeting, reconsider this action and instruct its President to appoint this advisory committee, as provided for in the new bill for appropriation as drafted for the College of Agriculture, which will become effective the 1st of next July. I believe much good can be derived by the dairy industry and the college by having this dairy advisory committee appointed from the ranks of active

dairymen, who are members of this Association.. We can then officially impress more directly upon the dairy department of the Agricultural college the actual needs of the dairy and creamery industry of the state.

I cannot emphasize too earnestly the importance of the dairy department of the experiment station investigating ECONOMIC RATIONS for dairy cows and calves intended for future dairy work. If the state of Illinois is to take a front rank as a dairy state, it should actively and intelligently enter a wider field of original investigation and research work on practical lines, that will tend to make the dairy business more profitable. The field for this class of work is so wide that there is absolutely no danger of its being even partially covered with a much larger force of investigators than now are engaged in this service. We know comparatively little of the physiology of the dairy cow as a milk producing machine and we cannot account for certain changes in the properties of her products, after being exposed to sudden or climatic changes or radical changes in her food.

Test Associations.

We are sadly in need of organization and effective work in this state in the very important matter of testing the value of our cows. Every dairyman ought to test his cows for butter fat and weigh the milk and dispose of unprofitable cows. We all realize this fact, but many hesitate to take the initial step.

The Agricultural college has provided a free short course of study in milk testing and cow judging, at the University, during the Stockmen's convention, which will be in session at Urbana from Jan. 21st to Feb. 2nd. Two or three dairymen in each neighborhood should get together and send one or two young men to this special dairy course. If the young man learns to make tests of milk and cream in a satisfactory manner the college will give him a certificate setting forth his efficiency. I earnestly recommend that this Association upon presentation of a proper certificate from the college by a graduate in such course, give the party a diploma. Such a course will stimulate many a young

man to perfect himself in this work and enter upon a contract to test dairy herds in his neighborhood, much to the profit of the owners of the cows. He can make some money and at the same time become a source of influence and benefit to his dairy community. I trust that our State Test Association may be established in some such manner and become thoroughly organized in each County. There should be one or more efficient and official cow tester in each county of this state. The officers of this Association are ready to lend a helping hand in this very important work.

Buttermakers' Association.

The butter makers of this state have formed an independent organization. They held, in Chicago, last fall, a very enthusiastic meeting. Our interests are one and eventually we shall, I hope, hold our meetings together. We wish them the best of success in their good work.

The State Fair.

We have reason to be proud of our wonderful State Fair, but especially of the magnificent show, of late years, of dairy cattle. Under the wise supervision and untiring efforts of Supt. Hon. A. O. Auten this department has grown by leaps and bounds and now each year we have the greatest show of dairy cattle to be seen in the entire country. The testing of dairy cows at the State Fair has proved very beneficial and creates much interest. Mr. Auten is to be commended for abolishing the barbarous and misleading practice of "bagging cows" before they are judged. I recommend that this Association hold a meeting at the State Fair next fall. We can have short programs for one or two days in suitable quarters, near the dairy stables. Mr. Auten has kindly volunteered to give us suitable space and lend us all the assistance possible. Such a meeting would be very instructive and we could meet some of the most prominent educators and successful men in the dairy business.

We would have an unlimited number of dairy cattle as specimens to work with and study.

We have a fine dairy building on the State Fair grounds, but it is not handled to the best advantage for promoting the interests of the dairymen. Every dairyman in this state should urge upon his representative on the Board of Agriculture, the necessity of a Superintendent of the dairy building, who is a practical and successful dairyman and one who will take an active part in the promotion and accomplishment of a creditable butter show. We need a man to organize and vigorously promote that department. The present refrigerator is well suited for retaining the samples of milk and cream, which I hope will be judged at our next fair. I recommend that this Association offers suitable prizes to exhibitors in this class. Our state is certainly the land of "milk and honey," but our dairy products exhibit ought to be large enough to crowd to the limit the dairy building and leave no room for the honey. The State Board could build an annex to the dairy building for the honey exhibit.

State Pure Food Commission.

The State Pure Food Commissioners have made wonderful progress during the past year in establishing a better understanding and in the enforcement of the laws relating to their work. We owe our Dairy Commissioner, Mr. Schucknecht, our deepest gratitude for the great work he has accomplished. Let us give him more earnest and continued support in the future. The present legislature can increase the appropriation for the Pure Food Commission, much to the advantage of all and provide a sufficient number of dairy inspectors to meet the present necessities and the rapidly developing work of the Pure Food Commission. It is hoped that the Pure Food Commission, in drafting their new law, will make proper provision for establishing a department for the gathering of statistics of the dairy industry in this state.

The law regulating the manufacture, sale and analysis of concentrated, commercial feed stuffs, for feeding live stock, is a very important one. Its passage was secured at the last session of the legislature, largely through the efforts of this Association. It is extremely advantageous to the dairy farmers and

all live stock interests. The Pure Food Commission should have a sufficient number of inspectors to secure the enforcement of this law.

Pure Bred Sires and Better Cows.

If this great milk producing state is to hold and increase its prestige and advance its dairy industry, it must raise more and better dairy cows. For years we have been going to neighboring states to buy our cows, why not keep this large expenditure of funds within our own borders? We must raise our own cows and improve the fertility of our dairy farms. We must meet the question of better dairy management squarely. On land that is worth \$200 per acre, one can raise a heifer calf and bring her into milk at the age of two to two and one-half years, at a cost not to exceed \$45. Suppose that calf is out of a grade cow, that has proved profitable and stood the test of the scales and the Babcock test, and by a sire that has been registered and is of a dairy breed. Would you sell that heifer for \$45 or \$50? No. Every man present knows that 90 per cent of such heifers are worth twice that amount and you know that the thinking, successful dairyman is not going to sell a good cow to you for what she is worth to him.

The southern part of this state can be made the great breeding ground for good cows for this and neighboring dairy states. Think of the car loads of milk consumed in Chicago daily, besides the large and increasing demand of other large cities. Are we discharging our duty to the state when St. Louis buys large quantities of milk from the Elgin district and when milk from Wisconsin is shipped to central Illinois?

We must buy more and better bulls, from deep milking families of cows. It will pay you to see the dam of your bull before you buy him, and insist upon seeing her yearly milk record and pounds of butter fat. Don't be satisfied with a test of two or three weeks for the dam of your sire. The calves which you expect to raise should come from a bull, whose dam was able to milk profitably, for years. There are plenty of such sires. Take the time and spend the money to find them. Your

first calf will pay for the extra expense of searching. You will never regret it.

The State Experiment Station has very kindly agreed to publish in a bulletin each year, all the tests of cows that have produced 225 pounds or more of butter fat in twelve months. This bulletin of performance will advise the dairymen of the state where to secure bulls, as well as cows and heifers, out of great producers. I cannot emphasize too strongly the importance of each dairyman in the state making yearly tests of his cows, under the supervision of the State Experiment Station, and having the results of standard cows published in the Bulletin of Performance, referred to above.

We are all in the dairy business because we know there is money in it and we like it, but let us not forget several necessary points. We must use our heads. We must run our dairy farms more on the plan of factories and other commercial enterprises. The work must be made profitable for the boys and girls. Do not ask your girls to wash cans and pails without proper conveniences, or try to make good butter without pleasant and sanitary surroundings. Do not ask the boys to do the milking and feeding when they are tired out with an altogether too strenuous day. They won't stand for it. Try to stimulate interest in investigation and the study of raising calves and feeding cows. Don't waste feed on unprofitable cows. Weigh the feed occasionally and at stated periods weigh and test your milk. Most of us are here at this convention because we want to learn more about the dairy business. Let every man and woman try to bring to the next dairymen's convention a man who does not want to learn.

It has been my opinion for some years that this State Association should organize a northern, central and southern dairy society and aid each to hold annual meetings and that the Illinois State Dairymen's Association should rotate its meetings so as to meet with the three auxiliary associations at least once in three years.

The general assembly, I believe, will cheerfully give this organization five hundred dollars annually, for each of these

three meetings and at least one thousand dollars for the proper conduct of the rapidly growing business of the Association.

In conclusion, I wish to thank the dairymen of the state for their hearty and efficient co-operation with the officers of this Association in their very earnest efforts to promote the dairy industry in the state. I wish to heartily congratulate you on the good work accomplished by this organization during the past year and to assure you of my best efforts to aid you in any line of endeavor that may be agreed upon at this meeting.

By the President:—I will now appoint two very important committees. The committee on memberships and the committee on resolutions.

For the committee on memberships I appoint Mr. E. E. Wilson, Mr. H. Storm, Mr. E. Sudendorf, Mr. C. M. Sprague, Mr. Fred Storey, Mr. W. R. Kimsey.

I hope you will please start at once and sell as many memberships as you possibly can, for we need the money. The membership is only one dollar and it entitles you at last year's book and also the proceedings of this meeting when printed, and which will be mailed to your address.

The committee on resolutions I will appoint Mr. Joseph Newman, Mr. W. R. Kimsey, Mr. Charles R. Mills.

All resolutions must be handed into the committee and passed upon first, so any resolution you wish to report, please hand to one of the committee as soon as possible.

By the President:—The next on our program is an address by Mr. W. E. Janes of Hinsdale, on "The Dairy Calf."

Mr. President, Ladies and Gentlemen:—

Before I begin my paper I wish to say that Mr. Caven, the secretary, has made a grievous error. My name is not Jones, but Janes.

By the President:—This is a very important and interesting paper, exceedingly interesting and important points. At the

close of Mr. Janes' paper, if any one wishes to ask any questions, they may do so. We cannot give much time to discussion, but as he goes over his paper, if there comes up a point you would like to ask about, make a note of it, and if we have the time, we will have discussion.

THE DAIRY CALF.

By Mr. W. E. Janes, Hinsdale, Ill.

Mr. President, Gentlemen and Ladies:—

I was somewhat surprised when I received a request from your honorable secretary to address this meeting on some subject that I might select, but preferably that of the Dairy Calf, and still more surprised when I received notice that I was to start the discussions at this meeting. But there is no doubt that the subject he selected for me is one of the most vital subjects for the dairymen of the country today.

I have not learned whether your meeting will end with a discussion of the "canned beef" question or not, but we will endeavor to start the calf right and let the cow take care of herself when the time comes.

THE DAIRY CALF.

Who can imagine a chance for existence more hopeless than that of a calf born in the average farmer's herd, and after being given that chance who can imagine a more miserable existence than that of the average calf raised where the milk is one of the main sources of income for the owner, who grudgingly allows the offspring of his source of sustenance enough to live on until it can run out and care for itself with the rest of the herd? Have you ever seen her—that poor, measly, potbellied, sunken eyed, half starved, bawling, little beast that does some way manage to pull through on sour skimmed milk that is given to it cold and with which it gorges itself "when it gets a chance" to such an extent that it is a wonder that it does not burst and thus end its miserable existence? There is no reason why every calf

that is produced from a profitable cow cannot be raised and the commercial product of its mother realized on if the dairyman would give this subject more attention. And you, brother dairymen, what proportion of your calves are you raising? How are you keeping up your herd? What kind of a bull are you mating your cows with? Have you looked up his ancestry? Do you know what the records of his dam and granddams are? Or are you just breeding to any old scrub bull you happen to get hold of? Well, perhaps the calves from that kind of breeding are better knocked on the head, and it is almost a disgrace to think of eating that kind of veal. But, as I said, there is no reason why this state of affairs should exist at this day and age. A little judgment and enterprise on the part of the dairyman could alter all these things. Just think how much more you would think of your cow and how much more you would consider her worth if you knew that her mother was a profitable cow and her sire was from the stock that had records you were proud to tell about. Of course it goes without saying—attempt to raise only the calves from the most profitable cows, and the scales and the Babcock test is the only way to determine that.

I don't know of any better way of telling how to handle the dairy calf than to tell how we have been raising from 50 to 75 per year for the past fourteen or fifteen years at Sedgeley farm.

About a week before the expected arrival of our dairy calf the cow is placed in a roomy, well lighted stall and allowed to become familiar with the surroundings and attendants. She is groomed and cared for the same as she will be after calving. The calf is allowed to stay with its mother about three days, when, if all goes well, it is taken to another barn, and that is the last it ever knows about that mother. At its new abode the calf is taught to use the "calf feeder" (a tin bucket with a rubber nipple in the bottom, with which I presume you are all more or less familiar). The feed is the same as it had from its mother at first; warm, whole, fresh milk. The readiness with which the healthy, well nourished calf takes to this new mother is surprising, and right here is where more than two-thirds of the

dairy calves get their greatest set-back in trying to make it drink out of the pail by sucking the fingers and eating in an unnatural manner, thus gorging themselves and not properly digesting the milk. By using the feeder they are compelled to take their time in eating, and are fed in the manner nature intended that they should be fed. When there are a number of calves in the same pen a short piece of rope is attached to the pen near where each calf is fed, and they are tied up before feeding. In the pen we always have a small trough with a little bran, meal and ground oats. The calves soon learn to lick up a little of this, thus drying up their mouths and lessening the tendency to suck each other. This also takes the place of the cream which we begin to take from them in the course of a couple of weeks by substituting skim milk for whole milk. And by the time the calf is six weeks old it is eating ground feed and getting skim milk entirely, and now is the time to teach it to drink. Its stomach is strong enough to stand it now, it has become accustomed to eating other feed, and the change has been gradual and brought about in a perfectly natural manner. From now on the progress of the calf depends a great deal on the kind of person in charge. The changing from the natural manner of nursing to drinking requires more or less patience, and the judgment on the part of the attendant, and to abuse and maltreat the poor little beast only tends to confuse and make it more contrary (if such a thing is possible.) The milk should be warm and sweet and it should be given regularly, the amount being from three to four quarts, with what ground corn, oats and bran with a little oil meal that it may need. Some good clover hay, or better, alfalfa, should be given it to pick at. Lately we have been using about a tablespoon full of blood meal in the skim milk and think the calves are doing better with it than before we commenced using it.

Right here I presume I might say that the best remedy we have ever found for scours, with which, no doubt, everyone who has tried to raise calves by hand has had more or less experience, is to mix equal parts of tincture of opium, catechu, ginger and lime water and give a tablespoonful every one, two or three hours, according to the urgency of the case. We have very

seldom lost a calf or colt from scours since we began using this remedy.

With regard to the milk, we separate all of our morning's milk and sell the cream, which nets us as much as the whole milk and gives us the skim milk for the calves. We take the same care of the skim milk we intend feeding as we would of any other milk. What we feed in the morning is taken immediately to the calves after separating and while yet warm, or if it has cooled down, we set it in a vat of warm water until it has reached the proper temperature. What is intended for night's feeding is cooled and set away until needed, when it is warmed up again. We continue to feed our calves skim milk as long as we have a supply on hand to feed them, and find that it is the cheapest feed and that they thrive better on it than on anything else we can give them. We always try to feed them milk until they are six or eight months old. Our loss of calves has been very small by this method and the greatest loss has generally occurred by changing attendant or the wisdom of some new man who thought the calf feeder was an unnecessary equipment.

The calves should have daily out-door exercise. Our calves after three months of age are turned out in paddocks to pick grass and to exercise.

We usually breed our heifers at from eighteen months to two years of age. Our cows are bred so that we have fresh cows coming along the whole year round. We aim to breed to the best of dairy-bred sires, as that influence is the greatest element of improvement for the dairy calf and the herd in general.

We estimate that the cost of raising the average calf is about \$18 per year. (And right here is another place for the average farmer to do a little figuring.) The heifer that it not worth more than \$35.00 to \$40.00 at two years of age has only paid, in that she has consumed roughage that has to be used up around the place. We have no trouble in obtaining for full blood yearlings from \$100.00 upward, so there is a nice source of profit even though the first cost for foundation stock is a little higher than for common stuff.

When the dairy calf is about to become a dairy cow is one of the most critical periods in her existence; the heifer should be handled and become thoroughly familiar with mankind and learn to trust and depend upon him. A very little handling of the young animals goes a long way in giving them confidence in their owner when their offspring has come, and if they have confidence in him, they will be proud and glad to receive attention from him, but if they have not, they will need a great deal more care, attention and unnecessary work which might have been avoided by kindness and perhaps an occasional manipulation of the udder, which familiarizes them with milking, and the hardest part of breaking the heifers to milk has been done while she is yet the dairy calf. If you are breeding your good cows to a bull that you are sure should produce calves that will improve your herd, you feel impelled to raise the calves and cannot help taking more interest in them than you possibly could in raising scrub stuff.

Whether your stock is Jersey, Guernsey, Holstein, Brown-Swiss, or any other class of cattle, stick to your text, and once having made up your mind what you want, keep on in that line with a pure bred bull and you will have a uniform herd of some kind, and as a general proposition a better grade of milkers than to jump from one breed to another each succeeding season. You get a reputation in a short time of having a heard of Jerseys, Holsteins, Swiss or some other breed of cattle, even if you never had a pure bred female on the place, providing you use a sire of the same breed for two or three succeeding generations.

Even with the greatest care that can be used in selecting calves, there will be disappointments. Occasionally a calf that you expect the greatest things from proves a disappointment. The best sires are often sacrificed before their real worth is known. On several occasions we would have given many times what a comparatively good bull could be bought for if we could get back some animal that had been sent to the butcher's before his real worth as a breeder was known. Of course this is an unfortunate condition that only time and close observation on the part of the breeder can obviate.

The course I have tried to outline here is as near as possible a course learned from actual experience. We have been breeding, testing and keeping records of our cows for the past fifteen years and the breeding question in dairy qualities of our herd has been general and very decided. We select our breeding bulls from stock that we almost know will transmit the qualities we desire to propagate, but, as I said before, disappointments to a breeder are a common occurrence and that point is one of the chief factors in intensifying the interest in the game.

In looking over the records of our herd for the past ten years, I find the following interesting state of affairs that will verify my statements regarding close attention to breeding the dairy calf.

During the year 1896, our record shows sixteen of our best cows (about all imported Brown Swiss) from January 1st to December 31st, made an average of 329 pounds of butter at 85 per cent butter fat.

During the year 1898, sixteen of our cows, consisting mostly of the same cows and their daughters, made an average of 363 pounds, a gain of 34 pounds per cow.

For the year 1906, we have been milking a great many of the heifers and descendants of these cows raised in the manner I have here tried to outline, and sixteen of these cows, from January 1st to December 31st, have made an average of 447 pounds of butter, or an average gain in our herd, taking 16 best cows, of 118 pounds of butter per year. Eight of these cows are being officially tested by the Illinois Agricultural College. During this period thirteen of them have had calves and have been dry for a period of from one to two months.

Such facts can only be obtained by following up the plan of weighing, testing and keeping a record of what your cattle are doing, and proves that by breeding only first-class sires to your best cows, and raising the offspring, the reward will surely more than compensate you for your expense and trouble, and you will soon have a herd of cattle that you will feel proud to show your

dairy friends and the recompense will be not only your own but continue to follow on to generations yet unborn.

DISCUSSION.

By the President:—Any questions you would like to ask Mr. Janes?

Q:—I would like to ask if you find that you get the best heifers from the best cows, that is, the persistent milkers?

A:—We think that we do. The better our cows the better we like it. Once in a while we get an exceptionally good calf from the cow we had supposed was not good, better than we expected. The general rule is that the best cow gives the best calf.

Q:—From the cow that is the most persistent milker you say you get the best calves.

A:—We don't have much trouble that way, but of course there is always an exception to the rule. But usually that is correct.

Q:—Can you tell us what is the percentage of butterfat. I mean the average?

A:—Our average is 4.2.

Q:—You speak of pounds of butterfat, 85 per cent fat. What do you figure that on?

A:—Entirely by test. We weigh every milking and a record is kept. Tested twice a month and records made from that.

Q:—Do you prefer ground oats to rolled oats?

A:—We find the calves will mature better on the ground Oats than on the rolled oats. Take hold quicker and more readily. The ground oats dry up their mouths quicker and learn them to eat quicker on the ground.

Q:—You mention scours. What do you give?

A:—Equal mixture of tincture of opium, catechu, ginger and lime water. Give a tablespoonful every one, two or three hours. Occasionally we give them a little castor oil when needed.

Q:—Mr. Campbell:—Ever used dried blood?

A:—Blood meal, a tablespoonful in the skim milk.

Q:—Not bothered with scours since using dried blood?

A:—To tell you the truth we are not bothered much anyway. The average farmer that is raising cattle has a great deal of trouble with that disease. I simply said that if we ever had that trouble that was the remedy we prescribed.

Q:—Not any trouble since using that, have you?

A:—Not any in the herd at all since using that. We are not subject to it anyway.

Q:—The gentleman spoke of a tube calf feeder. How do you clean it?

A:—Clean it the same as any other utensil. No trouble with them.

Q:—Do you use any special brand of calf feeder?

A:—We have been using ever since raising calves small calf feeders.

Q:—How long do you use that?

A:—Six weeks to two months, or three months; somewhere in there. It all depends on how well the calf is doing.

Q:—Do they use that readily themselves?

A:—They will take to it readily and soon learn to eat themselves.

Q:—Do you use ensilage?

A:—Yes sir.

Q:—Feed the calf that?

A:—Yes sir.

Q:—Mr. Mason:—You say in ten years you have made an average gain of 110 pounds. Did that come from breeding or difference in feeding?

A:—The gain has been in connection with our learning to feed and breed the calves. A better grade of cows and better milk than we had ten years ago. Our manner of feeding has improved along with the manner of breeding.

will get the report of Mr. Janes' paper in the next book, those who subscribe. The next on our program is Prof. Fraser. You

are all acquainted with Prof. Fraser, and some of us are particularly aware of the good work he is doing. He is especially to be commended for the bulletin he will now describe to us.

ESTABLISHING AN EFFICIENT DAIRY HERD.

By Prof. W. J. Fraser, University of Illinois.

Mr. President, I think if the gentlemen over in that portion of the house will sit over here, they will get a great deal more good, as the larger part of my remarks are on these charts.

The actual relation of the cow and the herd to the real profits derived from dairy farming is little realized by the people depending upon this occupation for a living. There is no line of farming where well-directed effort will pay so large a profit. Notice I say *well directed* effort for the profits derived from dairy farming depend almost entirely upon the good judgment and common sense used. The profits on the average dairy farm in Illinois today can easily be doubled.

Discovered Only by Scales and Test.

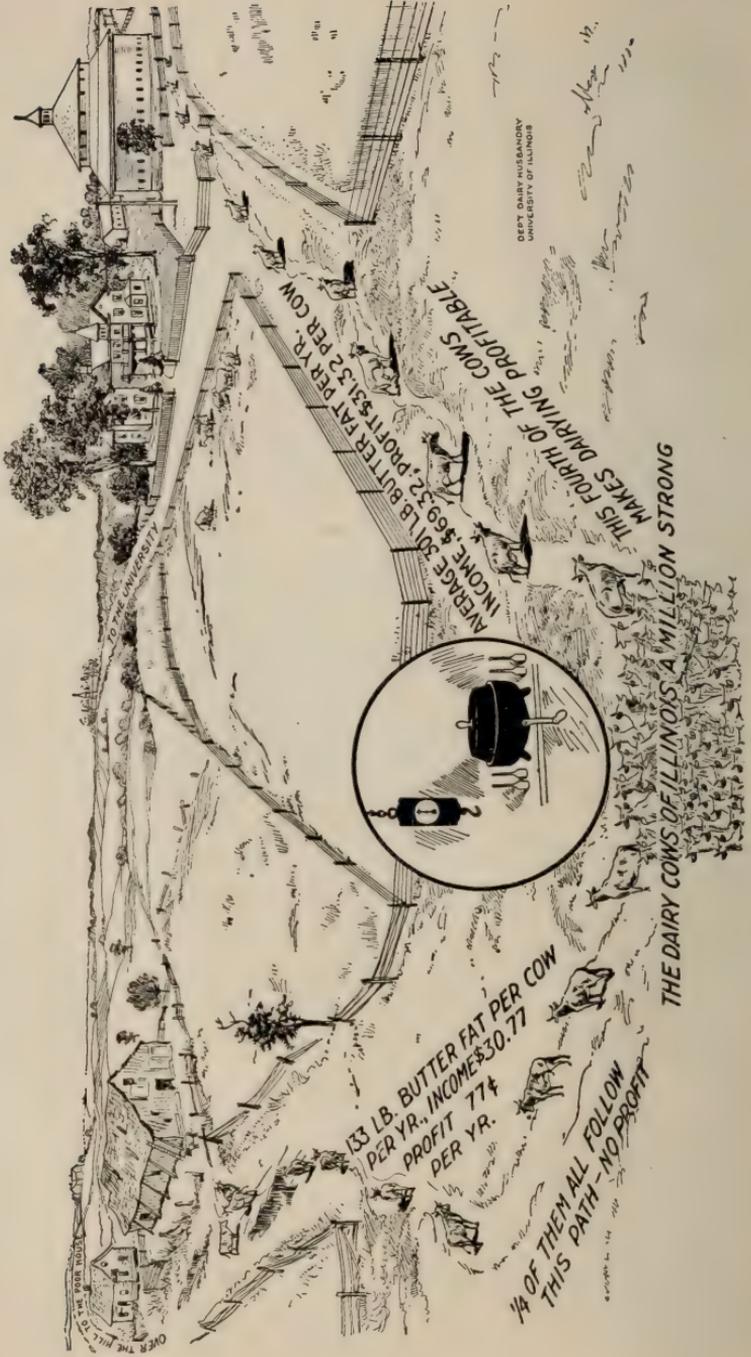
Quite unsuspected these Queens have everywhere honey-combed dairy society. All of them are dead beats; they will never pay for their board. The more of them a dairyman keeps, the poorer he is. The way to find out—the only sure way—is to weigh and test the milk of each cow.

What Rose Hath Wrought.

Twelve pounds of butter fat for a single week, is the production requirement for admission to the Holstein-Friesian advanced register. Three times in her third lactation period Rose made 17 2-3 pounds of butter fat per week. Twenty different weeks of that period her yield was more than 12 pounds per week. For five successive weeks, six months after calving, her average was 13 pounds of butter fat per week. In her fourth lactation

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COW PATHS THAT LEAD FAR APART



DEPT. DAIRY HUSBANDRY
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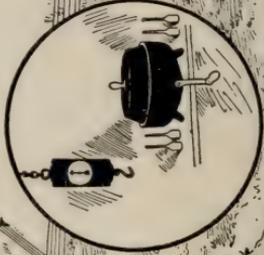
133 LB. BUTTER FAT PER COW
PER YR., INCOME \$30.77
PROFIT 77¢
PER YR.

1/4 OF THEM ALL FOLLOW
THIS PATH - NO PROFIT

AVERAGE 30 LB. BUTTER FAT PER YR. PER COW
INCOME \$69.32; PROFIT \$31.52 PER COW

THIS FOURTH OF THE COWS
MAKES DAIRYING PROFITABLE

THE DAIRY COWS OF ILLINOIS A MILLION STRONG



OVER THE HILL TO THE UNIVERSITY

TO THE UNIVERSITY

TO THE HILL

period there were 16 weeks during each of which Rose made more than 12 pounds of butter fat; and in her fifth period, 21 weeks.

Total production for twelve years, 87,102.3 pounds of milk—43½ tons—10,248 gallons—1,281 cans of 8 gallons each—106 wagon loads of 12 cans each; allowing three rods for a team this would make a procession one mile long—six carloads, making a good milk train.

Butter for 12 years, 4,318.36 pounds, worth at present prices (25 cents per pound) \$1,079.59.

Skim milk for 12 years, 72,585 pounds, worth at 15 cents per 100 pounds, \$ 108. 88.

Total receipts for 12 years (not reckoning calves nor manure), \$1,188.47, or \$90.04 per year.

Just think what the receipts of a dairyman would be whose herd consisted of 25 cows of this kind—\$2,500 per year, not including calves and manure.

Rose was bought for \$50 when 4 years of age. She has had only ordinary treatment, no better than she would receive on a good dairy farm. She has not been pampered or fed to produce the utmost amount of milk.

Rose Is Representative.

Remarkable as the performance of this grade cow, she is not heralded as standing apart in unapproachable splendor, but as a great leader of the thousands of money-making cows in Illinois.

Illinois has a million dairy cows. Like men, they do not travel the same path nor reach the same destination. Whither are they going, and how far, in their service for the dairyman? Who has stopped to ask, much less to answer the question? What difference is there in their efficiency? In the profits they leave in the owner's pocket at the close of the year? The dairyman has been in the dark as to the paths his cows take. But under the arc light of the scales and the Babcock test the parting of the ways is made plain. Half of all the cows in Illinois take the one or the other of the above paths.

Expensive investigations by the Illinois Experiment Station indicate that a fourth of all the cows in this state follow the left-hand path. That is, they produce no more than the average of 133½ pounds butter fat per year. That is the average of the lowest fourth of 554 cows in 36 Illinois herds tested a full year by this Station. This path is not the "milky way"; it lacks the upward arch, the starry brightness and—the milk.

At 23 cents a pound for butter fat these 139 cows make a return of \$30.77 to the dairyman. At \$30 per year for feed—and who would figure it less—their profit is 77 cents per cow per year! It takes one of these cows 4½ days to earn one cent profit, or the fun of milking her 45 times to earn the enormous sum of 5 cents.

But the highest fourth of the 554 cows produce 301 pounds butter fat, which means an income of \$69.32 and a clear profit of \$31.32 per cow (after taking out \$38 for feed). These are the cows taking the right-hand path above. These are certainly the right cows, and the path they take leads right on to the right things for the dairyman—profit, progress, plenty, an attractive home, wider usefulness, higher education for his children, and real enjoyment of country life for all the family. And the right dairyman will take great pains to add this kind of cows to his herd.

The average cow in that right-hand path is worth as much in actual profit to the dairyman as 40 2-3 cows in the left hand path; and 25 cows of this better sort return as much profit as 1021 cows that turn to the left.

As seen above, the poor cows naturally find their way to a poor barn, a poor home, a poorly kept farm and poor dairyman—and in the end the dairyman will do well, after slaving hard for years, if he does not find his way "over the hills to the poorhouse." If all these things are not met with on that cow path, it will be no fault of the great bovine procession traveling that way.

Not only individual cows but large portions of herds, and even whole herds, take the wrong path at the parting of the ways. Of these 36 herds, all the cows of the poorest herd averaged a pro-

fit of but \$1.74 per cow per year. The average cow of the best herd is worth more than 24 cows of the kind that forms the poorest three herds. The writer knows three other dairy herds the milk returns of which show a profit of but 62 cents per cow for the year. While in the same neighborhood are three herds the milk of which averaged a profit of \$60.94 per cow. One cow of this kind equals 96 cows of the other three herds. And in another locality the same kind of a contrast came to the writer's attention.

A little pondering of these divergent cow paths may help the dairyman to make a good turn for himself—turn on the light of the scales and the test—turn off the poor cows to the butcher—and turn all his attention to the high producing cows that make a specialty of turning feed into milk and money. It all depends on which path the cows take—and which cows the dairyman takes.

The profitless cow is a real and living issue and a large one in dairying for bread and butter. One of the greatest and easiest steps of improvement in the dairy business today is to discover and weed out these poor cows. Isn't it time to stop guessing at these vital elements in the profit of the dairy business and to find out for sure—by weighing and testing the milk—what each individual cow is earning for the owner.

We all know there is a difference in dairy herds as well as in individual cows. But do we clearly understand that some Illinois herds do not pay for the feed given them? That other herds pay too small a margin of profit to justify the investment in money and labor? And that still other herds are making their owners big money? When we realize this it is easy to see how profit can be doubled. Do dairymen in general know that these differences rest on plain causes that may be readily understood, and that a change from the poor herd to the highly profitable herd is a comparatively easy matter, within the reach of any farmer who is able to keep cows at all?

Ten years' observation of Illinois dairy herds and the individual testing of more than 800 cows in forty herds, has given

the speaker positive evidence of the practical worthlessness of about one-fourth the cows in these herds and the exceedingly great efficiency and value of the best one-fourth. Both these classes of cows are common in every community. As a rule there are some of each in every herd.

No Accounts Kept.

It is equally surprising that these poor cows are not known to the owner; their demand on his charity is not suspected. It is very hard to find a dairyman who employs any means whatever of knowing the exact returns from each cow in his herd. The ordinary dairyman has no idea of how much milk, butter fat or butter each animal produces in a year, or how much it costs to feed her. The natural result with the majority of our dairy farmers is large investment of money and labor for too small returns.

Few, if any, herds we have tested contained no cows of lowest forth that produce only 133 pounds fat. Nearly every herd also has some good cows producing over 300 pounds fat. Have a profitable standard and raise this each year, selling all cows that fall below this standard. This is easily done and it requires much less energy to weed out the poor cows than it does to continue to milk them.

Such records as we have discussed indicate that one-fourth of all the dairy cows in the state may be placed with Rose in the same general class of high-producers. This is made still more emphatic by the contrast of the poorest one-fourth of the same 554 cows, yielding an average of only 133½ pounds of butter fat.

The Mission of Rose.

The 12-year-record of Rose and her pioneer identification with these discoveries (all made by weighing and testing the milk of individual cows throughout the year) have given Rose a distinct mission to dairymen everywhere—a mission of far more value than the tons of milk she gave and the dollars she returned her owner. And this is her message: "In almost every dairy herd are several very good and several very poor

cows, but the dairyman doesn't know how good or how poor they are. The difference is surprising and vital to the dairy business. It is the difference between success and failure, between poverty and plenty. Find out what each cow is doing-- or isn't doing (by weighing and testing her milk). Keep the good cows and keep no others."

Let the memory and record of Rose ever stand, first, for a definite knowledge of this Difference in production, and second, for a settled policy of improvement of the herd. Standing for this, Rose will yet save the dairymen who are making the million cows of Illinois 4,000 times \$1,200, every year instead of returning one owner \$1,200 in twelve years.

Thousands of Profitless Cows in Illinois.

Queen and No. 3 are not alone in this losing business. The speaker knows from actual testing of 800 cows in forty different herds that there must be thousands of individual contrasts as great or greater than this in the dairy herds of Illinois.

How does it come that we have so many poor cows in Illinois?

A large proportion of Illinois dairymen are not raising their heifer calves, but buying their cows. This means there is no provision for perpetuating the dairy herd or the best cows in it. In a few years all the good blood of the present herd will be gone. This is a ruinous practice to the dairy business.

The cow buyer has no such natural advantages for getting good cows as the dairyman has. The latter has the mother cows and knows something of their milk record; he has cheap feed and the necessary equipment; calf raising is a part of his business. It is absurd to suppose that the dairyman can buy as good cows as he can raise. A prominent dairyman of the state says of his grade herd: "The heifers we raise from our best cows are better milk producers with their first calves than are the average mature cows we can buy." Several of our most progressive dairymen have said practically the same thing, which

means at maturity that two home-bred cows are equal to three that are bought.

If breeding means anything anywhere it means that the cow's quality of large milk production is likely to be transmitted to her daughter. There is no other animal from which such an absolute and complete record of performance can be secured as from the dairy cow. Shall the value of these records to her progeny be thrown away by not saving the good heifer calves?

Nobody else has so many natural advantages as the dairyman for raising good heifers, and nobody else has the dairyman's interest in it, or is likely to succeed so well at it. Any other principal method of replenishing the herd is sheer wastefulness of great natural advantages.

Absolutely Proved.

Every man who has had extended experience or observation in this matter will agree that the pure-bred dairy sire from high-producing dams, and which is also a good individual, is of peculiar value and great economy in building up the herd. The records of dairy breeding have proved it conclusively a thousand times over. No man who studies the facts can doubt it. The evidence is to be seen in the heifers of every such sire, and in their contrast with heifers lacking such parentage.

The great difference between the good and the poor cow cannot be estimated. The study of these ten years reveals this fact. I cannot close without referring again to the great contrast between the good and poor cows and what this really means to the dairyman's pocketbook and the life of his whole family.

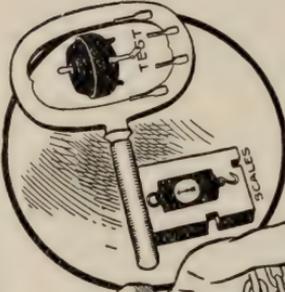
Why Dairying Frequently Doesn't Pay.

Americans don't take to the idea of chains and slavery, but many an Illinois dairyman has unconsciously drifted into the condition of the man in the picture. He is not chained to a fellow prisoner or to a post, but to a common (altogether too common) brute—to a worthless wilful cow.

He doesn't know where he is going, he simply follows the cow. That's how he got tied up to this creature; he didn't know

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WHY DAIRYING FREQUENTLY DONT PAY-



KEY TO THE SITUATION WITHIN HIS REACH



HES TIED TO THE PROFITLESS COW



THE USE OF THE SCALE AND TEST INEVITABLY LEAD TO THE SELECTION OF HIGH PRODUCING COWS - BETTER HOUSES, EDUCATION, MORE COMFORTS.

what he was doing, nor what the cow was doing—or rather what she wasn't doing. In fact, there's been altogether too little looking and doing in this man's business. The dairyman has blindly followed without figuring; he has worked hard with his hands but little with his lead pencil, and the dollars have come his way very reluctantly. And as for the cow, the only thing she has done right well is—the dairyman; she is "doing" him beautifully. If the dairyman ever gets hold of that big key there'll be "something doing" in that dairy! He will soon hand over his end of the chain to the butcher.

The cow is not worried. She is not disposed to look on the dark side of life as long as she can go where she pleases and get a living without earning it. Thus far she has found no trouble in pulling her owner along without his asking any questions, and she now feels sure that her milk record will never be inquired into. She doesn't know about the key within his reach.

That chain has never galled her shoulder, but she has plenty of gall for all that. She has been satisfied to make 133 pounds of butter fat in a year and to return to her owner a clear profit of 77 cents in 365 days. If the dairyman had 474 cows of this kind he could make from them just one dollar a day! With that he could keep soul and body together.

But do not mistake this cow for a rare specimen of an almost extinct family. On the contrary she is very common and popular on all our prairies. She is a cow of consequence and not to be sneezed at and dismissed from mind. She is, in fact, a leader; she leads that dairyman (and a great many others) where she will, while she grazes contentedly. She also has a following of one-fourth the million cows in Illinois—250,000 of them have learned bold assurance in using the dairyman's feed and barn and time and capital for a cent and a half a week per head. This cow is right now doing a great stroke of business in Illinois dairying. The only stroke that can ever get ahead of her is the stroke of the butcher's mallet on her head.

It may be said to the credit of this cow that she is not a

vicious animal. The dairyman has nothing to fear from her horns or her feet. She is a well-behaved creature, familiar to every farmer, and usually there is nothing suspicious about her manner. But when it comes to remorseless stealing of the bread from the mouths of the dairyman's family, her tribe may well be classed with the great business sharks that prey upon the people. She has kept the dairymen of this state out of fully five millions of dollars the past year without the slightest shame or nervousness. And yet the dairyman follows this cow as though he had never known freedom from such an encumbrance.

The dairyman who says that dairying doesn't pay is ten to one boarding several cows of that kind in his herd.

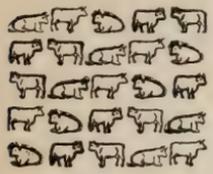
The dairyman is not exactly easy in his mind. That chain is heavy and tight, but he has carried it so long he thinks that burdens belong with dairying, or he lays the blame to ill luck or a poor price for milk; or perchance he says he cannot afford to keep good cows, forgetting that he could less afford to keep poor or worthless ones.

But see, the hands of science and the most successful dairy experience have provided him a key to the situation. As soon as ever he sees it—O, that he might see!—he will make use of the scales and Babcock test and find out what every cow on the place is doing for him—or against him. Armed with that knowledge, he will never follow that pious old fraud of a spendthrift cow again.

The cow for this dairyman stands behind him. She has learned the knack of turning feed into milk and butter fat. She represents the average production of the best fourth of the dairy cows in Illinois (300 pounds of butter fat per year), and the dairyman should get better acquainted with her. She is a better cow than he thought. In fact, he has not thought enough about this cow or known how many such are in his herd. He cannot know without using the key—weighing and testing the milk of each cow for the year. He would have a vastly easier time of it if he were tied to this cow, and to this cow alone. And as sure as he uses the scales and test and comes to know each

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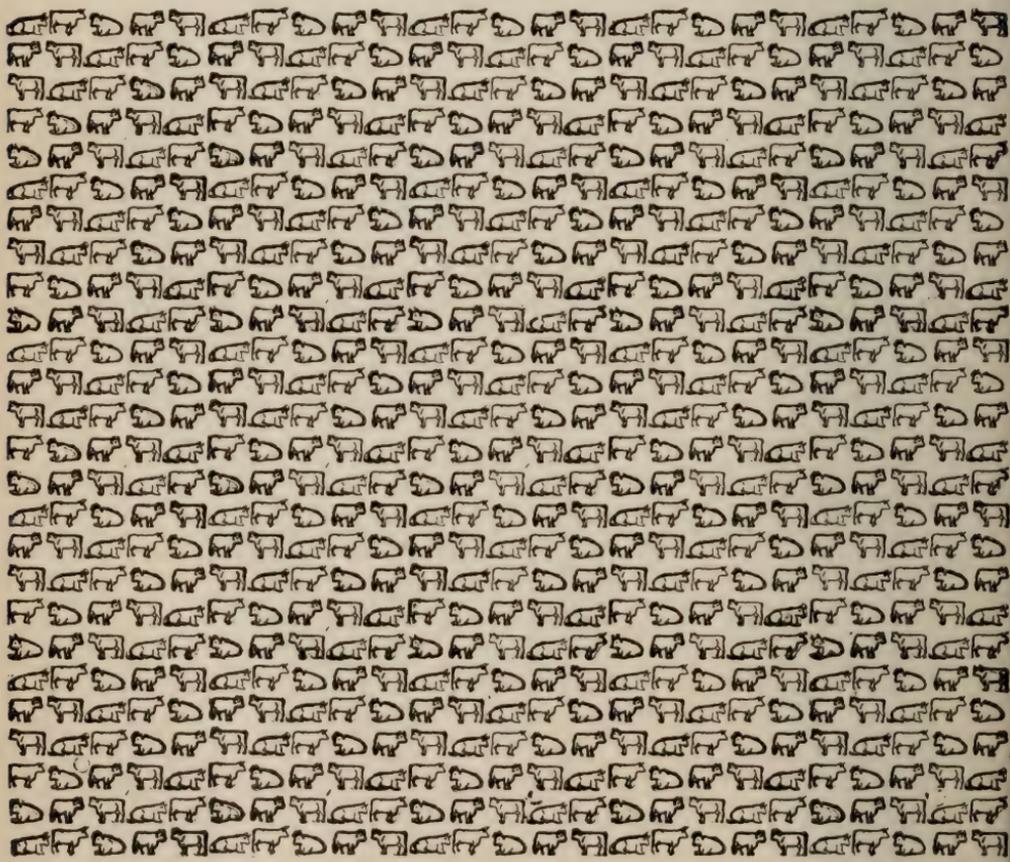
Twenty-five cows, each producing 301 lb. butter fat per year, return a profit of \$783.



This is the average production of 139 cows comprising the best fourth of 554 cows in 36 Illinois dairy herds.

The lowest fourth (139 cows) of the same 36 herds averaged 133½ lb. butter fat per year.

The picture below shows exactly how many cows of the poor kind, (1,021) it takes to return identically the same profit (\$783) as the above 25 good cows.



cow's production, he, like all other dairymen who have tried it, will gradually change his herd to this kind of high producers. And that will inevitably lead to more profit in his business—to better education for his family, to a more comfortable home, and to the conveniences and privileges that go with real prosperity.

The faults and failings of the worthless cow have cancelled or concealed the profits of the good cow, just as human idlers are a tax upon their fellows. The good cow has to do the work for both. Not knowing the production of either, the dairyman has overestimated the poor and underestimated the good. One cow of the good kind, producing 300 pounds of butter fat per year, is actually worth to the dairyman more than forty cows of the other kind. When the dairyman knows the good cows in his herd—knows how good they are—he will be just as anxious to tie to them as they are willing and faithful to serve him.

When will the dairyman start the rebellion (and the test), throw off his fetters, and fill his barn with the kind of cows that are glad to earn him good money and make possible a better way of living for his whole family?

WILBER J. FRAZER, Chief of Dairy Husbandry.
University of Illinois.

DISCUSSION.

Mr. Janes. Q:—Are the cows fed the same?

A:—They are taken care of practically the same, but not on the same feed. They are housed and cared for practically the same.

Q:—Queen has been bred oftener than Rose?

A:—Yes she has as a rule. But as a rule hasn't milked nearly as long. Another thing, Mr. Janes, she is not a persistent milker.

Q:—She was carrying a calf oftener.

A:—Yes, sir.

Q:—A cow that is carrying a calf cannot be a persistent milker. She raised seven calves. The other raised eight, but took twice the time.

A:—She raised seven calves in seven years, while this one

raised seven calves in ten years. Quite a little difference in that respect.

Q:—Have you any date of Queen in milk? How were her calves?

A:—No, we haven't. We haven't raised only one. Disposed of that because she was so poor.

Q:—Did Rose's calves all come to maturity and strong enough to calve?

A:—Three heifers from Rose, and all very good producers.

Q:—Equal their mother?

A:—Not yet.

Q:—What breed?

A:—A pure bred Holstein.

Q:—A healthy cow?

A:—Yes, a good strong, healthy cow, a good, vigorous cow. To look at her you would think she would do better.

Q:—What breed?

A:—Her dam was a seven-eighths Holstein. We tried to find out more but could not do so.

Mr. Campbell. Q:—You have traveled this state. Do you think it possible to go out through the State of Illinois and procure thirty to forty equal to Rose?

A:—No sir, I think it would be rather difficult to do that. You would have to do an immense amount of looking.

Q:—I mean go out haphazard?

A:—No. We saw Rose milked, weighed the milk and took a sample and tested it.

Q:—Test more than one milking period?

A:—It would be better if you could. If you live in the country it is hard to get the samples from more than one milking.

Mr. Janes. Q:—Rose had a better chance to make a record. If we should keep our cows for making experimental tests, if we didn't breed them they would do better for the record. How frequently should a cow be bred to do the best milking for ten years' period?

A:—For milk, about eighteen months' lactation period.

Q:—About what Rose is?

A:—Yes. Rose had the advantage

Q:—I don't think so.

A:—If a persistent milker that would be true.

Q:—Rose was a persistent milker and the other one was not. That's the reason she came out higher.

A:—Mr. Janes is speaking of dairy cows. One with beef tendencies wouldn't milk more than nine months. Of course she would do better to have a calf once a year.

Mr. Campbell Q:—After handling these cows, don't you think they are both freaks?

A:—No I do not.

Q:—No scientific breeding, and you think that Queen to look at her would be as good as Rose?

A:—No I do not. If Rose and Queen are freaks, then all the cows, or, rather, one-half of them must be freaks.

Q:—No special idea in the line of breeding by the men that bred those cows.

A:—Bred for dairy purposes both of them. We do not know who the sire of Rose was. The heifer was saved for dairy purposes. It was so long ago that it is impossible to find anything more about her.

Dean Davenport. Q:—How does Queen compare with the best one-fourth of the cows in the United States, and how does Rose compare with the poorest one-fourth in the United States?

A:—Queen compares better than the poorest one-fourth, which is 133. Rose a little better than the best one-fourth of the cows, which is 301.

Q:—Was it by intention Rose had six lactation periods in ten years?

A:—The reason was that she was not bred more frequently, she was a persistent milker. When this was started twelve years ago, it was before the dairy department. Then very little attention was paid to the dairy qualities in her. Prof. Farrington got her for different purpose. Then he simply wanted a good

dairy cow to see the effect of the change of feed on the milk. So that was rather by chance than purpose.

Q:—How about the labor?

A:—We considered that the skim milk calf and manure paid for the labor.

Q:—(Referring to chart) Does that man know he's got these poor cows?

A:—He certainly does.

Q:—What does he say?

A Member:—Probably don't believe it.

Q:—Where does he live, northern or southern Illinois?

A:—Northern Illinois.

Q:—How long a milking period, and how many milking periods should be given these poor cows?

A:—If fully matured, and she apparently has a good chance, I think one lactation period is enough. If not freshened right and not had a fair show, give her another chance. Ordinarily if in good health, and feeds well, one year is sufficient.

Q:—Safe to let the Experiment Station try it?

A:—Yes sir it is. We are not keeping Queen for the money we are making.

Q:—What sires did you use in connection with Rose, what breed?

A:—One Shorthorn first, and Holstein after that.

Q:—Didn't have any other?

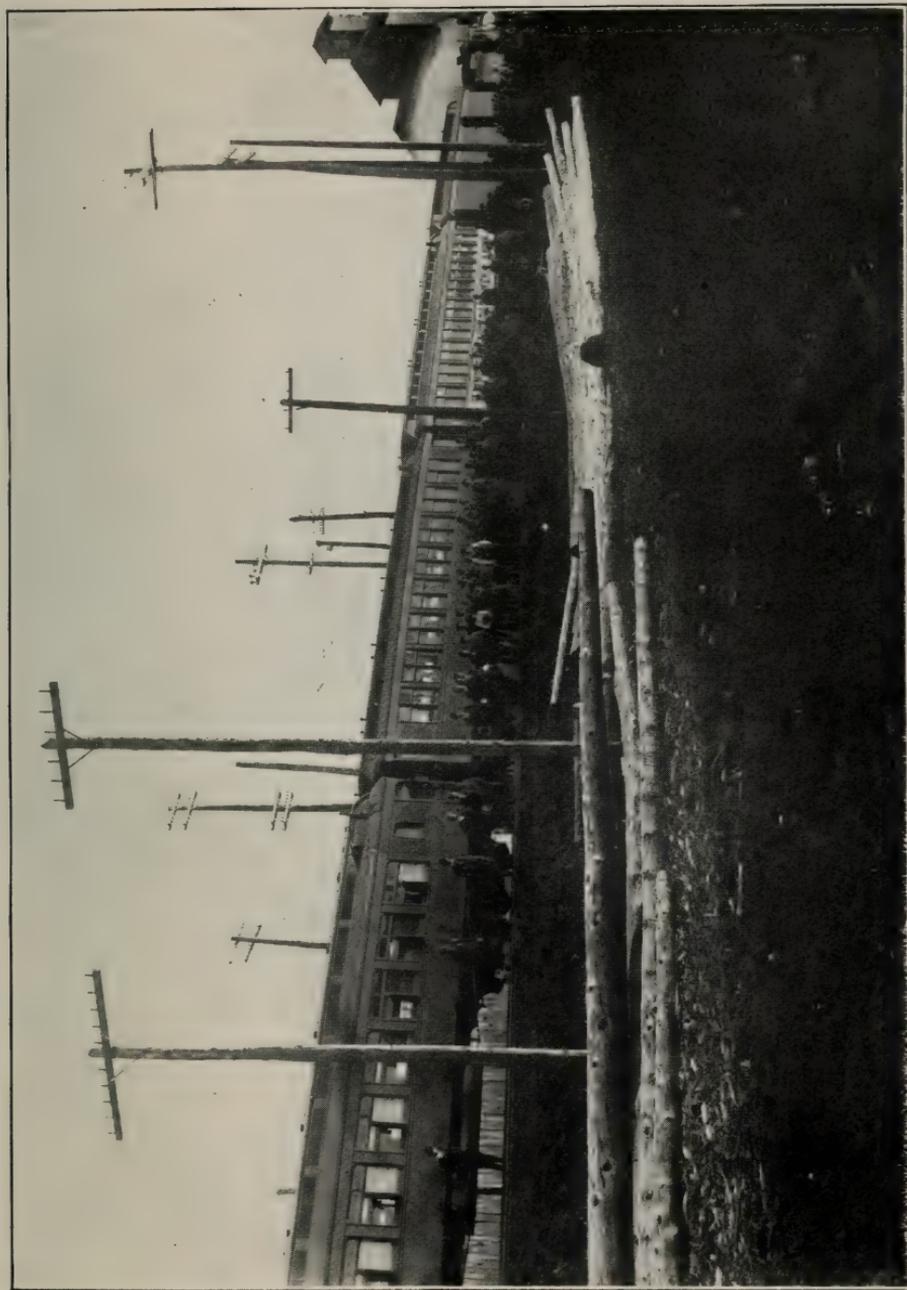
A:—No sir. We had two heifers from Holstein, and one from the Shorthorn.

Q:—Which was best?

A:—The Holstein best. I thought the Shorthorn good myself, but she was not up to the Holstein.

Q:—In these poor cows here, was any record kept of the lactation periods?

A:—Yes sir, at the time there was. I could not give you them now. I never saw that herd. It is published in one of the circulars



Dairy Train run over the Santa Fe, In Illinois, by Illinois State Dairymen's Association, March 25-30, 1907.
This picture taken at Morton, Illinois.

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Q:—The feed and care have a good deal to do with that record?

A:—Yes sir, feed and care have a good deal to do with the record of any cow. Here at the top is 102 butterfat, and down here 254, about two and one-half times as much in the same herd.

Q:—That will happen in all herds?

A:—Yes sir, Yes sir. That is not always feed and care.

Q:—Is that one year's record?

A:—Yes sir.

Q:—Average acreage 160, worth how much Mr. Mason?

A:—\$125.00 an acre.

Q:—Supposing you have a cow that will reduce more butterfat will you sell her?

A:—No sir, if she produces enough butterfat in one year, will get a few high testing cows to breed her up.

Q:—Have you any bulletins for this?

A:—We have not published any circulars that contains this particular information as yet.

Q:—The bulletin with these pictures in?

A:—No sir.

By the president:—Every dairyman ought to see this and get some help from this. You better all be members.

PRACTICAL DAIRY FARMING.

By B. L. Thomas, Woodstock, Ill.

Mr. President, Ladies and Gentlemen:—The condition my heart is now in, I think this is a pretty high altitude for me. I never tried to make a speech but once before, and there was no where near as large an audience as this. The fact is, there was one old gentleman listening to me. Through the advice of of a young lady, I was to speak to this old gentleman, who happened to be her father. When I found I had to make a speech

before him, I went to work in earnest and studied up a speech and learned it thoroughly. I knew it from beginning to end. I thought under no conditions would I make a failure of it. I thought it would win the applause of anyone. When I got there and started my speech very bravely, my knees commenced to trembel and got warm under my collar, and the firstthing I knew the whole thing had left me. I could not remember one single word of that speech I had learned so thoroughly. I don't know what I haddone. He helped me through, through the back door.

You people will wonder why I am here today. I wonder at it myself. I wondered why I was asked to go on this stage. It took me a long while to study it out. I know it is not proper to get up before an audience and make excuses. But under the conditions, I think it is my privilege to explain to you why I am here. There is scarcely a familiar face before me. In order to thoroughly make you understand, I will have to tell you a little story. It will carry you older people back seventy years maybe.

Can you remember when this thickly populated country was nothing but a wilderness, where the nearest neighbors were two or three miles apart. How well you remember settling on a piece of land; how you broke up a few acres, probably with oxen, had a pig in the pen, one cow and a few chickens. You put in a big field of corn, half an acre, two or three acres of wheat. How you had no way of getting the wheat except with the old fashioned cradle. I am not very old yet, but I remember carrying the bundles. The only way of threshing the wheat was by the old fashioned flail, and after getting it threshed out, the only way you have of cleaning it, way by nature's fanning mill, the wind. And after all that, the only way you had of taking that to mill, perhaps, was putting a bag of it across your horse in front of you, and starting off down through the field, and then following the cow path right straight on down to the little old creek, and then going on down to the old grist mill. There one of these old mills that was owned and run by an old fellow.

One day he sat there by the old water wheel, smoking his old cob pipe. A stranger happened in and he looked up and said "How do you do." The stranger said "You don't seem very busy." "No," says he, "I am only running on tailings." "Running on tailings, what do you mean by that?" "Eat all the good wheat, and in order to keep the old mill going, we have to run on tailings, screenings." I found out that when this program committee started out, that they ran short of good material, and in order to keep this thing going until closing time, they had to work in some tailings, and that is why I am here.

Now then, there isn't a man here before me this afternoon that loves the good old dairy cow any more than I do. There isn't many of you here that understand or realize the difference between a good cow and a poor cow much more than I do. All that I am sorry for is that I haven't had more experience with the good cows instead of this kind that Prof. Fraser showed up. But as much as I love cows, as much as I love milk, taking care of cattle, I do not love it well enough to devote my whole time to it. You say that I never will make a successful dairyman. I will not argue at all. But I have had the opportunity a few times of listening to some of these great dairymen, these men that milk vast numbers of cows, and these men that make such an immense quantity of milk around Joliet and around Elgin, over that great district where they make so much milk, and while I was listening to some of these men at the Farmers Institutes and other meetings, the thought came to me, I wonder if the wives of these men were to have the opportunity of getting up here before an audience, if they would tell the same story that their husbands told. If they would tell how they lived, of getting up early in the morning and working until late at night working and washing for the family. I wondered if the boys of these fathers, if they were to have the opportunity of getting up before an audience, if they would tell the same story their fathers told? How they loved to milk 15 to 20 cows, over 700 tons in a year. I do not mean for a moment to have you think that I believe that such dairymen as you have around here and Elgin

do not understand their business, made the success they have, made a wonderful success in both their homes and in their dairy, but merely mention these two or three things in order to try and bring out later a little discussion on this point. To have these men explain to me a little more thoroughly how they are able to make the success in this extensive way they have done, also in their homes. I am here, gentlemen, not as a teacher. I came here as an ignorant farmer, one who has no education, but seeking for information, and so I chose for my subject, practical dairy farming.

I do not mean by that, that it would be practical dairy farming to you people here or Elgin, situated as you are, but what seems like practical dairy farming to us working under the difficulties that now exist that we appear unable to overcome.

In the first place, I wish it to be understood that my brother and myself are in partnership. We own a farm together, or, we will as soon as the other fellow releases the mortgage. We are partners in everything but our wives, and in order to be as nearly related that way as we could, we married sisters.

In order to run our business successfully, we had to keep a close record of every thing we did and do on the farm. We have to keep everything in black and white.

People as a general rule, don't think much of a book farmer. They say that's kind of high-tones, or something like that. We had an institute in the northern part of the state, and I wanted a friend of mine to go, but he said he wouldn't give a cent to go there. He said "All that professor business is merely book learning and talk."

Here about five years ago we bought a farm of 160 acres. This farm had been owned by an old gentleman for a good many years, I do not know how many. In looking over the place after his death we asked that question, and when we bought the place we found one piece had been deeded to him from the government, and the deed was signed James K. Polk. He had owned it a long time, and in all this time he had kept no stock on the place. He had raised nothing but grain and sold

that off. You will have some idea of the condition that this farm was in when we took it. The land wouldn't raise only about 15 to 20 bushels of corn to the acre and hardly that. By keeping it heavily stocked, we have got it today to where an acre of it will produce from 60 to 70 bushels of shelled corn. The way we have done it is by milking cows, keeping hogs and such other stock as we have.

When we started in on this place, we had a dairy of cattle that was picked from two dairies. I would not tell this up home. My brother and I were both on rented farms, cash rent and they were heavily stocked. We had a sale and sold the stock off of my place and changed a few of the cows. The best cows in my herd I took to my brother's place, and the poorest of my brother's were fetched to mine and sold at this auction, and we thought we had an excellent herd.

We started in that way. Raised all our heifers and took our milk to the butter factory. We took the skim milk back and fed it to the hogs.

One day a young man, Mr. Glover, came from the University of Illinois, and he wanted us to take up this work that Prof. Fraser has told us of today. Wanted us to test our cows to see what they were doing. We told him we had a good dairy and did not want to spend the extra time, that we knew enough about dairying so we could handle cattle all right. He talked to us a little while, and finally he got us to consent to try it for a while

We started in and followed it up for one year, and when we got our paper back, showing what our cows had done, I tell you we didn't feel very proud of it. Our cows only averaged a trifle over 200 lbs. of butter a piece. We thought we had cows that we could make milk from, or we could make beef from. We found out that there wasn't but a few of them that were paying us a profit. We asked Mr. Glover what kind of cattle he would advise us to go into. He says, "Boys, that is for you to decide. If you want to run a dairy farm of milk cows, go into some dairy breeds, no matter whether Jerseys, Ayreshires, Holsteins or

any of them, but go into some one and stick to it. Whatever breed you take, stick to it, don't be changing around." Well, we studied on it a little, and finally thought we would get Ayrshires. But when we come to look it up, we found it would be hard for us to start with them because there not any near us, and it would be quite a hard matter for us to get hold of any cattle of that breed. We finally decided on Holsteins

We went in the first place and bought some registered cows, and bought a registered sire. We started in that way. I have some figures that show the yearly record.

The first year's record we burned up we were so ashamed of it. Why, it makes a man feel pretty small when he sees what some of the herds these dairymen have been doing. But I believe we are on the right road now.

Here is Thomas Bros. yearly record for 1905. I believe it is 21 cows. Cow No. 1 she gave milk 9078 lbs. in one year, tested 4.3 butterfat 3.90, butter 455 lbs. This cow grade Holstein I bought her at auction for \$32.00. When I got her home I tried to sell her for \$33.00, and today \$150.00 wouldn't buy her. If we hadn't started in testing our cows, we would have known nothing about her. Under the conditions she has done fairly well—no great records. This cow cleared us 200 lbs. of butter for her keep, and of course at the price of butter last year it would be about \$58.00 she cleared. We had two heifer calves from this cow. One is coming two years old in the spring, and the other a young calf. If she reproduces herself I see what an investment that was for \$32.00, and for \$1.00 I would have lost it.

Cow No. 2. I will just read pounds of butter they made. She made 360 odd pounds, almost 367 pounds.

The next cow made 351 pounds of butteer. I will give you the pounds of butter in the order that they are here.

Next cow gave 321 lbs. of butter.
Next cow gave 315 lbs. of butter.
Next cow gave 309 lbs. of butter.
Next cow gave 291 lbs. of butter.
Next cow gave 287 lbs. of butter.
Next cow gave 277 lbs. of butter.
Next cow gave 277 lbs. of butter.
Next cow gave 267 lbs. of butter.
Next cow gave 265 lbs. of butter.
Next cow gave 245 lbs. of butter.
Next cow gave 248 lbs. of butter.
Next cow gave 248 lbs. of butter.
Next cow gave 239 lbs. of butter.
Next cow gave 231 lbs. of butter.
Next cow gave 216 lbs. of butter.
Next cow gave 209 lbs. of butter.
Next cow gave 184 lbs. of butter.
Next cow gave 78 lbs. of butter.

This cow that only gave 78 pounds, I got her of Mr. Campbell here. She is a registered Holstein cow (Laughter). That is the record of 1905. I will explain about this cow to you. We heard that Mr. Campbell had a kicking cow that he would sell for so much money. Mr. Glover told us he believed that she would be pretty profitable cow for us to buy. We had quite a little experience with kicking cows. I had had my mind made up there was no cow that ever lived that I couldn't milk. I thought Campbell was a breeder and probably didn't know much about milking. The cow probably kicked a little and scared him out. I went over there to see about this cow and took her home. She was just almost dry. When this cow freshened we never let the calf suck her. I was going to show them how to stop her from kicking. I sat down to milk her, but I didn't sit there long. I was very kind to her and patient. That was the only way to win out, and I tried it again and she kicked. Tried it two or three times. I said "I can tie you and milk you anyway." I went and got a strap and tied the cow. I tried several times without the strap but couldn't do it. She taught me a lesson. I was determined to milk her a year, and milk her a year I did

and tied her every time. When I would sit down to this cow she would be leaking milk, and yet you could hardly get more than a quart or two at most. After getting through, within three or four minutes she would be leaking again. She acted that way for the whole year. The next year when she came in we left her calf and another one on her, and couldn't take the milk. The first winter raised five calves on her. Had her two years now, saved her two young calves that would take this milk. That was a valuable cow.

Mr. Campbell. Q:—Did you know that was a kicking cow before you got her?

A:—Yes sir, you told us all about her and I didn't believe you, but I do now.

As I said before my brother and I are partners, and we have to keep records. We take an inventory of the farm the first of January each year. Then we know something about whether we are going ahead or backwards. Here is the inventory a year ago this January and now.

1906, horses 6, valued at	\$ 925.00
1907, horses 9, valued at	1,200.00
Increase	\$75.00.
1906, cattle, we had 53 head valued at	1,560.00
1907, cattle, we had 58 head valued at	1,687.00
Increase of	\$127.00.
1906, hogs, we had 74 valued at	925.00
1907, hogs, we had 68 valued at	598.00
Decrease of	\$327.00.
1906, chickens, 200 valued at	80.00
1907, chickens, 300 valued at	120.00
Increase of	\$40.00.

Gain for 1906, \$452.00 and for 1907, \$ 504.50 which makes an increase of 52.50. In 1906 coarse feed was \$220.00 and 1907 it was \$382.00 a difference of \$162.00. Cattle sold in 1906 \$398.00, hogs \$1320.79. This will make some of you smile. Milk sold \$984.88, a total of \$2606.65 for the year. We paid out for feed \$400.00 leaves a balance of \$2206.46. And in addition to this we sold chickens \$65.00, eggs \$110.00, to be

added to this. Total increase on stock and crops last year and this \$329.50.

We have to take our milk to a butter factory, so in order to get all we can out of it, we have to have lots of hogs, raise all our heifer calves. It seems to me that hogs and cattle are made to go together. Now, most of you people take your milk to the condenser or ship it and there's lots of milk goes off your farm that you never get back on again. We sell nothing but the cream. For that reason we believe in mixing farming than running it all to milch cows, and while we are only just starting in this and trying to breed up a herd of cows, we hope in a few years to make a fair showing.

I thank you for your kind attention.

Mr. Mason. Q:—How many pounds of milk do you get on an average?

A:—I don't know as I have that down. This makes an average yeild of butter per cow of 271.27 pounds, deducting 200 lbs. for cost of board leaves a net gain of \$16.35 per cow. This dairy is I think 21 head we have of them heifers. We are milking 18 cows at present time that's giving 425 lbs. of milk a day. Out of these 18 cows there are five two-year old heifers and five three-year old heifers.

Q:—When you keep books you just take that a little farther and find out how much you expend for labor and invested for takes etc, can you do that?

A:—Gentlemen, I wish I could. That's the only thing that troubles me is to know where this \$2200.00 has gone to.

Mr. Campbell:—You got to adopt Mason's plan, the eight hour system; but he uses it twice a day. We do that on the six hour system.

Mr. Thomas:—We make a practice of getting up about half past five in the morning, and I do not think that over six times in a year we are ever later than seven o'clock, supper eating and all.

Q:—What time at night?

A:—Seven o'clock. Generally half past six through our work.

Mr. Mason:—In running a farm, strictly a dairy farm, you would be proud to show us those figures clear down.

A:—I didn't learn my catechism right, gentlemen.

By the President:—We are much obliged to Mr. Thomas.

I wish there were a few more to grind out as well.

I wish to call your attention to the Exhibit Hall. It is on VanBuren Street, just a block in that direction. There is a sign across the walk showing where it is and there is where we will hold tomorrow's session. The milk testing class will be held in Exhibit Hall. Those who have samples of milk they wish to bring in, can bring them in the morning before ten o'clock and they will be used in the testing class.

The meeting tonight will be held in this auditorium, and the general subject is the city milk supply. The speakers are Mr. Lane, Mr. Truman and Mr. Schuknecht. Besides the speakers we have our old friend, Mr. Lumbard, who will sing, and every one who has attended dairy associations for the last fifteen or twenty years have heard Mr. Lumbard sing and they know what he is and all about him. He is a fine old gentleman over 80. He belonged to the famous Lincoln quartet of civil war times.

The headquarters of the Association are at the Munroe. We have a room over there and some one will be there most of the time to answer any questions or give any information that any one may want.

Persons from a distance who have railroad certificates may leave them there or here at the Secretary's desk to be signed. I hope no one will forget to leave his certificate so we get the rate.

Tomorrow afternoon's session is a joint session with the Farmers' Institute of Will County, and will be held in the Opera House. The speakers are Dean Davenport, Prof. Haecker and O. C. Gregg. They are all men who are at the very top of the dairy business.

Tomorrow morning in the Exhibit Hall and all are welcome

to see the milk tested and find out what there is to be learned about testing milk.

Mr. Kimsey:—A word in regard to the headquarters room: I feel, and have heard a number say, that they get as much good from a personal talk with the persons attending. Around the lobby we naturally feel a little hesitancy in approaching the subject with them. There is plenty of room at headquarters for all to go there and talk. Allow me to suggest that around the hotel we make the headquarters room the general loafing room and consider every one introduced, so you can talk without any hesitancy, and we will thereby get the greatest good from our stay here.

Prof. Fraser:—There will be a meeting of all county dairy representatives immediately at the close of this meeting here.

By the President:—We stand adjourned until 7:30 this evening.

WEDNESDAY EVENING, JAN. 16, 1907

7:30 P. M.

President in the chair. Meeting called to order.

We have with us tonight a familiar dear friend, Mr. Lumbard. There is a treat in store for us.

Song. Encored. "Maggie."

Our next number is not on the program, but we shall have the pleasure of hearing a few remarks from Dean Davenport of the University of Illinois.

Mr. President, Ladies and Gentlemen:—

I would much rather listen to Mr. Lumbard sing than talk myself or any one else talk.

One of the questions that always occurs to us at the time of the meeting of any association like this, is, what does it mean for the industry it represents.

I suppose we ought not to hold an annual convention without exerting some influence over the progress of affairs represented by the people gathered together. I am one who believes we have

not yet commenced to scrape the surface in any direction, much less in dairying. Yesterday, an old gentleman came up to me and introduced himself and he said, "I never wanted so much to love as I do now. I would like to see this matter of agricultural development going on a while yet to see what's coming."

I heard an address a month ago given by an eastern college man who said these are the most interesting days and he wanted to stay awhile and see what is going to happen. I imagine a good deal will happen in dairying in 25 years. We shall either do much better, or do far worse. It will be one of the two, we are not going to stand still.

Dairying represents the most intensive form of agriculture that is practiced on this side of the water. It is a profession that is most intensive. Our difficulty is, we are trying to operate an extensive plan. There is a fair criticism laid to American dairying, especially in the states in the west, that we introduce the business in a period of our development and all planned on extensive plan. We milk 1020 cows on the extensive plan rather than on the intensive. But we are coming to a time when we must do something definite.

There has not been as much improvement as there ought to have been. Really, I believe honestly we have made progress in dairying in the last decade or two than should have been expected. The Babcock test ought to have done more than it has yet done. I am not blaming any one. I am stating facts. We have been so busy about so many things, interested in doing things, that we have not yet settled down to the business of developing an industry very much in this country.

If I might explain the thought in mind a little differently. I think that the individual dairyman, like the individual farmer, has had his mind on his own personal affairs and little on the industry he represents.

Let me take a very simple illustration. When I hear a man advocating buying cows instead of breeding them, advocate it as a general policy, why, I know he is looking from a purely individual standpoint. He knows, or ought to know, that no

business can thrive on that basis. Just like this: I hear a man say this is the way to do good farming, this is the way I do it and my experience has proven it to be good policy. I buy all the manure and haul on my farm, and buy the clover hay off my neighbors and manage every way I can to get fertility on the farm—but it was at the expense of his neighbor's farm.

Let me make this point clear. What we all need to do, and do it quickly, is to do those things that will establish the dairy industry as a whole on a solid basis. We have conducted the business altogether too much from the extensive standpoint of the individual. A whole lot of general things in the meantime have gone wrong.

There are three things which are a positive menace to the prosperity of the dairy business. We are here to find out if we can the right plan.

The three weak spots are: The inefficient cow, cost too much to make milk; 2nd, Antiquated and insanitary methods, we have not profited as much as we ought to, too much bacteria. And 3rd, The general public, who are our consumers, do not realize as they ought, for our benefit and theirs, the food value of dairy products.

Let me repeat: First, the inefficient cow to get rid of; Second, better methods, more sanitary ways of making better products; and third, that the public should realize better than it does the real food value of dairy products.

I remember when milk would not sell for more than four cents a quart. That was a permanent price for milk as if it had been written in the Bible; not sold for more than four cents a quart. There is no such thing as that. I have just been given a new edition of the ten commandments and it is not in that. People pay 35c a lb. for butter. How does that compare with lean meat which is 75 per cent. water. How does milk, butter or cheese compare now in the market as a food product with the meat product of this country. No comparison at all. The dairy products are infinitely cheaper. Three campaigns. One, better cows to make milk cheaper. Another, better methods, and

another, to teach consumers what the products are really worth. This is a business mans' meeting, not a place to pat each other on the back. It is a place to find the weak spots and pick them out. I believe we need to do some things for the general good of the industry as a whole, the individual can take care of himself; the sharp ones can. You will find individuals in any industry who get along all right. Some are so shrewd that they will get along as individuals all right in any business. What we want to be certain of, is that the dairy industry of Illinois is on a solid basis, and it is not sufficiently solid. We have too many inefficient cows, too much milk that is not fit for humans to consume, and the general public too ignorant what dairy products are really worth. They will not pay the difference, and they will not until we educate them. I wish some one else would do it, but if they will not, we will have to stir up the dairymen to educate themselves and the general public, and I think they can do it.

The reason we have not done before the things we ought to have done, is because we are at it 365 days in the year and sometimes another day. If we could get away from the cow for a while and look at the thing as it really is, have two months vacation, you would see some things we do not see when we are at it all the time.

We are looking for a man to come into the State of Illinois, study the business of agriculture as a whole from the economic standpoint, and a man who is not a farmer, but who is an economist, who will look at us from the outside. Burns was right when he said it would be good to see ourselves as others see us. We need that in agriculture today more than any other one thing. We *know* a whole lot better than we *do*. I think we want for agriculture a man to come into this State with experience to study us and our ways and to find fault with us, and show us where we are wasting money and efforts and losing in the way we are handling agriculture.

To illustrate. All over this prairie state we use six ft. mowing machines. Why are they doing it? I asked the deal-

ers and he said they say "that is all we can sell." Why won't the farmers buy those that come more than that? "It pulls too hard" the boys say. It ain't so at all. Any four of us men can pull 8 ft. mowing machines if it is in good shape. The draft is not the limiting factor at all. No work any easier than running the mowing machine. Why say that you can't run a mowing machine, an eight footer, when you use a seven foot binder on the same farm. It is utterly foolish. We do things as we do, for no more reason than that we have always done them that way. You tell an Englishman that he is not doing something right, and he will say "we always did it so." You and I need to get out one side of ourselves and look back and see what we are actually doing, and we need it in dairying more than any other phase of agriculture. These meetings are for discussion because matters are changing rapidly. Everything is being adjusted to new conditions, and we must readjust ourselves also.

It is costing us too much to produce milk. The consumer must be educated until he is ready to pay a reasonable price for a good product, and be sure he gets a good product.

We have something to do in Illinois and it is for the interest of every man to do it now and not to postpone it. It is not going to drift ten years more as it has in the past. If we are a dairy state, and we are, then we ought to be doing better than we are. We have in the two corners of this state, Chicago and St. Louis, the two great markets of the west. They are natural and legitimate plunder. But those cities ought to be supplied from Illinois. We can have the milk trade of St. Louis, if we go after it, and Chicago, if we can keep it. Am I succeeding in making this clear?

What we ought to do in this meeting, is to discuss a lot of questions that do not concern us as individuals, but the industry as a whole. Plan a long ways ahead. I had a long talk with Mark Dunham about his business years ago. He built up his business from one horse to one of the largest horse businesses in the country. He said when he published his first catalogue,

his secretary called his attention to the fact that lots of letters asking for the catalogue were children's letters, and told him he thought it would hardly pay to send them to children. But Mr. Dunham said "Oh, yes, send them right out." But the secretary told him some of the letters were from children only eight years old. Mr. Dunham said, "I don't care if they are only six months old, if he wants to see these pictures he can have them, and when he grows up he will buy a horse of me." And that was so for Mr. Dunham told me that nearly all his customers have been men who said they saw those pictures when little boys, and they bought a horse. We must look a long ways ahead, and we must work along certain lines that will develop a business later on. We want a more far-seeing policy than the dairy has yet developed, for developing trade in Illinois, and capturing certain lines of trade to support our business. I believe as soon as we apply ourselves to this, we shall have our share of the trade of the middle west if we go after it.

I do want to leave this thought with you. We ought to make plans to develop the dairy business as a whole, independent of any plans we have for ourselves as individuals. Have those lines fixed, those principles picked out, those points of attack planned, which will insure us trade ten years, or fifteen years from now, and, yes, twenty years from now.

The developing of business is like playing chess. You only pass move by move in certain quarters. The man who begins with a clear campaign in his mind and does not disturb it, stands a fair chance of winning. I think that is the kind of game for the dairy industry of this state. There are some things that must be done for the good of dairying twenty years from now, not resulting in a personal gain for you or me, and yet it ought to be done. It will come back to us in good time. We have got to do some things now that will produce results five or ten years from now, and if we don't, we will always have to deal with pressing questions. We can increase and double the consumption of dairy products in this state, if we set about it. There is not enough milk, butter or cheese used, not half

enough. I feel like saying these things as long as the president called me up. I thank you.

By the President:—We are indebted to you, sir. We all feel as if we were students. You have outlined a campaign, and we ought to have suggestions.

By the President:—Mr. Wilson has very kindly made arrangements for any of us who wish to accept the invitation to visit the penitentiary tomorrow morning at 10:30 o'clock. A car will leave here at that time. I hope none of you will absent yourselves from the meeting at the Exhibit Hall in order to take advantage of this opportunity, but you ought to go some time to visit the place.

We will now listen to Mr. C. B. Lane, Assistant Chief of the Dairy Division of the U. S. Department of Agriculture at Washington, D. C.

Mr. Lane has very kindly offered to give every support from his Department to start this new campaign for milk at our State Fair. I was speaking to him about it today.

A MOVEMENT FOR CLEAN MILK.

By M. C. B. Lane, Asst. Chief, Dairy Division, U. S. Dept. of Agriculture.
Washington, D. C.

Mr. President, Ladies and Gentlemen:—It gives me pleasure to meet with you today, and I have here a paper I have prepared on a movement for clean milk, which I will read to you.

In any reform movement, the object cannot be accomplished by sensational methods. If this were the case, we should have had clean milk long ago. For the dairy has been a target for many years and accused of being the source of practically every contagious disease, the cause of high death rates in our cities, and put down as the most dangerous thing in existence. Some of the things that have been said are true, and some are not. Some people never see anything but dirt in the dairy. Men

ignorant of the most fruitful cases of unclean milk have advocated from time to time most ridiculous things. For example, in a Western City the Board of Health was asked to pass an



C. B. LANE
Assistant Chief Dairy Division, United
States Department of
Agriculture.

ordinance compelling all dairymen to remove their beards. What is needed is less painting of the pump and more work at the source of the fountain. Less pasteurizing and sterilizing and renovating and aerating, and more thorough careful work back at the dairy farm. Not that the dairyman is always at fault, for often the milk leaves the farm in good condition, but is not properly iced in transit, or is mixed with some other fellow's milk and the good qualities lost. However, the farm end is a good place to turn on the searchlight.

Now, when there is a general agitation of the subject throughout the country, when the consumer is paying more attention to his milk supply, when the dealer is looking for good

milk to supply this demand, and when the producer is taking more pride in his business and making an effort to meet the demands for a better product, the time seems ripe for some forward movement for clean milk.

The Boards of Health in our cities are doing excellent work in passing ordinances to better control the healthfulness and cleanliness of the cows, the sanitary conditions of the stables, the water supply, proper cooling and storing the milk and delivering it to the consumer with a low bacteria content, thus insuring its keeping quality. They are taking more stringent measures to keep the milk shops in a sanitary condition, isolating them from the horse stable, wagon shed and living apartments. We are receiving letters at the Department almost every day for information along this line.

That there is great need for a clean milk movement is evident to anyone who will take a day or two visiting the dairies supplying milk to almost any of our cities, large or small. Dairies which supply us with milk which we have on our tables every day. What do we find? Out of 300 we have recently inspected near one city, you can count on the fingers of your two hands those in good condition. Dr. Walter Bonsel, Sanitary Superintendent, Health Department, New York City, stated recently that of the 5,000 dairies they had inspected, just 5,000 were ordered to make changes and corrections. Out of 62 samples of milk taken in one day, six showed less than one million bacteria to the fifteen drops, while the other 56 showed counts ranging from 1,180,000 to 39,060,000, and twenty-three showed more than 10,000,000.

It is not altogether the dairyman's fault that conditions are not better. I believe we have been getting at this thing wrong end first. The cities have been endeavoring, largely through enforcement of laws to make these improvements, but instead of spending all their time and money *telling* dairymen not to do this and that, I believe that much of the time and money could be better spent by having practical and capable inspectors go direct to the dairy farmer and point out the faults to the

dairymen, and, through education and cooperation and encouragement, assist him in bringing about the desired improvement. This would not bring the results in all cases, but in very many. Most dairymen would be willing to make improvements if they knew exactly how to go about it. I say this advisedly, because I have had charge of the work of inspecting several hundred farms and I know all about their troubles. It is all right for our cities to set standards for bacteria; it is all right to insist that the milk shall be cooled; it is all right to require that the milk contain a certain per cent of butter fat and solids; it is all right to insist that the cows be tuberculin tested; but the dairy farmer should be assisted along all the lines by capable inspectors and given the help and encouragement possible, and the city should come into personal contact with the individual producer. They are only just beginning to do this, which, to my mind, is the most important work in securing a clean milk supply. Our cities, however, are hampered by lack of funds which permit of only a small number of inspectors. Dairies supplying milk to some of our cities have never been reached at all. What are fourteen inspectors to 30, 000 dairies? This is the situation in one of our large cities.

It is evident that only slow progress can be made in improving dairies under these conditions. If a sufficient number of inspectors could be placed in the field to report conditions and close up dirty dairies until they were put in proper condition, it would go a long way toward securing a clean milk supply. One small city I know of has accomplished this, and no dairy that has not been approved by the Board of Health can sell milk within its limits. The poor dairies ship their milk somewhere else.

A Plan for Scoring Dairies.

Any successful plan for the improvement of milk, must be practical and must work for the good of both the producer and consumer. It must be broad enough in its scope to cover all conditions of dairies and must be of such a character that it can be applied by City Boards of Health, milk dealers, or any organization working toward the improvement of milk. After care-

fully considering the question of how to meet the present needs in this respect, we have decided that if a score card was carefully prepared setting forth the conditions and giving each branch of the dairy a definite rating that this would largely solve the problem. The score card idea is not new. The method has been used for years in scoring butter and cheese, and more recently in scoring corn, milk and cream, and the farmers are getting used to this method of rating these various products. The rating of dairy farms by the score card method has been practiced more or less in different places, and some half dozen cards are in existence at the present time, and have been used with greater or less success. We have prepared a score card in the Dairy Division, however, after the experience of scoring some 500 dairies, which we believe is thoroughly practical. By this system, the dairyman's defects are pointed out and he is given a definite rating in all branches of his work, and further, the score is put on file and can be referred to at any time and comparisons made at a glance. In most of the systems now in vogue for inspecting dairy farms, the inspector asks a long list of questions and his report is very indefinite. That is, it cannot readily be determined by reading it over just what the conditions are in the particular dairy. Our plan provides for a rating of stables for ventilation, light and sanitary condition; the cows for health and cleanliness; condition of utensils and facilities for cooling, bottling and storing the milk; condition of water supply, etc.

BUREAU OF ANIMAL INDUSTRY.
Dairy Division.

SANITARY INSPECTION OF DAIRIES.

Owner or lessee of farm
 Town State
 Total No. of cows.....No. milking..... Quarts of milk produced daily...
 Is product sold at wholesale or retail?.....
 If shipped to dealer give name and address.....
 Permit No..... Date of inspection..... 190...

	SCORE		REMARKS
	Perfect	Allowed	
COWS			
Condition (2)	} 10		
Health (8)			
Cleanliness.....		5	
Water supply.....	5—20		
STABLES			
Construction	5		
Cleanliness	5		
Light.....	5		
Ventilation (4).....	} 7		
Cubic space per cow (3).....			
Removal of manure (2).....	} 3—25		
Stable yard (1)			
MILK HOUSE			
Construction (2)	} 5		
Equipment (3)			
Cleanliness.....	5		
Care and cleanliness of utensils..	5		
Water supply (Temp..... ° F.)	5—20		
MILKERS AND MILKING			
Health of attendants.....	5		
Cleanliness of milking.....	10—15		
HANDLING THE MILK			
Prompt and efficient cooling.....	10		
(Temperature of milk: ° F.)			
Storing at low temperature.....	5		
Protection during transportation	5—20		
Total score.....	100		

Sanitary conditions are—Excellent..... Good..... Fair..... Poor.....

Suggestions by inspector

.....

Signed

Inspector.

DIRECTIONS FOR SCORING.

	Perfect Score.
Cows.	
Condition and Healthfulness. —Deduct 2 points if in poor flesh, and 8 points is not tuberculin-tested and there are no outward signs of disease	10
Cleanliness. —Clean, 5; good, 4; fair, 2; bad, 0.....	5
Water Supply. —If clean and unpolluted, 5; fair, 3; otherwise, 0.....	5
Stables.	
Construction. —For cement floor (a)* in good condition allow 2 points; fair, 1; poor, 0; wood floor (b) or other material in good condition, 1; fair, ½; poor, 0; good tie (c), 1; good manger (d), 1; box stall (e), 1.....	5
Cleanliness. —If thoroughly clean, including floor (a), windows (b), and ceilings (c), 5; good, 4; medium, 3; fair, 2; poor, 1; bad, 0	5
Light. —Four square feet of glass per cow, 5; 1 point off for each 20 per cent less than four square feet per cow	5
Ventilation. —Good ventilating system, 4; fair, 3; poor, 2; bad, 0.....	4
Cubic Space per Cow. —If 500 cubic feet or over per cow, 3; less than 500 and over 400, 2; less than 400 and over 300, 1; less than 300, 0	2
Stable Yard. —In good condition (a), ½; well drained (b), ½; otherwise, 0	1
Milk House.	
Construction. —Tight, sound floor, and not connected with any other building (a), well lighted (b), well ventilated (c), 2; (d) if connected with another building under good conditions, 1; otherwise, 0; (e) if no milk house, 0.....	2
Equipment. —Hot water for cleaning utensils (a), 1; cooler (b), 1; proper pails (c) and strainers (d) used for no other purposes, 1..	3
Cleanliness. —Interior clean, 5; good condition, 4; medium, 3; fair, 2; poor, 1; bad, 0	5
Care and Cleanliness of Utensils. —Clean (a), 3; kept in milk house or suitable outside rack (b), 2; otherwise, 0.....	5
Water Supply. —If pure and clean running water, 5; pure and clean still water, 3; otherwise, 0	5
Milking.	
Attendants. —Healthy	5
Cleanliness of Milking. —Clean milking suits, milking with clean dry hands, and attention to cleanliness of udder and teats while milking, 10; no special suits, but otherwise clean (a), 7; deduct 4 points for uncleanly teats (b) and udder (c) and 3 points for uncleanly hands (d)	10
Handling the Milk.	
Prompt and Efficient Cooling. —If prompt (a), 5; efficient (b), if 50 degrees F. or under, 5; over 50 degrees and not over 55 degrees, 4; over 55 degrees and not over 60 degrees, 3; over 60 degrees,	

0; if neither prompt nor efficient, 0	10
Storing at Low Temperature. —If 50 degrees F. or under, 5; over 50 degrees and not over 55 degrees, 4; over 55 degrees and not over 60 degrees, 3; over 60 degrees, 0.....	5
Protection During Transportation to Market. —If thoroughly protected (iced), 5; good protection, 4; partly protected, 2; otherwise, 0..	5
	100

Score.

If total score is 90 or above and each division 85 per cent perfect or over, the dairy is **Excellent** (entitled to registry).

If total score is 80 or above and each division 75 per cent perfect or over, the dairy is **Good**.

If total score is 70 or above and each division 65 per cent perfect or over, the dairy is **Fair**.

If total score is below 70 and any division is below 65 per cent perfect, the dairy is **Poor**.

* The letters a, b, c, etc., should be entered on score card to show condition of dairy, and when so entered should always indicate a deficiency.

Practical Experience With the Score Card.

The Dairy Division is now making a thorough inspection of the milk supply of Washington city in cooperation with the Board of Health, and the score card is being used for rating the dairies (930) supplying milk to the city. 200 dairies have already been visited, the scores ranging all the way from 26.15 to 88.5 and averaging 50.5. The cows, including condition, cleanliness, health and water supply, received an average score of 11 (55.7 per cent) perfect score being 20. The stables, including construction, light, ventilation, cubic space per cow, and removal of manure, scored an average of 8.82 (35.3 per cent) perfect score being 25. The milk house, including construction, equipment, care and cleanliness of utensils and water supply, scored an average of 12.75 (63.7 per cent) perfect score being 20. Milkers and milking, including health of attendants and cleanliness, averaged 10.29 (68.62 per cent) perfect score being 15. The average for handling the milk, including prompt and efficient cooling, storage and protection during transportation, was 7.55, (37.7 per cent) perfect score being 20.

It will be noted that the stables were found to be furthest from perfect, and it is believed that improvements are needed

here more than anywhere else, in most of the dairies throughout the country, and it is in the stables that the greatest improvements could be made with least expense. There is no good reason why dairymen should not get a perfect score for cleanliness and yet these 200 were only 44 per cent perfect. The light in most stables visited was conspicuous by its absence. Scarcely any attempt was made by most of the farmers to have any system of ventilation. Some stables have cement floors, but as a rule partially decayed, broken planks, soaked with urine and covered with manure are found. The cubic space per cow was frequently found too low, about 86 per cent. Only 33 per cent hauled the manure to the field daily, and 46 per cent of the stable yards were in bad condition.

The following letters will give an idea of the way this work appeals to the dairy farmer and indicate what may be accomplished by this system along the lines of improvement of market milk.

Dear Sir:—It gave me great pleasure to meet your dairy Inspector. He called at our farm and thoroughly scored our dairy, giving us 75 per cent and showing, or pointing out to us where we might score 100 per cent with a few improvements, the fact we appreciate very much. I am just writing these few lines to show our appreciation of the valuable work you are accomplishing for the benefit of the public health as well as the dairymen at large. The visit of the Inspector did me a world of good pointing out our defects in the dairy.

Wishing your Department the hearty cooperation of all the dairymen, I am

Yours sincerely,

(Signed)

Manager for————

My Dear Sir:—I want to thank you personally for your visit to our farm this week; it has inspired me with renewed life and vigor. I shall not wait until the new year to make new resolves and promises but begin right now. I know I shall never

reach my own ideals even, but I have made up my mind to try. No matter what the motive is in the Department of Agriculture in sending out such inspectors, it cannot fail, in my judgment, to do immense good.

I want you to come around next year again and if I am not entitled to be marked up at least 20 points, I will promise you to go out of the business and I ought to.

Very truly yours, . . .
Signed _____

The Board of Health in Washington is already using the scores for the purpose of revoking permits and several who have scored low have been cut off. After all the dairies have been scored, the names of those who have reached a standard of 70 or above will be published in the local papers. This will encourage the dairyman in his efforts to produce clean milk, and he will use the results to advertise his product, and it is fair and right that he should. The published results will give the consumer an opportunity to know where good milk can be secured. At the present time, it is difficult for the consumer to determine where he can get good milk and what the condition of the dairy is he is taking milk from. This has worked out nicely in my own personal experience. I have recently dropped the dairyman supplying me with milk after finding that his rating was only 43 on a scale of 100 and I have given a dairyman with a of over 70 my custom. Right here, I want to say that the present method of selling milk is very unfair both to the producer and the consumer. The dairy having a low score and producing insanitary milk sells his product for the same price nothing about the sanitary side of the question. The score card system will have a tendency to grade the dairies as well as the product, and to put the sale of milk on a fair basis for all concerned.

Work in Progress Outside of Washington.

In addition to the work in rating and scoring dairies conducted in the city of Washington, we are cooperating with the Boards of Health in one other large city and over 700 dairies

have been scored by the regular city inspectors. The average score of the dairies is about 41 and it goes without saying that there is much need of missionary work in this direction. This city has established a standard of 30 points at the start and revokes the permits of any dairies that do not come up to this standard. While this seems ridiculously low, yet many dairies are being cut off. As conditions improve, the standard will be raised. The results of the work in the city referred to are most encouraging, and I am advised by one of the Health Officers that they thoroughly believe that by continuing work along these lines, clean milk will soon be realized.

Some Results of the Work.

Where some of the dairies having low scores were turned down, the owners requested the Board of Health to supervise the building of new barns and dairymen in some instances have stated that they would build any kind of barn the Board of Health wants. The effect of the work of scoring dairies in one town has been that the milk from dairies receiving the high score has all been bought up by dealers at a considerable advance over the old prices. In one case where milk was selling in summer for 10 cents per gallon it was raised to 12½ cents, and where the price was 16 cents in winter it was raised to 18 cents for dairies scoring 65 or above. Very bad dairies were passed by altogether and dealers would not buy their milk at any price. Dairies in this particular town are given a month to clean up; if nothing is done at the end of this time, the license is revoked. A man is sent in old clothes to see if the dairyman is still selling milk; if so, he is prosecuted for selling milk without a license and usually fined \$20 and costs.

Standard Too Low.

The standard of cleanliness in our average dairies is too low, if we simply judge from what the eye can see and the nose can smell. In my opinion a system of rating conditions and certifying to them is the best way out of the dairy troubles. People will pay a premium for a good thing particularly when it is a good business proposition. Take, for example, the official tests

of our various breeders associations, a buyer will pay hundreds of dollars more for an animal in the "Advanced Registry"—a guarantee, don't you see, of the ability of that animal. If she can produce twenty pounds or more of butter in a week when officially tested, they raise the price still higher. What we are coming to in our dairies is the use of a certified score for a guarantee, and it will mean dollars to the dairyman. That it will bring the dollars is not a theory but a fact. In one of our cities where this scoring has been going on among the dairymen, all the dairies scoring 65 or above find a ready sale for their milk at an advanced price, while some of those falling below can't sell it at any figure.

Some Advantages of the Score Card.

The possibilities of the score card in increasing the dairyman's reputation and his business and his profit are well worth his careful thought; the score card educates to a better product and to better profits. I tell you dairymen, the consumer is not slow to discriminate if he has knowledge of conditions under which milk is produced.

The score card is the best weapon I know of to drive the filthy dairyman out of business; it shows the dairyman; it shows the Board of Health, and it shows the consumer just what the conditions are.

For the benefit of you dairymen who are trying to produce clean milk, and for the consumer's safety, the dirty dairyman should be shut out of competition. More attention should be called to the value of the good product, and to advertising this rather than bring into prominence the dirty conditions and spend all our time on police duty hunting out bad conditions and offenders against the City Ordinance. Put the good dairyman on the Honor Roll and advertise his products as safe and sound.

I have great confidence in the dairyman and great confidence in his ability to do things right. It isn't a question of money; it isn't a question of great scientific knowledge. What some of us need is to take a little more pride in our work; and have a little more determination to keep our dairies in good condition.

When we have these our dairies are going to score high and the profits are sure to come.

A Plan for the Registration of Dairies.

We have just established in the Dairy Division at Washington a Register for Dairy Farms and propose to enter in this register the names of dairies which reach a grade of 90 or over. The names of all registered dairies will be published in some form and these will be known as FIRST CLASS. This will be an inducement for dairies to reach this standard and give the consumers an opportunity to know where good milk can be secured. Further, it will no doubt result, in some instances at least, in securing better prices.

The object of the system is:—

1. To establish a register for dairies reaching a certain grade of perfection.

2. To give encouragement to dairymen producing milk of high quality and influencing insanitary dairies to improve. From the work already done along this line it has been found that many dairies could raise their score at least 20 points by simply thoroughly cleaning their cows, stables and utensils and properly handling the milk. In many cases this could be done without the expenditure of a single dollar.

3. To induce dairymen to voluntarily make application for information and assistance rather than force them by means of laws and ordinances. If they see that by improvement and registering their dairies, it will help their business they will take advantage of it.

4. To determine how many dairies in each state and in the United States are producing high class milk and where they are located.

5. To improve the quality of market milk in general.

6. To help the consumer to find a supply of clean milk.

Naturally the best dairies or the so-called model dairies would be the first to make application and many of them would be able to enter the registry without any expense or change whatever. It is the aim of the owners of these dairies to always keep them

in excellent condition. They do not need laws or regulations. This class of dairies should be increased. At present, they do not receive the encouragement they deserve, and they should have any assistance in a business way that can be given them. As to the poorer dairies, many would be forced to make improvements in order to hold their business, but many that I have scored could raise their rating several points with little or no expenditure, simply by cleaning their stables, cows and milk houses, and promptly cooling and bottling the milk. As to the small dairy, the milk business is like any other, the smaller it is the more expensive to run in proportion to the business done, but a small dairy can be conducted as cleanly as a large one. In many instances the increased sales would more than make up for the extra care in production and handling. Whether large or small dairymen they should produce clean milk and give the necessary attention to it. Some dealers who buy milk that can be guaranteed pay nearly double the market price of ordinary milk.

Like the work already accomplished by Milk Commissions, the improvement of a few dairies would have a marked effect on the entire milk supply. Milk wagons displaying signs showing that their milk is approved by reputable judges have their effect upon others. While this is an advantage, it is well earned. For example, many dairymen who received diplomas for high scoring milk at the National Dairy Show use this to advertise their milk. The same would be the case with the registry plan.

Scoring City Milk Shops.

We have prepared a score card for the scoring of city milk plants or milk shops and have put it into practical use in Washington. This is similar to the one used for dairy farms and I believe is the first attempt to give city milk shops a definite rating by this method. A copy of the score card with full directions for the inspector follows:—

UNITED STATES DEPARTMENT OF AGRICULTURE,
BUREAU OF ANIMAL INDUSTRY.
DAIRY DIVISION.

SANITARY INSPECTION OF CITY MILK PLANTS.

Owner or manager.....Trade name.....
 City..... Street and No..... State.....
 Number of wagons.....Gallons sold dairy.. } Milk
 } Cream.....
 Permit or license No..... Date of inspection.....190..

	SCORE.		REMARKS.
	Perfect	Allowed	
MILK ROOM.			
Location.....	10	.....	.....
.....		
.....		
Construction—	} 10	.....	.....
Floor (3).....			
Walls and ceiling (3).....			
Drainage (4).....			
Cleanliness.....	15	.....	.....
Light and ventilation ..	10	.....	.....
Equipment.....	} 15	.....	.....
Arrangement (3).....			
Construction—			
Sanitary (2).....			
Durability (2).....			
Condition (3).....			
Cleanliness (5).....			
MILK.			
Handling (12).....	} 20	.....	.....
Storage (8).....			
SALES ROOM.			
Location (2).....	} 10	.....	.....
Construction (2).....			
Equipment (2).....			
Cleanliness (4).....			
WAGONS.			
General appearance (2) ..	} 10	.....	.....
Protection of product (3)			
Cleanliness (5).....			
Total.....	100		

Sanitary conditions are—Excellent..... Good..... Fair..... Poor.....

Suggestions by inspector

Signed.....

Inspector.

DIRECTIONS FOR SCORING.

Milk Room.

Location.—If not connected by door with any other building, and surroundings are good, 10; when connected with other rooms, such as kitchens, stables, etc., make deductions according to conditions.

Construction.—If good cement floor, and tight, smooth walls and ceiling, and good drainage, allow 10; deduct for cracked or decaped floors, imperfect wall and ceiling, etc.

Cleanliness.—If perfectly clean throughout allow 15; deduct for bad odors, unclean floor and walls, cobwebs, unnecessary articles stored in room, etc.

Light and Ventilation.—If window space is equivalent to 15 per cent or more of the floor space, allow 10; deduct 2 points for every 3 per cent less than the above amount.

Equipment:

Arrangement.—Allow 3 points for good arrangement; if some of the equipment is out of doors or so placed that it can not be readily cleaned, make deductions according to circumstances.

Condition.—If in good repair, allow 3 points; make deductions for rusty, worn-out or damaged apparatus.

Construction.—

Sanitary.—If seams are smooth, and all parts can be readily cleaned, allow 2; deduct for poor construction, from sanitary standpoint.

Durability.—If made strong and of good material, allow 2; deduct for light construction and poor material.

Cleanliness.—If perfectly clean, allow 5 points; make deductions according to amount of apparatus improperly cleaned.

Milk.

Handling.—If milk is promptly cooled to 50 degrees F. or lower, allow 12 points; or if pasteurized at a temperature of 149 degrees F. or above and promptly cooled to 50 degrees or lower, allow 12 points. Deduct 1 point for every 2 degrees above 50 degrees. If milk is pasteurized imperfectly, deduct 6 points. If milk is improperly bottled or otherwise poorly handled, make deductions accordingly.

Storage.—If stored at a temperature of 45 degrees F. or below, allow 8 points. Deduct 1 point for every 2 degrees above 45 degrees.

Sales Room.

Location.—If exterior surroundings are good and building is not connected with any other under undesirable conditions, allow 2; for fair conditions allow 1; poor conditions, 0.

Construction.—If constructed of material that can be kept clean and sanitary, allow 2; for fair construction allow 1; poor construction, 0.

Equipment.—If well equipped with everything necessary for the trade, allow 2; fair equipment, 1; poor equipment, 0.

Cleanliness.—If perfectly clean, allow 4 points; if conditions are good, 2; fair, 1; poor, 0.

Wagons.

General Appearance.—If painted and in good repair, allow 2 points; for fair condition, 1; poor, 0.

Protection of Product.—If product is iced, allow 3 points; well protected but not iced, 1; no protection, 0.

Cleanliness.—If perfectly clean, allow 5; good, 3; fair, 2; poor, 0.

As in the case of the score card used in field work, this system enables the inspector to give each plant selling milk a definite rating and the existing conditions can be seen at a glance. Some fifty milk plants have already been scored with very gratifying results. As a rule the managers of the plants were very willing to have the inspector go through and make a thorough examination. In most cases they are also very willing to talk over the score and take any suggestions the inspector may have to give. In many instances, they have stated that they were going to make the improvements immediately and they invited the inspectors to call again when these improvements were made and give them another scoring.

Of course a great variety of conditions are met with in going through these milk plants. A few have the salesroom connected with the kitchen or living room, which is objectionable for the reason that in case of sickness in the family, any contagious disease might readily be transmitted to the customer buying milk. In a few cases, women with children in their arms came from the kitchen or some other part of the house into the salesroom to wait on customers.

How far should Boards of Health go in requiring dairymen to improve their conditions?

Just how far Boards of Health should go in requiring dairymen to improve their dairies when the greater part of the consuming public are not willing to pay better prices for better milk is a question worth considering. While the price is a drawback to the improvement, many dairymen selling their milk in our cities for 7 and 8 cents a quart are already receiving a good price and it is not too much to demand of them that they keep their cows clean, their stables whitewashed, their utensils clean, their milk houses clean, and that they cool their milk to a temperature of 55

degrees or below. I do not think it is too much for the Boards of Health to ask of the dairy farmer that his score reach 70 points on a scale of 100. In introducing this work into a city, it will probably be necessary to make the standard less than that at the start, possibly 40, and even then a large number of dairymen will be compelled to improve their conditions or go out of business.

The greatest need is for intelligent effort on the part of the dairy farmer to produce clean milk. As soon as the producer can be led to adopt right practices and take a pride in keeping his place in good condition, he is placed on the road to the production of clean milk. The only way to do this is through personal contact. Many dairymen have access to the literature telling them how, including dairy papers, farmers' bulletins and government reports, etc. Many dairymen have the example of their neighbors; many dairymen have the money; what they lack is the will, for "Where there is a will, there is a way." The score card is now convincing to most dairymen and shows them their best and weakest points, and is the best means we know of at the present time to reach the individual dairy farmer and to set him on the right track.

The use of the score card is effectual in grading dairies and indirectly in grading the milk.. THE STRONGEST INCENTIVE TOWARD THE PRODUCTION OF A BETTER GRADE OF MILK WILL COME WHEN THE DAIRYMAN IS PAID FOR HIS PRODUCT ACCORDING TO ITS VALUE. When this time comes, and it is fast coming, we shall see the dairymen striving to get into the class that receive the most for their milk, rather than the class whose product brings the lowest price.

One of the greatest drawbacks to the improvement of the milk supply of any town is gossip and talk and misrepresentation. Some farmers in one town were ready to believe that the big dealers were trusts because they paid more for their milk and got more for it. The farmers got the idea that the Board of Health was in the trust because they had some of the same

phrases in their code as the dealers. This, of course, was due to ignorance. Agricultural papers and dairy organizations should support the work and this would make it much easier.

The Meat Inspection Law passed by Congress helped the Boards of Health very materially to enforce other laws. In one city the Board of Health was given eight new inspectors without asking for them. Dairymen will be compelled to sell better milk in our cities in the near future. The customers demand it, the dealers in turn demand it, and the dairymen must produce it.

A temperature of 50 degrees or below is already being insisted upon in some places. Farmers say they will put up ice if they have to. The tuberculin test is coming and the tide is turning in its favor. Many farmers who objected to it at first are now the best friends of the movement. At least two cities are forcing the dairymen to have their cows tuberculin tested, and as a result tested cows are bringing high prices or cannot be purchased at any figure. About 400 cows have been tested in the vicinity of one city and 29 per cent proved to be tuberculous. The time is coming when all the cows must have a free bill of health, and the dairyman who sees to it that his cows are healthy will be in a position to meet the demand when it comes.

Clean Milk Should Command a Better Price.

Milk produced under clean conditions certainly ought to command a premium over that produced under dirty conditions. With the average consumer, however, milk is looked upon as a necessity to be bought as cheaply as possible. If he is asked to pay a higher price, he says immediately it is robbery. He gives no thought to the fact that the price of grain has been advancing during the past ten years, and that wages for farm laborers are not only higher but difficult to obtain. Still the price of milk remains just about the same. The consumer should know that it costs money to produce clean milk and that it means extra labor and extra care. Further, the dairyman cannot be expected to produce it without reasonable profit. The consumer demands that other food products be produced and handled in a cleanly manner, and if the price goes up for any cause he takes it as a

matter of course and willingly pays it. He should be willing to do the same for clean milk.

A Word to the Producers.

You producers should hold together and pull together in this matter now when public sentiment is with you, and when the price of foodstuffs and labor is high, and you have every reason to demand a fair price for a good article. But see to it that your product is clean and that it deserves the price you demand. It is not for your interest to allow the consumer to get the idea that this most valuable food product, Milk, is produced and handled under dirty conditions. I believe that every dairy should be subjected to sanitary inspection by the Board of Health, and I believe further that the inspection should be welcomed by every intelligent dairyman. A certification such as we are giving by the use of this score card, stating the condition governing Mr. A's or Mr. B's milk to be satisfactory, will have a tendency to be satisfactory, will have a tendency to increase the sales and inspire confidence. I believe that in the future it will be for the dairyman's interest to produce clean milk and that he will be rewarded for his efforts.

Educate the Consumer.

Poor flavored milk and short keeping quality is not altogether the fault of the dairyman. This is particularly the case where milk is not delivered in bottles and the customers put out various receptacles, of all degrees of cleanliness, to receive the milk. Many of these receptacles stand for hours with the dust of the street accumulating in them before the milk is delivered. After the milk is received, it is often set away with other foods without any protection where it readily absorbs any odors present. Even if delivered in good condition, too often it stands in the sun for hours and rapidly deteriorates. When milk is received, it is the duty of the customer to put it immediately into a cool place away from strong smelling foods. The milk bottles should be used by the customers for no other purpose than the storage of milk. It is also the duty of every person using bottled milk

to thoroughly clean the bottles before they are returned to the dealer. Further, all bottles should be returned promptly. The dealer provides the bottles and gives their free use and he has a right to expect the consumer to return them promptly and in good condition. Again, while the consumer has a right to expect milk that is clean and rich, when such milk is delivered to him, he should be willing to pay a fair price for it.

DISCUSSION.

Q:—Anything said about the richness?

A:—In considering milk and cream? Yes. We consider milk containing 4 per cent fat is perfect. We deduct one point for every 1-10 below that down to state standard. If it is not up to the state standard, it is not up to the legal milk. This is one of the questions asked. Who is going to say whether milk containing 4 per cent fat is any healthier or worth more money than $3\frac{1}{2}$ per cent fat. The chemist says it is, but it is for the human stomach to settle that question.

Q:—Is this work done by the national government?

A:—Yes sir. The idea is for the improvement of milk which can be introduced by city boards of health. We are trying it in Washington to see how it worked. Other cities have applied for the score card system. It is being used in two other cities, and the work is going along nicely. The score card helps the rating of the dairy.

Q:—Have you any score cards with you?

A:—Yes sir, I have a supply with me, and I am in hopes to be able to show it on the screen.

Q:—I would like to know whether this inspection shall be done by the city or state?

A:—I think the cities ought to look after the dairies supplying them with milk. I don't care how large a city or how small. One city in New York State has no milk coming into that city that is not produced from a dairy scoring at least 80 points, not a single dairy in that city under 80 points. That was started in a small city. Take the City of New York, it has 14 inspectors for 30,000 dairies. It seems a small number, and there ought to

be more inspectors. If 70 inspectors could be placed in the field to score and study the milk supply of New York City, to visit the dairies and make them clean up, or close up, then this could be covered. That would allow 500 dairies for each inspector.

He would have to work twenty days in the month. He would be able to cover 10 dairies a day, and he would visit every dairy under his charge once in two months. That is good inspection. It is not such a big thing after all if we only get after it. In Washington, have covered 350 out of 930 dairies.

Q:—Do you think a man can inspect 10 dairies a day?

A:—These dairies are in the city. It is possible to score 25 dairies in a day, but for an average he would not be able to score more than eight or ten. It depends a good deal on the condition. Most of the consumers of milk only think of securing milk as a necessity, and something that they must have, and something that is to be purchased as cheaply as possible. They never stop to think that during the last ten years the price of feed has gone up, labor for the dairy can hardly be found at all, and any labor that is satisfactory you have to pay high prices for. They don't stop to think that the price of milk is just about the same as ten years ago. In the case of other foods, if the price of butter goes up a little, or meat or eggs, that is all right. They pay it and say nothing, but you raise the price of milk a little and you hear the cry "Robber" right away. It is high time that the consumers were educated about milk and about different grades of milk he is buying. There is more need of education along that line than any other. Take the milk sold in our cities. The consumers put out all kinds of dishes for that milk, and it stands in the street for hours, and that milk is finally delivered and taken into the houses and perhaps it is set away with strong smelling foods, or in a place that is not cool, and then in a few hours it is sour, and it is all the fault of the dairy. I think the consumer has a lot of responsibility here and should take better care of it. Wash the bottles thoroughly and return them to the dealer who gave them to you free of charge, and take a little more interest in it yourselves.

Q:—What is the price they get in Washington for this milk, the commercial milk?

A:—The average is eight cents a quart. Some is sold for ten cents specially selected milk.

Q:—Does it test 4 per cent?

A:—Hardly four per cent.

Q:—What is the bacteria count?

A:—Something like New York. 39 million in some places. An inspector brought in ten samples of milk picked up at random, and nine out of ten had quite a quantity of foreign matter in the bottom, you could see it, hay, manure, bedding, etc. We filtered that through a small bunch of cotton and looked at it through the glass, and you would wonder that you could ever use such milk on your tables, and yet we are doing it every day. If that was shown up in the water, we would not drink it, but in milk it goes.

Q:—What do farmers get for their milk at wholesale, this eight cent quality?

A:—Four cents a quart. I think the farmer is getting all that kind of milk is worth. That is my opinion. He has no kick coming on the price. We want to get our milk and butter and cheese, and get it labeled in such a way that the consumer will know what he is buying. If milk contains millions of bacteria, dairies that score low, that is low-class milk. It is not worth a high price, but if a dairy is scoring 75 or 80, and taking special pains to make clean milk, advertise him and let the consumer know what he is doing. I believe we ought to encourage the good ones and discourage the bad ones. We never hear about our good dairies. Yet your neighbor who is making no effort to make clean milk, insanitary, low per cent of fat, in the same market gets the same price, is not much encouragement for improvement when things are that way. The score card is going to work out and improve the conditions of things I believe.

Q:—The poor dairyman is injuring the public taste for milk?

A:—He is. One poor dairy will go a long ways if the consumer hears of it. I tell you dairymen, you cannot afford to

have the consumer get the idea that your milk is produced under insanitary conditions. They are not slow to discriminate when they know what the conditions are at the dairies. When we published the dairies in New Jersey—and every dairy that sells milk to Mount Clare was rated on this score card method, and the bacteria count was taken and published—if the conditions were filthy the consumers knew it. The cards are gathered at the end of each month. Milk test, so and so, the fat $4\frac{1}{2}$ per cent, condition at the dairy excellent, and so on. And No. 2 milk runs up to 300,000 bacteria, and so on up. The boards of health showed their average for the year, and there was a difference between 9,000 bacteria for the best dairy, and to 340,000 for the poorest. Up to 10,000 to 15,000 to the c. c., ten cents a quart for the milk and a great demand for it. Why? Because the consumer knows the conditions.

Q:—Do they send score cards to the dairies?

A:—Send out inspectors in Washington to every dairy, and he gives the dairyman a score and explains why he cuts them on certain things.

Q:—You haven't said a word about pasteurizing or sterilizing milk on that?

A:—Well, the ideal milk is clean milk that has not been renovated or changed. But there are conditions where, perhaps, pasteurizing is the better of the two evils. In New York City at the present time, the dairymen supplying milk to that city are not in the sanitary conditions they should be, and the milk, as it comes into the city, contains a very high bacteria count, and would not keep more than 24 hours. What are you going to do? If you do not pasteurize that milk, by the time it reaches the consumer it is going to be sour. There may be a condition where pasteurization is better than no pasteurization.

Q:—You mean to say that if you have a dairy that will score from 75 to 90 that it is better without pasteurization?

A:—Oh yes. Seventy or above produces milk that will keep three or four days or a week. We have only just begun to study out this question. At the National Dairy Show in Chicago there were 45 exhibitors from all over the country.

Medals were given for the best milk. In rating that milk they counted for flavor, chemical qualities, keeping qualities and general appearance. They found bacteria all the way from none at all to twenty-one million. How long did that milk keep? Some was shipped over a thousand miles from points in Massachusetts and Kansas. It was not scored until it was three days old and it was sweet as a nut, and some kept for five weeks. That is the whole trouble with our milk supply. It is not clean. If we had clean milk there would be no trouble.

Q:—Any butter fat and it kept for five weeks?

A:—Yes, indeed. Regular market milk. The percent of fat ranged from 2.8 up to 7 per cent. The milk was supposed to be average product sent to the market.

I have 75 slides that I cannot show you, as they tell me the lamp will not work. I thank you for your attention.

By the President:—Will you favor us with a song Mr. Lumbard.

Song. Encored.

By the President:—We have here another representative on the city milk supply, Mr. Truman of the University of Illinois.

FIELD WORK IN CITY MILK SUPPLY.

By J. M. Truman, University of Illinois.

Mr. President:

Fortunately for me the hour is late. The lecture I had to give was to have been illustrated, but we have an excellent excuse for making my talk short, and a cause of thankfulness to you.

I am glad to say a word about this question. I am one of those who believe that we are not doing all this work on our farms and with our cows, and selling milk, simply to get money. I hope we do these things for the friends we have and for the loved ones we have. You would not milk cows or do anything

else if you were the only man on earth, or no friends with the great crowds around you paying no attention to you. We work for the people we love, for the children we have. It is for the little ones I have a word tonight. If there is anything we can charge up against the dairymen of this country, there is none gives us more regret, than the death of thousands of babies in this country every year because we make dirty milk. It is true. I wish it were not. I know personally of case after case of babies that have died simply because they could not get clean wholesome milk to use. I heard a paper in Chicago a few months ago that said that the number of babies that died in the United States every year, directly attributable to impure milk, was at least 50,000. That sounds large, and probably is overstated. I hope it is. Even saying and admitting that it is an over-statement, the fact remains that a great many children have a great deal of trouble getting started in life, because they are unable to get good milk. Within two months, I have had, in the little towns at the University, at least a dozen come to me and say, "Won't you give us milk from the University dairy? Our baby is sick, we must have good milk, and we can't get good milk in these towns." I am telling secrets, but that is the statement made to me over and over again. One man came to me and said his baby was sick, that it was three months old and that they had not been able to find anything to agree with it. I told him our route was full and I could not turn our customers away and could not let him have any milk. A day or so later the mother came to me with tears in her eyes and said, "I am afraid my baby is going to die. Nothing will agree with it." I told her I would send the wagon around tomorrow. Whenever a case is as bad as that, we attend to it. That baby hasn't been sick since. It was four months old when the milk was sent and within eight hours the change was noticeable, and within two days the baby was a different child and commenced to fill out. Before, it was thin and the skin laid loose on the body and limbs. The baby will laugh at you now while before it was a lifeless little thing. You may rest assured that mother

praises the university milk. We scored the dairy the other day. It scored 80 or 85, fair grade of milk. We call it a good average, but it was clean enough to save that baby's life.

I have done a good deal of work in Illinois and investigated the dairy conditions in your towns. Have written to all the towns but three in Illinois of over 10,000. I haven't done any work here, but have at Mattoon, Cairo, etc. I have studied the milk conditions, and tell you tonight, that all the impurities that apply to Washington, applies to Illinois too.

In talking of this matter of good, pure, clean milk, I don't want you to think it is only a question for the man who sells milk in the city. I told this Association last year, at Effingham, a man in Cleveland, I was doing this work, said to me just before that convention, "I can buy good meat, preserves very best and cheapest, but I cannot guarantee good cream and butter to my patrons at my restaurant, or good cheese. I cannot buy it anywhere in this country so it will be always good. Some of the cream is not fit to put in the coffee. Frequently I buy butter, the best in the market and it is off flavor, and my customers complain." He said, "I never buy two cheese and have them taste the same. Why is it?" It is not because the man who makes the cheese, doesn't know his business, or the man who separates the cream, but because the milk has so much dirt in it and so many impurities from the farm that it is almost impossible to make a uniform product. And don't think because you don't sell your milk to the city that it does not affect you, for it applies to the whole country.

I don't want you to go away and think we do nothing but scold. Mr Lane and I have some pictures that we wanted to show you from New York, Ohio and Illinois of some of the most beautiful dairies, cows and sanitary plants that a man could wish to look upon. We are not all dirty, and we are not very far behind the times. We are in a process of evolution and do not want to get behind. We want to keep moving right along. Get a few things better each year. Get your stable clean, that will be a new step in the right direction. Next year it would be a good thing

to brush that cow off and wash off her udder and get rid of this sediment. Do it this way, point after point, and in a few years, and I hope it will not be longer, we shall be proud of the milk we furnish the people of this country to drink, or to be made into butter and cheese. We can do it, and we are bound to do it. It will pay also.

I heard an eastern man say, not a month ago, from one of the best shipping estates in New England, that we will have to do these things, and make these improvements, but the people had not come to the point where they understood what it cost to do it. We must educate the people as to the value of these products and as to what it costs to produce them. And also you demand of the dairyman that he give you a firm product, and that you have the honesty to pay what it costs to make that. It will be done and in not very many years from now.

I am grateful to you for staying so long.

By the President:—It has been a very profitable evening without the views.

Tomorrow morning we meet in Exhibit Hall. Professors Lane and Truman will give practical experiments. You will see by the program we have a very interesting morning session, so be early.

Tomorrow afternoon we shall meet at the Opera House, but tomorrow morning our session will be in Exhibit Hall.

We will now adjourn until 10 o'clock A. M.

THURSDAY MORNING, JAN. 17, 1907

Exhibition Hall

By the President:—The meeting will please come to order. Mr. Lane and Mr. Truman will talk to us this morning on Milk and Cream, and give us practical experiments. Mr. Lane will speak first.

MILK AND CREAM.

By Mr. C. B. Lane, Washington, D. C.

With higher ideals of food products and a better knowledge of their composition has come more careful methods of judging them. The commercial value of milk and cream, for example, has until recently been rated by the city Boards of Health, and by the milk dealer, on the basis of the fats and solids they contained. If they reached a certain standard in respect to these qualities and contained no preservative, no questions were asked. Now we are beginning to go farther in this matter, and to consider the sanitary condition of these products, and standards are being established for bacteria, for foreign matter, for pus cells, temperature etc. In other words, cleanliness is considered a commercial quality. Naturally, the consumer should be the most interested in these standards for judging milk, but he is quite helpless in any attempt he may make to bring about improvements, as considerable time is required to make efficient tests, and simple appliances are lacking. In order to properly judge milk or cream, then we

must depend upon the laboratory to make such tests as cannot be applied by the senses.

The First Attempt to Judge Milk and Cream on the Basis of a Score Card.

For many years the National Creamery Buttermakers' Association, as well as State Dairy Associations here, called for exhibits of butter and cheese at their annual gatherings, and offered medals and diplomas for these products receiving the highest scores. It seems very proper therefore, that the milk producer should have an opportunity to exhibit his product and have it scored in a similar way.

The National Dairy Show, held at Chicago, in February, 1904, seemed to offer an excellent opportunity for such an exhibit, hence the Dairy Division of the Bureau of Animal Industry secured space and called for exhibits of milk and cream through the medium of the daily papers and by means of press bulletins. Much interest was exhibited in the contest from the start, and applications for entry came from many states, the most distant points being Massachusetts on the east, Maryland on the south and Kansas on the west. Thirteen states were represented in all and there were 45 exhibits.

Difficulties Proved Only Imaginary.

We had but little encouragement to attempt an exhibit of this character. It seemed to be the general opinion that it would be a difficult matter to bring together samples of milk from distant points and give them a test on any fair basis. Little difficulty, however, was experienced. The milk was all required to be produced and shipped on the same day, and as it was all iced, distance had but little effect upon the product. It was thought that an attempt to score milk and cream on a basis similar to that used for butter, and giving a certain number of points to flavor, composition and bacterial content, might present some difficulties, but the plan was carried out with most satisfactory results. In fact, much less difficulty was experienced by the judges in deciding upon the various points than was anticipated. The scoring was done upon the produce when three days old.

**DAIRY DIVISION SCORE CARD.
JUDGING MARKET MILK.**

Score for sample marked

NUMERICAL SCORE.

Perfect, 100.	Flavor, 40.	Chemical qualities, 25 points.	Keeping qualities, 25 points.	General condition and appearance of packed contents. 10 points.
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Score..... Initials of Judge.....

Date.....1907.

DESCRIPTIVE SCORE.

(Check as found below.)

Flavor.	Chemical qualities.	Keeping qualities.	General condition and appearance of package and contents.
Perfect.	Perfect	Perfect.	Perfect.
Bitter.	Per cent. fat.	Number of Bacteria.	Unattractive.
Garlic.	Per cent solids not fat.	Per cent acid.	Foreign matter.
Weedy.			Metal parts.
Silage.			
Cowy.			
Tainted.			

DAIRY DIVISION SCORE CARD.

JUDGING CREAM.

Score of sample marked.....

NUMERICAL SCORE.

Perfect, 100.	Flavor, 40 points.	Chemical qualities, 20 points.	Keeping qualities, 25 points.	General condition and appearance of package and contents, 15 points.
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Score.

Date....., 1907. Initials of Judge.....

DESCRIPTIVE SCORE.

(Check as found below.)

Flavor.	Chemical qualities.	Keeping qualities.	General condition and appearance of package and contents.
Perfect.	Perfect.	Perfect.	Perfect.
Bad odor.	Wide variation from guaranteed per cent. Fat.	Number of bacteria.	Frothy.
Bitter.	Solids not fats	Per cent acid.	Lumpy.
Weedy.	Total solids.		Foreign matter.
Garlic.			Unattractive.
Silage.			Metal parts.
Cowy.			
Tainted.			

Flavor is given the most points on the score cards for the reason that it is considered most important. Unpalatable milk or cream is practically of no value as an article of food; on the other hand if these products contain a low percentage of fat or an excessive number of bacteria and still have a good flavor they must be utilized and in fact a good deal of milk and cream of this character is used. Hence it is apparent that flavor is of first importance. This is also recognized in butter and cheese where flavor is often given 45 points out of 100. Natural milk possesses little taste or odor, if well supplied with fat it may be described as rich, pleasant with no undesirable after taste. Slight contamination can often be detected more readily by the sense of smell than by the taste. Heating the milk in a closed flask to a temperature of 90 or 100 degrees assists in bringing out foreign flavors and makes them more perceptible. 40 points should be given for perfect flavor and deductions made for off flavors according to the judgment of the party making the test.

Chemical Qualities.

This refers to its chemical composition from the standpoint of its commercial value and includes the per cent of fat and solids no fat. Fortunately these two things are quite easily determined. It is important the market milk shall be of good average composition, further than this the consumer is but little interested. In case of milk for butter and cheese, however, its value for the production of these products is of great importance. If milk for household purposes contains 4 per cent fat and 9 per cent solids not fat it seems fair to consider it perfect. While this standard is a little higher than the state standards for milk, it gives a little encouragement to the dairyman who is making an effort to produce milk containing 4 per cent fat or better. I would deduct one point for every one-tenth per cent below 4 per cent and if it fell below the state standard it would not be legal milk, hence not entitled to any score.

I might add here, however, that we have no scientific proof that milk containing 4 per cent fat is healthier or of more value from the food standpoint than milk containing 3.5 per cent of

fat. The chemist says it is but the human stomach should answer this question.

Keeping Quality.

By this we mean the length of time milk will remain in a palatable condition. The keeping quality is measured by the number and kind of bacteria present, and the acidity of the milk. The determination of these points is important if the actual commercial value of the milk is to be known. We will consider the keeping quality perfect when it does not contain over .2 per cent of acid. I would allow 5 points for acidity and deduct one point for every .01 per cent above .2.

I would allow as follows for the number of bacteria per c. c.

Less than 10,000	20 points
Over 10,000 and less than 25,000.....	19 points
Over 25,000 and less than 50,000	18 points
Over 50,000 and less than 75,000	17 points
Over 75,000 and less than 100,000	16 points

With the above plan, a good deal of encouragement is given to the dairyman making an effort to produce clean milk free from bacteria, and credit is given for his efforts as far as they go. While the number of bacteria in itself may not be of special importance in milk, but a large number present is a good indication of the sanitary condition under which the milk is handled.

General Condition and Appearance of Package and Contents.

The package containing milk should be clean, free from metal parts, and should have no visible foreign matter. If tin tops or other metal parts are permanently attached to the bottle they are difficult to clean and can hardly be considered sanitary. If foreign matter is found in the bottle, such as particles of manure, hair, bedding, etc., it is an indication that the milk is produced under dirty conditions. Deductions should, therefore, be made for poor packages and foreign matter in the milk according to conditions found.

Market cream is judged on a basis similar to that of market milk. With this product, however, under the head of Chemical Qualities, the percentage of fat only is considered.

A little higher per cent (.25) should be allowed for acidity in cream than in milk and in judging the appearances and general condition of the product such points as lumpy and frothy condition are taken into consideration.

The Educational Value of Milk and Cream Contests.

Such tests as these are of great value in pointing out to dairymen their defects in handling milk and showing possibilities in the production and keeping quality of clean milk. At the national Dairy Show in Chicago, held February, 1906, the results were most gratifying in showing the keeping qualities of sanitary milk. Some of the samples remained perfectly sweet after being shipped a thousand miles across the country, put in storage at a temperature of about 32 degrees F. for two weeks, and then reshipped a distance of 900 miles to Washington, D. C., where they were stored in an ordinary ice box for several weeks longer, some of the certified samples being still sweet after five weeks. A part of the box of cream entered in this contest was placed in cold storage in Chicago at a temperature of 33 degrees F. and remained sweet and palatable for a period of seven weeks.

Superiority of Certified Over Market Milk.

The so-called certified milk entered in this contest was quite superior to the market milk, the total scores averaging 94.8 and 89.7, respectively for the two classes. This result goes to show that certified milk is a superior article, and is actually worth more when we consider its better flavor and keeping qualities and freedom from objectionable bacteria, and, further, the fact that the richness of the milk is guaranteed. It is apparent that the producer of certified milk must be a thoroughly capable man. He must understand matters pertaining to the healthfulness of cows, the effect of disease or any inflammation or unusual condition of the cow upon the milk, also the composition and effect of the various feeding stuffs on the cows, the effect of overfeeding, and unusual disturbances which effect the quality or flow of the milk; he must have some knowledge of bacteria and know the importance of sterilizing utensils, which are one of the sources of bacterial contamination. He must appreciate

the fact that injudicious feeding of turnips, garlic, ragweed, and unsound silage will produce undesirable flavors in the milk, and must know how to guard against them. The work of the producer of certified milk is often too little appreciated by those who require such milk for the sick room, infants, etc. They should rejoice in the fact that by paying a little higher price than that charged for ordinary milk a product can be secured that is guaranteed to be rich, pure, clean, wholesome, and produced from healthy cows.

It may be said concerning the market milk exhibited at the National Dairy Show that a large percentage of the samples remained sweet for a week in the exhibit case, the temperature of which was about 50 degrees F. While these samples probably represent a very much higher quality of milk than that ordinarily supplied to our cities, it demonstrated that market milk will keep for several days if handled with reasonable care and held at a temperature below 50 degrees F.

While no definite percentage of fat was specified for market milk except that it should be above the government standard of 3.25 per cent, it is of interest to note the wide variations shown in the 23 samples exhibited, namely, 2.6 to 7.1, the average being 4.5. It is known that such wide variations are not uncommon in many of our cities.

It may be stated that these wide variations occur not only in the milk supplied by different dealers, but in the milk from the same dealer from day to day, particularly where the "dippage" system is practiced. These variations may be due to not properly mixing the milk from the different cows, or failing to mix the milk in the can before dipping it out. This results in dissatisfaction on the part of the consumers, for the reason that they do not want cream delivered to them one day and a product approaching skim milk the next. This question of uniformity is one of great importance to both producer and consumer.

Sanitary Methods More Important Than Breed of Cows.

The fact is also of interest that both the milk and cream which won the medals at the contest were produced from herds

that were largely of mixed breeding. This indicates that the sanitary conditions under which the milk is produced and the methods of handling it are of more importance than the fact that the animals are pure bred or that they are of some particular breed.

DISCUSSION.

I will answer any questions.

Q:—Was this milk at the show pasteurized or sterilized?

A:—No sir, none of it. A most careful and thorough test was made for preservatives and could not detect anything of the kind. This attracted a good deal of interest in New Hampshire, and it was my privilege to judge 24 samples, and I presume about half of it had more or less foreign matter, and the bacteria was from 10,000 up to several 100,000. A good many of these dairymen could not believe their milk was not clean, but we easily proved to them by taking their bottles to the windows and showing them. This foreign matter only cuts off a few points.

Q:—Don't you consider it a hard matter to keep fine dust out of milk?

A:—Oh yes. Milking must be done in a cleanly manner. Of course it is possible to filter it out, through sterilized cotton. A good many bacteria get in even then. If dust is in there, better to strain it out. It is not attractive and does not improve the looks of the package. The consumer does not like to see it there.

Q:—Can the test be made by dairymen and find the bacteria?

A:—Yes sir.

Q:—By home dairymen?

A:—Not very well. The test for bacteria has to be done in a laboratory under good conditions. He can find out if his milk is clean by looking at the bottom of the bottle, and keeping his cows clean, and keeping the manure out of the stables. He can test his cows with the Babcock test. When it comes to bacteria it requires time and experience to carry through these tests. I wanted to bring some tests with me which I arranged

for this convention, but there proved to be so many bacteria in the gelatine that I could not bring them.

Q:—In regard to the formaldehyde in milk. Does it make any difference to the milk the amount of preservative?

A:—Well, preservatives of any kind are not allowed in milk by our city ordinances or by our pure food laws.

Q:—Have they got good grounds for that?

A:—I think they have. Dr. Wiley made some careful experiments on the use of salicylic acid, and from the results he got, I think he was able to make the declaration that they were injurious, particularly from the standpoint of digestion and derangement of the digestive system. We do not want any preservative in our milk. Make it clean and you will not need any artificial preservative in the milk.

I thank you for your attention.

MILK TESTING.

By Prof. J. M. Truman, Urbana, Ill.

Mr. President, Ladies and Gentlemen:—It seems when we come to the question of testing milk, that it is an old story. I think you must all know how to test milk. If you do not, you ought to. In this stage of dairy work it seems if every man is interested, he ought to know how to use a Babcock test.

We have some samples brought in here this morning, and all that it seems necessary for me to do would be to go ahead and test the samples, and you can see how the test is operated. As to any speech I might make on testing, you have heard it over and over again.

A man must test his cows to know what they are doing. A city has no right to allow any man to sell milk without inspection. That is not because the dairymen are dishonest in selling milk below standard, but because there are a great many men engaged in the business who do not know all about what takes place in milk, and do not know when they take some cream off

in the morning for their coffee and then sell the milk, they are breaking the state law. It is not only that milk shall have three per cent butterfat, but solids as it comes from the cow. If you skim off one per cent, you are breaking the law and liable to arrest and fine, as if you sold it below three per cent. It must be sold without anything taken from it, or added to it. Therefore when it comes to city work, it is necessary to have inspection for two reasons.

The first reason, perhaps, is that the men who are inclined to be dishonest should be cautioned and made to keep the law. Second, and a very important reason, the men who are selling the good milk and doing their best to keep the law, should have that indorsement of their work that comes from inspection. For instance if a dozen milkmen, and half are doing the very best they can to furnish good milk and cream, milk up to the standard in every way, and being undersold by some other men who are watering the milk, then the city should know about that, and the consumer should know about it, and the most effectual method of doing away with dishonest practice is for the city to test the milk of each man and publish the result, exactly what the test was from each dairy, and you would find those men very quickly come to time.

One case where a man was running three retail wagons, and the health officer took samples of the milk, and found formaldehyde. He sent an inspector to the factory one or two days and finally located a gallon bottle of formaldehyde. He published the result in the paper and in less than one week that man hadn't a customer left; absolutely had to quit the business. He had three retail wagons and all he could do was to sell wholesale to another dealer. That was the verdict of the people on that kind of work. That was severe, but he was an old offender and knew better. Publicity will work wonders in any district.

Illustrates Milk Testing.

The question comes to every farmer, whether he shall do this work or send it to the Experiment Station. We cannot test all the milk. It is not an expensive operation. This outfit.

including case costs about Ten Dollars. This simple test with only two bottles can be bought for Three or Four Dollars the whole outfit. Five Dollars will buy a complete outfit. You should test once a month through lactation period, four milkings, this morning, tonight, tomorrow morning and tomorrow night will give a fair average for the month. An hour's work, or two hours' work once a month will give a man a good idea of the comparative value of the cows in his herd, and any one can do it down to the fourteen year old. You can learn in two or three hours.

There is a course beginning the 20th of this month a two weeks dairy school course which ought to have a thousand boys from this state learning to test milk for the dairy farm, and go back from the university and do this work on the farms.

I will go ahead with this testing.

DISCUSSION.

Q:—What temperature for accurate testing?

A:—Anywhere between 55 and 70. If too cool, you do not get action enough on the acid and will get a white curd that has not been cut up by the milk. If too hot the acid will act too strong and will have burnt sugar and not able to read it. It should be somewhere near 60 to 70. It is rather cool this morning, and I will have to use a little more acid.

Q:—Very frequently I have a cloudy spot in the neck. And then it will be clear and the lines will cut. Is that foreign matter in there?

A:—No I think it has been a question of how the acid has been added and the strength and temperature of the milk. If a little variation and then sometimes things happen and you cannot tell why it is. As far as I know the samples have all been treated alike, and as you say, some have cloudy matter in them and we do not know the reason why. If it is anything enough to interfere with the test I can tell why it is. If enough cloudy material I can generally see it is because the milk or acid is too cool. Very frequently in doing that work a man is in a hurry

and will not get enough acid and it will make a difference. The white color comes from too low action of the acid.

Q:—In using steam tester won't that make a difference?

A:—You are liable to get it too hot. The steam that is running the tester getting into the chamber where the bottles are and are liable to get burnt fat, more liable than with a hand tester. But still never have any trouble with the new machines if properly made. It is not so particular about the amount of acid but the amount of milk. I can tell when that goes into the milk by the color it turns it. A little greenish tinge under that milk and that is the true color, the proper color of the acid in the milk as it comes together. As we stir that up we have the action giving the darker color and we find that this gets hot. It ought to be a little more dark (referring to test) but I think we will get a pretty fair test. It is rather cool in here to use this kind of a tester.

I am going to put a drop of formaldehyde in the next sample. I am going to put a drop of formaldehyde test, I will put a drop in. These preservatives, iceline, milk sweet, etc., formaldehyde is the basis of nearly all these preservatives.

The agent says you can use this preservative and that it can't be found, and it makes the milk keep sweet and it is all the better for the people. That is how the agent talks the dairyman into using it very often.

You see the color? No reason why your judgment should not tell you whether there is formaldehyde in it or not. When you put in the acid you see it gets a deeper purple ring. Buying milk from anyone you can make the test in a minute and know whether there is any preservative in it or not. That test will show one part formaldehyde to 500,000 of milk. No dairyman can put it in such small quantities so you cannot detect it.

Q:—Will ordinary sulphuric acid do that?

A:— You must have a little iron sulphate in the acid.

Q: There wouldn't be that much in the milk?

A:—No not as much as I have here. This is strong, of course. You buy four per cent solution and I think it is the same strength. I mix water with mine.

Last Summer I went to a town of 30,000, and bought 24 samples of milk in two hours, and out of that number 7 had formaldehyde and 15 were adulterated with water or skim milk, and about 18 of that 24 had dirt in the bottom of the bottle, and it wasn't Joliet or Galesburg either. ..

Q:—When skim milk is added it is adulterated below standard?

A:—Yes sir, when added at all.

Q:—If above three per cent?

A:—In the law it is considered just as much as if below. By the adding of skim milk you destroy the natural proportion. When you have milk from the cow you have solids in about the same proportion to the total fat. If you add skim milk you increase the solids not fat in proportion to the amount of fat in it. If a cow gives 5 percent fat she is high fat as well as in solids. If you add skim milk you are destroying the percent.

Q:—Take milk reduced to 3 per cent. If reduced by skimming or by water can you tell which it is?

A:—Yes sir, without any trouble at all. I intended to have shown you. You can't tell by the butterfat test or the lactometer, but with them both you can. We have tried that. You take a sample and drop in the lactometer in the milk and it will go too deep in it and we know it has been watered, because the water makes the milk lighter. A pint of milk weighs 1.032 pounds, while a pint of water weighs a straight pound. We took another sample and the next fellow's lactometer didn't drop far enough in, the milk was too heavy. That was skimmed because the fat was taken out and milk was still heavier. It didn't take the dairymen long to find that out. Another was skimmed and watered and the dairyman didn't know any more about it because he had done both to it. But when the lactometer is put in and it floats at the right place, then I know one of two things: Either it will test between 3 and 5 per cent of butterfat, or it has been skimmed and watered, and we have decided that.

Q:—The temperature makes some difference?

A:—Every lactometer has a thermometer and if for 60

per cent it shows 65 then I must make the correction. I know for every degree that milk warms up it is .1 degree lighter and must make the difference for temperature.

(Illustrates with milk samples.)

We have destroyed the solids not fat. By whirling it the fat being the lightest drives the solids to the bottom of the fat. The whirling is to separate the fat. We must add water to bring it up into the neck of the bottle where we can read it. 3.8 on the first one.

Q:—What sample is that?

A:—No. 2 Sprague.

1st:—3.8 Sprague No. 2.

2nd:—3.6 Sprague No. 1.

4th:—4.2 Sprague No. 3.

3rd:—4.3 Sprague No. 4.

Prof. Lee has class in butter judging.

THURSDAY AFTERNOON, JANUARY 17, 1907

AT OPERA HOUSE, IN JOINT SESSION WITH WILL COUNTY
FARMERS' INSTITUTE.

Meeting opened by Superintendent of Will County Farmers' Institute as Mr. Wiggins, president of the Illinois State Dairymen's Association was detained.

I want you to go to the Universalist Auditorium this evening if you possibly can and you will be well repaid for going. We will now listen to a reading by Rev. Beddoes of Plainfield.

Reading: Rev. Beddoes. Encored.

By the President:—I have an unexpected treat for you this afternoon. The old gentleman I spoke to you about is here and will sing for us.

Song: Mr. Jules Lumbard.

From the audience: "Sing Maggie." Encore.

By the President:—I have an alteration to make in the

Committee on Resolutions. I will put Mr. J. McDonald Smith on that committee in place of Mr. Joseph Newman as he is not here yet.

For the nominating committee I will appoint Mr. John Coolidge of Galesburg; Mr. Mason of Elgin and Mr. George Knoblock of Marion.

Prof. Davenport will speak to us on the breeding problem but first I want to call upon one who is here this afternoon who is one of the foremost men in this state on live stock. He has done much for the Live Stock Shows, State Fairs and Institutes. I refer to Col. Mills of Springfield and I will ask him to give us a few remarks.

REMARKS.

By Col. Mills, Springfield, Ill.

Mr. President, Ladies and Gentlemen:—This is rather unexpected to be called upon this afternoon.

Our worthy president desires more than anything else that attention should be called to the rapid advancing of the dairy interests of this state. During the past year it has been my privilege to act as a member of the Dairy Advisory Committee, and in that connection I have been brought into intimate and close relation with your president. I may say if you have any substantial results in the development of the dairy interests in this state, it is very largely owing to the active interest and practical business methods of President Wiggins which he has put forth to advance your interests. You all know he has been a practical dairyman from, I might say, his boyhood. He has one of the best equipped plants for the production of high class milk that we have in the state, one of the very best. His mind is constantly on the alert to advance the dairyman's interests of this state and the nation in general, and especially in connection with his official duties. This will be a matter of great surprise to him, because it was the last thing he would expect me to say here on this occasion. I want to congratulate the dairymen

of Illinois upon the practical work and upon your patriotic man that your executive officer has been the past year. The dairy interests have gone forward in leaps and bounds since he took his seat, not only in your dairy association, but at the Station at Champaign. We hope the work will be a continued success for the promotion of your interests. It is a movement that interests you all, and at this time and in this connection I want to call attention to a short dairy course at the University, commencing on January 21st and continuing over until February 2nd. It is proposed to give two hours a day to the testing of milk, ten lectures on good and poor cows, and a lot of other instruction that will be very valuable. In order to be successful in your calling, the first thing necessary is to have profitable cows, and how to handle them to the best advantage. It is not expected that many of you here that are actively engaged in the conduct of dairy herds can go there but there is not a single neighborhood that you can't find some active young man that would be very glad to go down there and take the course of instruction, and then come home and give all the people in his neighborhood the benefit of that treatment. Let all the young men who would go and take that course think of this. After they had passed a satisfactory examination they should be given a diploma by the University, in testing cows. It is one of the important matters, and you can consider that. Every one of you should gather together and say, "Where is the best boy to send down there?" Pay for his expenses, it will not be more than Ten or Twelve Dollars for you, but when he returns he will be worth thousands of dollars to you for the information he will gather there.

Professor Fraser has some of the programs of this short course and if you will ask him he will give you one of the programs and will give you any information that he possibly can.

Before I take my seat, I want to tell you how pleased I am to be here. It was my honor and my privilege to order the Will County Institute in the early days of Institutes in this state, and I well remember the stormy day we had and the crowd we had in the Court House and we held it in fear and trembling, but one and another of the intelligent farmers and their wives

came in until that room was full, and until every bit of standing room was full. Some of you were probably there. It was during the time when this institute work was under the control of the Board of Agriculture of the State. When we think of those times and see the results that came from that, it was the wisest move you had undertaken. Continue in this good work and make Will County the banner Institute of the State in the future that it has been in the past.

By the President:—I have received a telegram. We had on the program for last night Governor Deneen, and this telegram says: "I regret very much I cannot attend meeting of Dairymen's Association. I am to meet with the State Board of Charities and Superintendents of Institutions here today to consider estimates for appropriations. Under other circumstances I should be pleased to attend the meeting.

Charles S. Deneen."

He is such a hard working man it is hard for him to get away.

By the President:—The next on our program is an address by Prof. Davenport, Dean of the University of Illinois, on "The Breeding Problem." He needs no introduction, we are all his scholars and we will give him our hearty support.

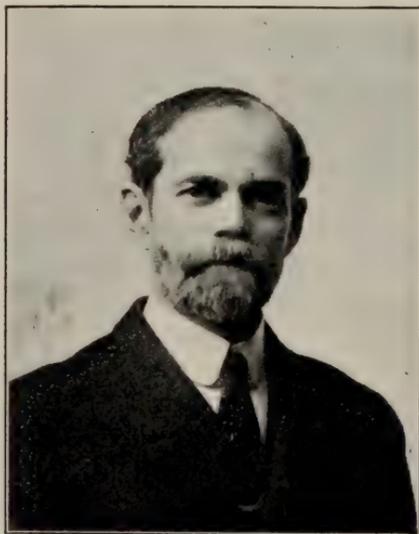
THE BREEDING PROBLEM.

By Prof. E. Davenport, Urbana, Illinois.

There are two general systems of breeding open to the farmer. One is expensive, the other is cheap, and both are effective.

The one system provides high bred parents on both sides, the other only on the side of the sire. The practical advantages for the purposes of the milk producer are all with the latter system. It costs only about ten per cent as much and if *followed up for half a dozen generations*, it is over 9 per cent as effective.

A calf may be provided with a pure bred sire with a long ancestry back of him for an extra outlay of from two to four dollars, depending upon the number of cows in the herd and the grade of sire in service. In practice it need not rise above the lower figure, for a good sire ought to get 40 calves a year for at



PROF. E. DAVENPORT,
Dean of College of Agriculture,
University of Illinois.

least five years, half of which will be heifers, fully accounting for an extra outlay of \$200.00 on the sire.

If however, we undertake to provide the calf also with a pure-bred dam, the cost will be greatly increased. The dam will cost anywhere from \$100.00 to \$200.00 more than a native cow. She will do well if she produces four good heifers in her lifetime. This will put from \$25.00 to \$50.00 extra on the calf because of its pure-bred dam. It is no reproach to pure breeding to say that she isn't worth it from the *milk production* standpoint.

Let us see, however, what is involved in the two dollar

investment on account of a sire. First of all, this is two dollars, not in a *calf* but in a *cow*. What does it mean?

It is said that the sire is half the herd. He is more than that. For practical purposes he may be the whole of it. The rapidity with which the blood of the sire will "pile up" if the same line is persistently followed is shown in the following table:

The Rate at Which the Blood of the Sire Accumulates in Grading.

Generation.	Blood.	Per cent Improved.	Per cent Improved.
1	$\frac{1}{2}$	50.00	50.00
2	$\frac{1}{4}$	75.00	25.00
3	$\frac{3}{8}$	87.50	12.50
4	15-16	93.75	6.25
5	31-32	96.87	3.12
6	63-64	98.43	1.56

From this we see that after six generations of infusion of the blood of the sire less than two per cent of the original blood of the dam will remain, *whatever* it was. In this way, for example, a *practically* pure bred Jersey or Holstein-Friesian herd can be built up in six generations from *any* foundation whether mixed blood, or pure bred. Indeed in this way one breed can be changed into another within the space of time indicated provided only the system be persistently followed. In this way the farmer receives quickly and in the form of one animal, the practical benefits of many generations of the most expensive experience of the most skilled breeders.

In actual practice the dairyman can do better than this for he can make the dam help the sire at every step far more than her simple blood lines would indicate. For business and commercial reasons he should test his individual cows, and if he will do this, eliminating the poorest he will, so far as milk production alone is concerned secure all the advantages of pure bred animals in much less than six generations.

But, the fatal fact is that most men either lack the business foresight to do this thing persistently or else they are ignorant of the consequences of breeding to a part bred sire. They

are almost certain sooner or later, to abandon the pure bred sire and use one of the grades because "he looks all right."

The moment this is done, all progress through the sire stops, and no further improvement is possible except through the slow process of selection which is the same a breed improvement. That is, the farmer has stopped half way in securing what has been accomplished by others and goes at it single handed and alone with a half improved stock, for half bloods can never give rise to anything but half bloods, and the progeny of three-quarter bloods can never be better than three-quarters; they may be less, but they cannot be more.

By the law of ancestral heredity the offspring inherits from all its ancestry. Now there are 126 of them within the six generations under discussion, and over 2,000 of them within ten generations. It is pretty well-known now, that the progeny inherits from these ancestors on the average in pretty definite proportions, depending upon their relative nearness; that is to say, it gets one-half its hereditary influence from its immediate parents, one fourth from its four grand-parents, one-eighth from its eight great-grand parents, and so on backwards in a decreasing series whose ratio is one-half.

By this we see that if the immediate parents only are good then the chances are only about one to two that the progeny will be their equal. But if the two parents and all four grand-parents are of the same high excellence then the chances are raised to 75 per cent, whatever the ancestry back of this point. But again, if we go one step further and have the advantage of another generation (16 great-grandparents) of selected ancestry, now the chances arise to 87.5 out of 100; and this fraction will increase with a selected ancestry till it will in time rise to 100 per cent or absolute purity.

This law is the friend of the farmer as long as he persists in using the best sires, and it is the one that proves his undoing when the sire is changed for a part bred animal, no matter how well bred he "looks."

The best cow census the Station has been able to take, indicates, as Prof. Fraser has shown, that approximately one-fourth

of the cows of Illinois do not pay for their board, and that another fourth ought to be replaced with better cows as rapidly as possible.

I am not surprised that this is so, because for many years it has been a favorite practice among dairymen to buy the best cows they could pick out—milk them one season and send them to the butcher. From the breeding standpoint, this has the same effect as if every dairyman carried a gun, and when he saw a good cow should shoot her on the spot. There has been so much of this, that the wonder is, that any good cows are left. It takes four years to raise a good cow and only one to close her out by this method. It would need an enormous territory devoted to breeding cows to keep up with this slaughter and such a territory does not exist. It is no wonder, therefore, that good cows have been getting more and more scarce and higher in price.

This having come about, many dairymen, it is true, now keep the really good cows more than one year, not with a view of securing progeny, but of prolonging the service of the cow as long as possible. They breed them, therefore, not to a good sire, but to a scrub—"Anything to make the milk come, as the phrase goes." This does prolong the life of the cow, but the effect, so far as the progeny is concerned, is no different than if she had been shot as soon as her excellence had been discovered. In either case—as soon as she gets into the hands of a commercial dairyman of this kind her chances of leaving good progeny are over.

Now this is breeding backwards. What would have been the speed record today if trotting horses had been bred in such a way that the best performers left little or no progeny? Fortunately many dairymen are beginning to see the point and to keep good sires. Their number should increase. What I have said about "grading up" applies to these progressive individuals, and to them I want to enter a word of protest against the unnecessary slaughter of young bulls. The common practice is to buy a young bull and after keeping him a year or two, sell him to the butcher. The excuse is, that he "got ugly" or that we "must avoid inbreeding." I want to protest at these points when discussing practical breeding for dairymen.

In the first place, all bulls are ugly. They are morose and dangerous by nature. The really sweet tempered bulls are just where Custer's good Indians were— all dead. Whoever has occasion to keep a bull should know that he is a dangerous animal at any age, and he shouldn't be sold simply because he gives evidence that the milk of human kindness has soured in his stomach.

Then as to inbreeding: If our farmers were half as careful to avoid other mistakes in breeding as they are those of inbreeding, we should make progress faster. I am not ignorant of the fact that disaster may follow inbreeding among animals already closely bred for many generations. It does not necessarily follow, however, and in practice all good breeding is, and must be, the result of close breeding. Not only that—there is no authentic case on record of untoward results from inbreeding among half bloods, three-quarter bloods, or even much higher grades. I do not say that it could not happen, but I do say that the chances of disaster are extremely remote and in practice can be safely disregarded.

The best advice that can be given in the light of the most recent knowledge, is that the bull, even for grading purposes, should be a good individual, and then he may be safely retained as long as he will do good service. It involves, of course, his breeding upon his own offspring, but this in grading is as safe as any breeding proposition ever can be. It is well, of course, in selecting the next sire, to buy one of slightly different family blood lines and then the dairyman may rest easy in his mind.

I know what is said and what is firmly rooted in the minds of all people, about the matter of incestuous breeding, as it is called, but we are not to confuse the sociological question of human relations with the purely physiological one that concerns us here. The question of morals does not enter into our problem, and out in nature, the head of the herd is head as long as he can maintain his supremacy.

I hope these matters will receive consideration, and that the present useless slaughter of young bulls will speedily cease.

We cannot stand so much wholesale killing of the best in this business except to the lasting hurt of the industry.

There are three weak spots in the dairy industry today and one of them, is the inefficient cow. It costs too much to make milk. We must have better cows so that a larger proportion of our corn meal and oil meal, of our clover and alfalfa shall go with the milk can and a smaller share into the dung heap.

If we are to have better cows we must breed them, and we must do it ourselves; by well known methods which have succeeded everywhere. When I say these things to dairymen, I am met by the objection that it costs too much to raise a cow: that dairymen cannot afford the milk to start the calf. I suppose the same objection will be raised here and now. If so, I will say that the dairymen will soon be forced into rational breeding or he will do worse.

A cow is a component part of a dairy plant, just as much as are barns and shipping stations, and the production of her successor is a "fixed charge" upon the business just as taxes and insurance, and the business of economic milk production will never be on an established basis until a supply of cows of high efficiency is assured.

It is not enough that Jones and Smith are able by peculiar shrewdness to get all the good cows and thereby thrive partly at the expense of Thompson and partly at the expense of the consumer but it is that we need to inaugurate practices that will establish the dairy business as a whole upon a sane and safe basis so far, at least, as fundamentals are concerned.

There is a persistent call amounting almost to a demand upon the Station for more field work; for more personal advice; and this is good. But what dairymen need most to do now is to avail themselves of what is perfectly well known, and not to be told some new thing. There is no royal road or short cut around the situation and we cannot much longer stave off the responsibility of raising cows. The average dairyman is interested at once in all questions of feeding but he turns the subject when the matter of breeding is raised. He is putting large amounts of costly feed into exceedingly poor machines and he

must improve this machine and establish a reliable source of efficient cows or go out of business. We should campaign the state for the rational breeding of the most effective machine in existence for the production of human food—the efficient dairy cow.

I truly wish that this Association would get behind the proportion and justify its existence by hastening the final and speedy departure of the inefficient cow.

We may say we have here a fine looking Shorthorn steer or cow, and there in the field are his 2000 ancestors. What would they look like? Some red, white, brindle, some roan, all the breeders favors from all time. Supposing the parents were both red cattle. There are no red in the ancestry back of them, but they are red themselves. What are the chances that the calves will be red? Fifty out of every hundred. You ought to come out right about half the time. An excellent good looking sire here and a good cow and breed them together. Keep one animal always in service and the thing takes care of itself, and have that one good.

DISCUSSION.

Q:—Do you mean, Professor, that you maintain the vitality of the herd by that method?

A:—Yes sir, it has been done over and over again. We are talking of the lifetime of a single individual.

The offspring is often not like the parent. It is the same in humans. You go back to the country you have left since boyhood, and you often mistake little children for their fathers and mothers who went to school to you, over and over again, so close is the resemblance, and again, you would never suspect there was any blood between the two. It is how much father and how much mother ancestry. I will give you the law of ancestry of heredity that gives one the proportion which we inherit from the parents and grandparents and so on back. We have a few ancestors. Go back one generation, four, another, eight, another, sixteen, and so on back to 200 ancestors within ten generations. There would be some good and some not. I wouldn't want

all mine here for you to look at. I happen to know that my grandmother was a Dutch woman and probably some of the Custers individuals there too.

Q:—Wouldn't it be a good deal safer where a community of dairymen are raising same breeds of stock to exchange their sires before their calves are old enough for breeding?

A:—I suppose so. I might say I am going to Champaign and it would be safer to walk, but the chances of being killed on the way and the advantages of going on the train—I don't think that's fair.

Q:—You are not giving a fair deal.

A:—I am talking about breeding. I am talking of the business of breeding. By the use of the sire, not the dam.

Q:—If you breed a sire two or three times you will destroy just as sure.

A:—How do you know?

Q:—Have done that same thing and lost.

A:—How many?

Q:—All but one and tried seven or eight times.

A:—I would like to have the record.

Q:—You get the record of that man's Shorthorns.

A:—I am talking about breeding.

Q:—The principle would be the same.

A:—No sir.

Q:—Will not inbreeding destroy the vitality of the herd?

A:—Not necessarily.

Q:—In thoroughbreds it does?

A:—Not necessarily.

Q:—Done that this far, Shorthorns.

A:—Not a single case.

Q:—Large herd. He found it necessary to kill off his calves and keep only a few.

A:—No sir, you won't find that. What about trotting horses, breeding of Arab horses, a good many strains of cattle bred right in among themselves. There's Gentry of Berkshire—

Q:—How many killed?

A:—He bred more live ones. The Berkshire breed is what they have made it and inbreeding has done it.

The point is this: From the standpoint of pure breeding there are two things likely to happen. Parents same on both sides weakly of constitution and lack of breeding power. What are the two most common faults in animals generally? Those are the two. One-third of children die. Why? Because they are not strong enough to live. We destroy by our mistakes. That being true, if you bring together two lines of that kind on both sides you are going to have weak constitutions or both. Two things most likely to happen. Take the criminal tendencies in human beings. When a woman who is criminal, and this man who is criminal are related, their children in the long run will be criminals. Why? Because of the prevailing tendencies of that character in the blood of both of them, whether related or not. The tendency to weakness of constitution is too strong in all of our race, that if you practice inbreeding on both sides you are likely to run into weak constitutions, etc. It is greater in some races than others. The hazards are greater in cattle than horses. They breed so much slower. Inbreeding necessarily means calamity in pure bred animals. The chances of trouble are much greater.

Mr. Campbell:—I tried inbreeding on my farm and never raised one out of seven calves.

Q:—What kind of sire did you have?

A:—As good as I could find. Have had a bad streak or luck.

Mr. Gurler:—Your object here is to show the dairymen how to go to work with his own herd and breed and improve the herd. You are not talking of pure bred animal breeders. It does seem to me that you are all right on that point.

Mr. Davenport:—I know I am Mr. Gurler.

Q:—We know there is need enough of the average dairyman going to work to improve his herd. I take sides with you there.

A:—I thought you would.

Mr. Wallace:—Grading up. Talking of average dairyman.

I will admit if I avoid inbreeding, have got to sell that bull, and he may sell an animal for beef that would be worth a thousand dollars. If no other way of avoiding it except your way, then your way is right. But certainly in any part of this country it would be easy for six to get together and use the same breed and then exchange their bulls, or sell them and avoid the danger of inbreeding. It is a serious matter even with grade cattle. To illustrate, one man has Shorthorns and sold them because he could not go right along inbreeding without ruining the herd. A man may be an exception like Gentry, but it is a mighty dangerous business and should be kept in the hands of a skillful man not the average dairyman for he will come to grief. He better turn his hand to something he knows about than run the risk of inbreeding.

A:—Skilled men don't know any more than the rest of us. As to the chances, a man knows perfectly well the strain of animal he is handling and expects some trouble. I think a breeder of pure bred animals of ten or fifteen years experience may well pause before going to inbreeding, but I would take the chance. If I found the sire was not giving good calves, I would get rid of the sire. If I found he was I would not be in a hurry.

Q:—If you lose the majority?

A:—I don't expect to lose the majority.

Q:—I lost all but one.

A:—The first case I ever heard of.

Q:—He's got to get the bulls.

A:—He can see the herd. You can find out the milking qualities as any other animal. We must try to avoid this tremendous waste of power. We are not going forward in our breeding, gentlemen. We must continue to breed that bull until we know what he is doing.

Mr. Gurler:—Mr. President I would like to ask a question on a subject that has not been touched upon. We are within forty miles of Chicago a milk producing territory and this subject is a very vital one. It is a test of the practicability of your method and within sixty miles of Chicago we have land valued

at \$70.00 to \$110.00 an acre and I would inquire whether you or any number of dairymen have tested this sufficient to know the cost of bringing a farm bred animal to maturity at two years or two and a half years old, as compared with buying fresh cows in the ordinary course of business.

Prof. Fraser:—We have been for nearly three years getting data on that subject. It is not of sufficient quantity yet to say much about it.

By the President:—I have tried that personally. I pay \$10.00 an acre for the land I farm. I have a five years record of every cost of keep of heifer calves I raise in a practical way. Took monthly records until two years ago. It is seven years since I started to keep the record. Five cents a gallon for the skim milk and 12½ cents a gallon for whole milk to start heifer calves with. Cost of feed on market, cost of hay and value of the calf to start with. I found heifers will cost you on \$200.00 land an average of \$45.00 to bring them into milk. I think that a very careful estimate.

Q:—How much cut down on \$100.00 land?

A:—I can better afford to bring my calves into milk at cost of \$15.00 or \$50.00 than go to Minnesota or Wisconsin and buy cows that they are glad to push off on me at \$55.00 or \$65.00. My heifers are all giving an average better than the average of cows I can buy at maturity for the same money or even more. Next year will be better.

Q:—What is this milk you bring heifers up with?

A:—Skim milk.

Q:—How much a hundred?

A:—Sixty cents a hundred. Isn't giving that heifer half a chance.

Mr. Wiggins:—I can sell it for that.

Mr. Gurler:—Raise heifer calves and produce your cow as cheap as you can buy it for skim milk, we average dairymen can do better than that.

A:—You can beat that all hollow in that country.

Mr. Gurler:—In the past three months been testing up some heifers at two years old, weigh 800 lbs. or along between seven

and eight hundred. These little heifers are making one pound of butter fat per day. It would bother me now to buy any bunch of cows that will do that, and they will do better next year. I am not in sympathy in buying other people's cows. We cannot afford to do it.

Prof. Davenport:—They are all inbred cows, you don't want that.

Mr. Gurler:—I have always done that when I had skim milk, raise my own heifer calves. I was in the certified milk business and all going off the farm and had to buy; did not have one-third of what I needed. To keep up the business I was compelled to buy not that I wanted to or preferred to do it; it was a matter of necessity.

A Member:—For a number of years have lived in Wisconsin and tell of a sample of successful dairymen of that state. Bred a great herd of Jersey cattle. Was fortunate enough to be the owner of that Jersey, Victor Hugo who made something of a reputation in Canada. I mean Mr. Houston. He kept that animal until he reached 15 or 16 years of age and took two men to hold him when he come to serve. The result was to build up a practical dairy herd of cows that he brought around about the country, and if ever a man has made a success in that line of work that man is Mr. Houston. Not only did he succeed in making butter that took top prices on the market at Chicago, but he could hardly supply the demand of men in Chicago who wanted to buy Jersey cows. Mr. Houston would not keep a heifer calf that did not grade up. The male calf was sacrificed and the heifers that did not grade up to the average. That is the only way, as the professor has said, by which a dairy herd of superior quality whether Jerseys or Holstein-Friesians is to be produced.

Prof. Davenport:—I do not want to be misunderstood. You will be drawn into this matter of breeding naturally, and when you are do not be afraid of it, don't be frightened out of it. You will want to do some close breeding.

By the President:—I will ask the Resolution Committee for a partial report at this time. Mr. Kimsey.

Mr. Chairman. As Col. Mills has been called to leave, we

will present this partial report while he is yet with us. Those who heard the address of our president given yesterday realized that many of the subjects named by him, and in fact all of them, were stated so tersely that the committee felt best to adopt them as a whole.

“Resolved that the recommendations for advancing the dairy industry of the State, contained in the able and comprehensive address of President Wiggins are worthy of the favorable consideration of all interested, and should be made effective by every progressive dairyman.

“Resolved, That we heartily approve of the advanced and businesslike method for promoting the dairy industry of the state, recommended by President Wiggins in his annual address, and that the same be and are hereby approved and adopted by the Illinois Dairymen's Association in annual convention assembled.

“Resolved, That the Illinois Dairymen's Association most heartily approve the action of Prof. Davenport, Director of the Agricultural Experiment Station, in the appointment of a special representative in each county in the state to aid in the work of testing dairy cows, and the promotion of the dairy industry of the state.

“Resolved, That the attention of the dairymen of the state be directed to the great importance of the early testing of their respective herds, and the reporting of all tests to the Director of the State Experiment Station.

“Resolved, That the Director of the Experiment Station be invited to publish a Bulletin annually, in which the tests may be announced of all cows that have produced in twelve months 225 or more pounds of butter fat.”

I move the adoption of the resolutions as read.

Motion is seconded. All in favor say “I”. Carried.

By the President:—We will now listen to a reading by Miss Grace Haake.

By the President:—Mr. Caven has an announcement he would like to make. Mr. Gregg has yet to speak, of course.

Mr. Caven:—I wish to make an announcement of the evening meeting before the adjournment time. Our session this

evening will be held in the Universalist Auditorium. The stereopticon views, which were to have been presented last evening by Mr. Truman of the University and Mr. Lane of the Department of Dairy Husbandry of Washington, will be presented tonight. Mr. Wallace will be the principal speaker of the evening. You heard Mr. Wallace a little this afternoon. He took issue enough so that those of you who do not know him will know that he is a man who is well informed and will certainly be a pleasing speaker.

Tomorrow morning the session is in the Exhibit Hall during the session of the Farmer's Institute here. It is a butter judging test open to all exhibitors of butter, and will probably not interest some who are attending the Institute.

Tomorrow afternoon, however, while the ladies of the Institute are meeting here in the Opera House, the session of the Dairy Association will be held in the Joliet Transfer Barn. The lectures will be on the Dairy Cow, and we will have some six cows there as models for the speakers to use in illustrating points they make. The speakers will be Prof. Fraser, Prof. Hopper and N. P. Hull of Michigan. The barn is a steam heated barn and chairs will be provided, and it will be just as convenient a meeting place as in any hall.

By the President:—We will now have a solo by Miss Florence Bush entitled "Sing me to Sleep." Encored.

By the President:—The Temple Quartette are here on the platform, so do not leave the room until after Mr. Gregg's address and they will sing for us, but they will not sing to empty seats.

I wish the nominating committee to get to work and report by tomorrow evening.

Supt. O. C. Gregg, of Minnesota, was then introduced by the President. Mr. Gregg made a few remarks as follows:

LAW OF SELECTION FOR IMPROVEMENT OF DAIRY CATTLE.

(A more extended and carefully prepared presentation of this subject by Mr. Gregg will be found following the regular report of the convention.)

Mr. President, Ladies and Gentlemen:—

I have not attended public meetings for many years without fully appreciating what the conditions are in a prolonged session. If you are not tired, I believe your chairs ache. I have some things in mind growing out of thirty-five years' experience that I believe many dairymen in Illinois should hear. I cannot at this time give the address which I had prepared for this occasion, but will make a few preliminary remarks. Provided the Secretary of this Association is willing, we will furnish for the coming annual report of the Association, the subject matter that I would like to have presented upon the platform. This can be read by you at a later time. Then you will have time to carefully consider it and give it that attention which I believe the matter deserves.

There are some preliminary things to the address which may follow this short talk, that I would like to establish in your minds. What I now shall say ought to be received by every practical and well read breeder of dairy cattle. First of all, I wish to correct a misunderstanding that some of you received yesterday, when I made the distinction that there was such a thing as an animal having no quality as a dairy animal, even though it might have a paper pedigree. A long experience has taught me that I have no use for a sire unless he has *quality*. If a dairy sire has quality, then he will have two pedigrees. One of them will be made by man; it will be a matter of record; you can get an abstract of it; it will be largely valuable in proportion as that record is authentic and shows the productiveness of the ancestry of the animal which is so pedigreed. The second pedigree is made by nature. Then it will have the marks upon its body which come by the law of heredity. When the ancestors of that animal are animals such as you wish to perpetuate, then these ancestors by the law of nature, will mark the body after a certain pattern, such as we may be able to make plain to

you in the printed matter which we will furnish to your Secretary. I have learned to place great stress upon this pedigree which nature makes. Nature makes no mistakes. She is very careful of her record. Man may sometimes make mistakes in reading the record, but when a man has had experience and careful observation and has made a study of this record of nature, then he is very sure to make a correct judgment with reference to the quality or absence of quality on the part of a dairy sire that may have a paper pedigree in both cases.

I am not here today, nor at any other time or place, to speak in favor of the scrub sire or of the grade sire. I do, however, with all the force that I can command, both in speaking and writing, favor only that sire which has that quality which has been so strongly transmitted that it shows itself upon his very body. When I use the word *quality*, I wish to convey the thought that the dairy animal which possesses it has those functions by which digestion, assimilation and milk secretion are so strongly developed in him that he has the power to transmit those three qualities to his offspring, and by so doing improve the dairy qualities of the herd that he may stand at the head of. I have not for thirty-five years studied this matter with such rare facilities as I have had, without understanding that there is a wide difference between the record of a man who makes the paper pedigree, and the record of nature who never makes a miss. My duties have taken me over a wide range of states. I have had great opportunities in meeting with breeders of dairy cattle and visiting dairy herds, and from this wide observation and field of experience, I say without any mental reservation that there is many a sire that is rated as a full blood, that is backed by a paper pedigree, that is an absolute curse to a dairyman. In my early years I had some experience with those full-blooded registered scrubs. I think that I have made this matter plain. Too many people have confidence in a full-blood alone. The practical dairyman should learn as quickly as possible, to discern between the full-bloods which have quality in them and those full-bloods which lack quality to that extent that they are simply full-blooded scrubs.

If I had the time I could give many and many an instance, where men in Minnesota, and I have found them in other states also, have turned over to the shambles dairy sires that were worth their weight in silver, simply because they did not know their value. Such killing of grand good sires is a serious loss to the dairy industry of this great middle west. A man who had studied this subject matter that I advocate, would have recognized the quality of these animals and would have stopped the slaughter in time to have saved this great loss. I am well aware that the views which I hold are opposed by some men, but on the other hand we have ample backing from some of the best breeders of America, and I have a backing of twenty years of success based upon the principles which we recognize to be true.

I wish the dairymen present would remember that we are not speaking from the experience of one little farm, but from a large number of farms, where we have placed dairy sires, and every one of them a success. We have, however, to remember one case in which we gave our recommendation for a sire through the backing of a man who claimed to know how to select dairy cattle, and that recommendation placed an illy bred brute of a Holstein sire in the hands of two young men, where he wrought the evil result that will ever follow the use of a full-blooded scrub. We not only have a demonstration on our own farm of the principles which we advocate, but we have also made a fine demonstration at one of our state institutions, where we have selected upon two separate occasions Holstein sires for the improvement of the herd of that asylum.

We are not in sympathy with the plan which some would carry out to establish a new breed of dairy cattle. We already have a good number of dairy breeds well established from which we can get by selection the animals that we need, and we can make a greater advancement by using these cattle and breeding them in dairy lines than we can by crossing the breeds or by any other step by which we are apt to lose so much of time by that great force which every reader recognizes, namely, reversion. Now, reversion is that part of breeding that we must ever guard against. Breeding is sometimes defined as based upon the law

of "like begetting like," but this is only half the truth. We should ever add these words "or a likeness of some ancestor." Here is where we will find any amount of trouble unless we use an animal that has been bred after the type that we want, from performers that we can approve, for a period long enough to establish an heredity that will transmit either the likeness of the animal which we see before us, and if by reversion he goes to an ancestor, still we are satisfied because it is like himself.

I am speaking with much earnestness on this matter and I can explain to you why I am so deeply in earnest when I say that when I first began the improvement of my dairy herd I had an experience of about twelve years, when struggling to establish a home upon the frontiers of Minnesota, I bought and used four full-blooded dairy sires (so-called), every one of them a failure. All that I got out of that long siege was a knowledge which I am now endeavoring to impart to you, both by this address and by the printed matter which I will furnish. Let it be understood that I did not mix breeds. When I tried a sire and found him a failure, I cleaned out all of his progeny and started in with another. Lest some will think that I favor some one breed, I will state that I had in those four sires a representative of the Ayrhsires, a Jersey and two sires from the so-called milking Shorthorns. Let me add right here, that some of the finest dairy blood in the world will be found among these three breeds mentioned, but you must get it by selection. Please remember this, and if you wish to transmit the grand dairy qualities from these breeds that we have enumerated, then by all means take the greatest of pains in the selection of the sire from those breeds.

We here give in a few words some underlying principles in the law of the breeding of animals. First: The form of an animal is always in harmony with the performance of the animal. This is seen in the running dog, the running horse, the beef cow, the fighting dog, etc. Secondly: There is a strong tendency which amounts to almost a law, that in breeding the sire transmits the form. This is shown so conclusively in the breeding of mules. We can lay it down as a rule without an exception that

the mule always resembles his sire (the ass), but he will get his temperament from the dam. The draft mule is always bred from a heavy, slow going, patient draft mare, but will have the conformation of the ass, which gives him the mule formation. Every southern man knows that when he wishes to breed a pair of road mules, he must use a hot blooded mare. Here we have the conformation obtained from the sire as before, but the temperament comes from the dam. Now, take these two principles together and you have the foundation for the great law that must be observed in the selection of a sire to aid in improving the dairy qualities of our herds.

With these two rules, let us ever bear in mind the great errors which have been committed in the past in the breeding of our domestic animals. We will inherit more or less of the evils of these errors by this law of reversion that I have referred to. We now enumerate some of these evils which are matters of common knowledge to us all.

First: The color craze in the breeding of Jersey cattle has cost some of the best blood that ever was produced in the Isle of Jersey. In order to get the solid color, some of the finest of the dairy stock of that island were sacrificed because of a little patch of white, more or less, upon the body. The Holstein cattle lost much quality in their successful change from the old red and white stock to the black and white of today. The belted cattle have obtained their belt of white about the black body by the sacrifice of everything which did not possess that color mark.

Second: One of the strongest illustrations of the ignorance which has moved some breeders was obtained by me at the Chicago Fat Stock Show a few years ago. I was introduced to the expert judge of beef cattle, a man who had come from England in order to pass judgment upon our stock at Chicago. He was a typical Englishman—a man of wide experience. I was introduced to him as Uncle Sam and he to me as Johnny Bull. This familiar introduction enabled us to soon become quite well acquainted. During our conversation I asked him the question, why it was that the English and Scotch breeders had bred the feather on the legs of the Shire and Clyde horses. He

replied by saying that for a long time he was at loss to know why this had been done, but one day he met a Scotchman and asked him the same question, and the Scotchman replied by saying: "Don't you understand? Haven't you read the Scriptures? Haven't you read how that Samson, was strong when he had his hair long and how he lost his strength when they cut it off." So you see, the extremely orthodox Scotchman conceived the idea that when he had long hair on the legs of his horse he had strength in his horse. Here is a sample of ignorance and there has been much of it in the breeding of all of our domestic animals. Of this I am fully persuaded. While we say this, let it be understood that we recognize the fact that in the past we have had some great breeders in the old country, but as in the case of Bates and Booth, they regarded their knowledge as a trade secret, and died with their mouths closed, without leaving anyone the better for the knowledge that they had obtained from a long and successful experience.

I will close this talk with one more statement and then leave the article which we shall furnish to your Secretary to give the complete detail of this subject matter which I urge upon your attention. I have a friend who is today at the head of one of the Experiment Stations of the Great West. He spent the summer of 1906 in England. At my request he looked up carefully the quality of milking Shorthorns as found in the dairy districts of England. Upon his return he made report to me. In substance the report contained the following statements:

1. The Shorthorns of England in the dairy districts show some of the finest dairy quality that can be found in any breed.
2. The men who are pursuing dairying with the Shorthorn cattle of England, never used the registered full-blood Shorthorn sires at the head of their herd. They say that if they do they will lose their milk. Now, the reason for this experience lies in this, that the standard for registry for Shorthorn cattle in England is the beef standard. My friend told me that they did not understand as well as many American breeders do, the laws which govern this loss of milk, but experience had taught them that.

3. The expert judge from England, whom I have referred to before, told me that there were a certain percent of breeders in England who had begun to recognize the fact that the Short-horn must be bred in other lines than the mixed line of beef and milk as confined in one animal. He told me that they were beginning to breed the Shorthorns for milk in one class separate and distinct, and breeding the Shorthorn for beef in another class, separate and distinct.

I fear that I weary you if I prolong my talk at this time. I thank you very much for the courtesy of your patient attention.

By the President:—I wish we had more talk like that just received. We will now listen to the Temple Quartet.

Song. Encored.

By the President:—We have had a very pleasant and profitable afternoon. Come tonight and bring your neighbors. Adjourned until 7:30.

THURSDAY EVENING, JANUARY 17, 1907

At Universalist Auditorium

By the President:—We have a very interesting program this evening and had better get started.

First of all I will ask for your railroad certificates. Please bring them to the Secretary's table.

We shall now have the pleasure of hearing a duet by Mr. Lombard and Mr. Bagley.

Song: Larboard Watch. Encored.

By the President:—We are very much disappointed at not hearing Mr. Schuknecht last night, but he was detained on account of illness. We are delighted to see that he is with us this evening. Mr. Jones, the Pure Food Commissioner is not here, and I am pleased to introduce Mr. Schuknecht.

PURE MILK CAMPAIGN IN ILLINOIS.

By H. E. Schucknecht, Asst. Food Commissioner of Illinois.

Mr. President, Ladies and Gentlemen:—I hope you will bear with me this evening. I have been ill and do not feel well yet. I am sorry to say that I have been unable to collect absolutely accurate data or as much as I should like to have had for this occasion. I have looked forward to meeting with you with a great deal of pleasure, in the hope that I might present to you the work which we have done and are doing. We consider it



H. E. SCHUKNECHT,
Asst. State Food Commissioner of
Illinois.

very important because it deals directly with the product you are interested in. But I have not been able to do all that I wished, but I shall try to tell you in the simplest way I can the work we have been trying to do in the dairy department this year and something about the results we have obtained.

The subject assigned me is "Pure Milk Campaign in Illinois," and though sickness has prevented my collecting absolutely accurate data, or as much of it as I should like to have presented to you, still figures and statistics are dry anyhow and what you are most interested in are the main facts and these I can give you.

First, let me tell you something of the importance of milk as a food that you may fully realize the necessity of having it pure. Milk is nature's first food and therefore heads the list as the one most important food. It is the only known natural food which, alone will sustain human life indefinitely, and is the only natural food which can be successfully substituted for the first food nature has provided for the human family, and for this reason milk is the most important of all foods; and there is no man smart enough to adulterate milk for profit on the one hand who is so dull on the other as not to know that he has committed a wrong by tampering in any way with this most important of foods and, thanks to modern sentiment for pure milk, he gets but little sympathy when exposed.

In the investigation which we conducted throughout the state last summer we started about June 1st, it having taken the best part of two months after my entering the department in April to fully equip and prepare for the work, and overcome the hundred and one obstacles encountered here and there. So far as my work in the office would permit I took part in the inspection of the milk supply of the various cities, but in a very large measure it was necessary to delegate the work to our inspectors whom I instructed in the work as well as I could. But in this I again had the force of the old adage, about the shoemaker sticking to his last, demonstrated, for I soon found that while the inspectors perhaps did the best they could, I could not get the statistics I desired and required. I could tell them what I wanted as minutely as if talking to a child, but lack of long training in that direction stood in the way of their appreciating the necessity and seriousness of the situation, and with all respect to the inspectors I say now that my experience the past year has taught me that for dairy work we should have trained or experienced dairymen.

In our work we found a good many things that are amusing, some almost pathetic if we considered the effect of them on the health of the babies and invalids of the community, and all were interesting.

We had not proceeded far with the work till we discovered that most of the cities had health departments, some humane societies, with the officers in many instances sleeping so soundly it was a shame to give them so rude an awakening as to drop into their city, collect samples and then tell the papers we could not come oftet because of lack of funds but that ourfindings would show the necessity of thorough work by the city health departments in the future.

We went to one city and the health officer suspected that things were in bad shape but didn't like to go after anybody, living right there as he did, and just trying to get started in business. As indicating further how we found local conditions we went to another city and the first milk man we met informed us that the city had a milk inspector who took samples every week and as it was a city from which any good inspector and health commissioner could easily drive adulterated milk in a month (they had been at it a year) we felt satisfied our trip would be for naught. However, we took samples from 15 out of a total of 18 dealers and the analysis showed four samples to be adulterated with formaldehyde and three adulterated with water.

Suit was brought in the seven cases and six of the seven pleaded guilty and paid a fine. One case is pending. In addition to this a large percentage of the cans used in that city were unspeakably filthy and entirely unfit for use in the sale or transportation of human food.

In citing this it is not my purpose to charge any official with wrong intent, for we have made it a point to co-operate with local authorities where possible, but if these conditions do not show rank negligence they do show gross incompetence and show what may be expected when inspection is done by novices or men not trained in the work, and is a condition which the public should insist on having corrected.

We visited thirty-five cities and found that in thirty-two of them milk which was skimmed and sold as standard milk, or milk which was adulterated with water or formaldehyde, was being sold with impunity, thereby practicing fraud on an unsuspecting or helpless public and in addition placing the lives of infants and children of the state in jeopardy.

So much for adulteration and its effects. In addition to the facts given is the further unpleasant fact that not one of the 35 cities escaped having milk sold within its limits from unclean and insanitary cans or vessels, or milk not properly strained, showing a deposit of filth in the bottom of bottles or other vessels.

In a few of the cities some excellent milk was being sold, but my estimate, based on personal observation of conditions in the various cities which I visited, is that not more than thirty to thirty-five per cent of the milk sold in the cities of the state was in the condition it should, and easily could, be when offered for sale as human food, if only sanitary conditions were observed in the production and handling of it.

This is indeed a sad state of affairs and becomes sadder when I tell you that there is no law in Illinois under which we can compel sanitary conditions to be observed in the production, manufacture or sale of milk or any other food product without establishing in court that an article or a condition complained of is positively injurious to public health, and, in the case of milk, adulterated with formaldehyde or anything else, we are under the necessity of proving guilty knowledge on the part of the defendant which is well nigh impossible to do.

We collected about 1400 samples, and aside from unclean milk sold from unclean vessels, for we have not the statistics on that point, we brought 76 suits for milk or cream adulterated with formaldehyde, 17 for skimmed milk sold as skimmed as standard milk, 5 for milk both skimmed and watered, 12 for milk below the standard and thirty for watered milk of which about 17 were against farmers delivering milk to creameries or shipping stations.

In most cases brought, the defendants have entered pleas of guilty while some are fighting, and in Champaign the Depart-

ment lost a case brought on account of milk adulterated with formaldehyde because the court ruled we must prove that the defendant had knowledge of what he was doing, which he denied, and of course we could not, nor should the Department be expected to prove this.

To further show you that conditions are not what they should be in Illinois in the milk traffic, I have collected some of the most vicious preparations being sold to and used by milk men to adulterate the milk and have them here. The list includes Iceline, labeled a wonderful discovery to keep milk sweet without ice, manufactured by Heller Chemical Co., Chicago. It is a mixture of formaldehyde and water. Freezine, made by B. Heller & Co., Chicago, according to the label is the only scientific invention for keeping milk and cream sweet, etc. It was discovered after many years of experimenting that this gas had the same effect on bacteria as freezing; also it cannot be detected in milk. This is as big a pack of lies as can be written in that many words. They go on to tell Mr. Adulator that where the law prohibits its use in milk, he should use it to disinfect the cans or bottles used, and get IT into the milk and *himself* into court and perhaps jail that way. It is formaldehyde and water. Another preparation is "Milk Keep" which is made by nobody but is capable of killing as many babies as either of the other two, for it is a solution of formaldehyde. Another preparation is "Special 'M' Preservaline", made by the Preservaline Mfg. Co. of New York. On the label they do not claim any more virtues for the stuff than the others but as theirs is the only genuine article, they caution the public against selecting any other drug route for their little ones who consume milk. This product is also a solution of formaldehyde. Next we have "Liquid Milk Sweet," manufactured by the National Preservative Co. of Quincy, Illinois. According to the label this is a "true milk preservative" and is not an adulterant. More lies. It is a solution of formaldehyde and is as deadly as the rest of them and the statement that the makers of all the above fall but little short of trafficking in the lives of the babes of the state would not be short of nor beyond telling the plain truth.

There is no doubt of formaldehyde being a poison and to substantiate this statement I quote the words of A. Wynter Blyth, the celebrated English authority on adulteration, as found on page 237 of his book on "Foods: Their Composition and Analysis." He says: "Formaldehyde is, without a doubt, poisonous, and the question has to be discussed as to whether it is permissible to preserve articles of daily food, such as milk, by its addition. The Department Committee on Food Preservatives, etc., 1901, recommend that the addition of formalin to milk be absolutely prohibited." And the United States Dispensary, which is the American authority, says of formaldehyde: "The discovery of Trillat in 1888 of the germicidal powers of formaldehyde has been abundantly confirmed. It probably ranks in power as a little inferior to corrosive sublimate, although it certainly is much stronger than carbolic acid. According to K. Walker, its 1 per cent aqueous solution will destroy all pathogenic spores within an hour. It is further claimed for it that it has the power of destroying the toxins of various diseases. (Schmidt's Jahrb., Bd., cclii.) It has a very powerful action on various forms of organic matter; one part in four thousand completely decolorizes wine, precipitating extractive and coloring matters." And it says further that "upon the higher animals it is one of the most irritating substances known." Also, "Formaldehyde is much used for the preservation of human bodies; an injection of one per cent solution usually suffices, the body in a dry room rapidly hardening without decomposition." In other words, it is used as an embalming fluid, and I should like to know if anyone would consent to its use in his own food products or in food intended for their children.

In addition to the awful stuff mentioned before, I have here other adulterants. One is Powdered Iceline, a preservative in dry form. It is principally, if not all, boric acid and belongs in the category of substances that are injurious to health. Another is B. Heller & Co.'s cream thickener and is used to make heavy cream from thin cream. It is sucrose of lime and gelatine and is a fraud in milk products. Another fraud is Heller Chemical Co.'s "Cream Albumen" in liquid form and the label says it is

the greatest scientific invention of the age. It is a gelatine preparation and the same firm makes "Cream Albumen" in powdered form, composed of sucrate of lime and gelatine. "Cream Albumenoid" made by Preservaline Mfg. Co., New York, is also sucrate of lime and gelatine. The same company makes 'M' Preservaline in powdered form for milk and cream and it is borax, a harmful substance when used as food.

The various mixtures of formaldehyde which I have shown you, sell for a dollar per quart bottle, and it may be some comfort to the adulterator to tell him that each bottle contains from seven to ten cents worth of the drug and water enough to make the dollar's worth. These things and the fact, as shown by our investigation that a large per cent of the hotels, restaurants and lunch rooms sell little standard, but largely adulterated or skimmed milk as standard milk, plus the lack of sanitary conditions in the producing and handling of milk, are what stand between you, Mr. Dairyman, and as large and legitimate a market as you should have for your milk, for I am certainly not imaginary when I say that such a state of affairs as this cannot but have the effect of prejudicing a large per cent of the consuming public against milk, the most useful and wholesome of all foods. It will take some years of rigid enforcement of good laws to restore the confidence of the public in the wholesomeness of our milk and bring the consumption per capita up to where it should be, and in the absence of proper laws now existing I trust you will make it your business to assist in passing adequate laws at this session of the legislature. In this law should be proper provision for compulsory cleanliness in the production and sale of all dairy and food products, and a provision making it a misdemeanor to manufacture for sale, offer or expose for sale or sell, or advertise any substance intended as an adulterant for dairy products. Dairy products should be and the public should demand that they must be, pure. The law should also provide sufficient appropriation so we may keep our inspectors working all of the time instead of having to withdraw from this most important work in the midst of it for lack of funds as was the case last summer.

In addition to milk work done during the past eight months, we have paid some attention to the sale of butter substitutes and have cases against thirty dealers for illegal sale of oleomarine and some for renovated butter sold contrary to the law.

The establishment of a new Municipal court for a time and later sickness, have stood in the way of these cases being prosecuted but these will be in the courts in the near future.

Before closing I wish to acknowledge the valuable assistance rendered the department, in our last campaign for pure milk, by the press of the state, by publishing results of our investigations and giving due publicity to the matter of prosecutions, etc., for publicity is a "big stick" and it has been wielded lustily. The Hon. James A. Rose, Secretary of State, lent a most valuable hand also, as will be seen from the following clipping:

CRUSADE FOR PURE MILK.

Secretary of State Rose Will Give His Aid to Other State Authorities.

Secretary of State James A. Rose announced his intention of aiding the authorities in the crusade that is being waged over the state against dairymen who sell adulterated milk. Where companies are incorporated for conducting a dairy business, and are found guilty of either selling milk that contains an adulterant, or is found to be below the standard set out in the pure food act, Mr. Rose will bring the matter to the attention of Attorney General William H. Tead for the purpose of instituting proceedings compelling such corporations to show cause why their charters should not be revoked.

This announcement of the secretary of state comes as a result of the war now being waged by the pure food commissioners against the venders of milk and cream that is sold in violation of the pure food act. In many of the cases already investigated it was found that some of the dealers used formaldehyde, or some other preservative and others sold milk that did not contain the required amount of butter fat.—Elgin, Ill., News, July 24, 1906.

and I am pleased to assure you that Governor Deneen has been, and is now, in hearty sympathy with our efforts to secure pure milk in the state.

Permit me now, to thank you, Mr. President and the Illinois Dairymen's Association for the privilege of addressing you.

DISCUSSION.

Mr. Truman:—May I ask what proportion have you found this to be used, in your chemical analysis, one part in 10000 or what?

We are not interested, Mr. Truman, in determining in what proportion they are used. Our interest is in determining the fact that they have been used and that it is unlawful.

Q:—As far as health is concerned?

A:—As bearing on health; I can best answer by making the statement that based on the information that the Secretary of Agriculture collected from more than a thousand specialists and in connection with the department of the treasury and Commerce and Labor, I believe were authorized under the National law and prohibited from using formaldehyde in any way in food.

Mr. Truman. Q:—My whole sympathy is with you. But we recognize the fact that some report of the New Jersey Station sent out reported one part in 20000 is not injurious to health.

A:—Answering that question I will say that the report of the U. S. Department of Agriculture is entirely to the effect that an article of this kind is injurious in any quantity whatsoever. The quantity cannot be small enough but what it is injurious.

Q:—You say the New Jersey Report——

A:—Yes sir and the position taken by them entirely overshadows that New Jersey Report.

Q:—They are using that, the manufacturers to hold that position?

A:—I think a report of that kind is entirely unwarranted.

Q:—That is simply embalming fluid?

A:—Yes sir, that's what it is.

Q:—Do they advertise that?

A:—Any way at all, for use in milk.

Q:—Through what medium?

A:—I am not sure, but the medium that they use is their own and bills through the mail. I am not altogether familiar with the medium. Salesmen on the road.

Q:—Might come under the post office department?

A:—It might. I am sure I do not know. We have no law in the State of Illinois by which we can touch them.

By the President:—We were disappointed at not having our pictures last night. Mr. Lane, our Assistant Chief of the Dairy Division U. S. Department of Agriculture was unable to finish his lecture. He has done a world of good in this meeting, and the United States Department of Agriculture have been very good to send Mr. Lane to Illinois to talk to us, and we are very anxious that he should continue his lecture and give us a few of the views he intended to give last night.

Stereopticon Views.

Mr. Salmon. Q:—Would like to ask about some of the barns for milking. I have found less bacteria where they do not use any barn at all in summer. I have followed the city milk supply for eleven years and have a strict rule that as soon as the temperature is right, to keep the cows out of the barn. I have not milked the cows in the barn but have an open shed nearly covered over to keep the feed dry and ourselves dry in milking. In case of stormy weather we didn't let them out at all and have found them cleaner and it is cleaner preparation for milk in summer.

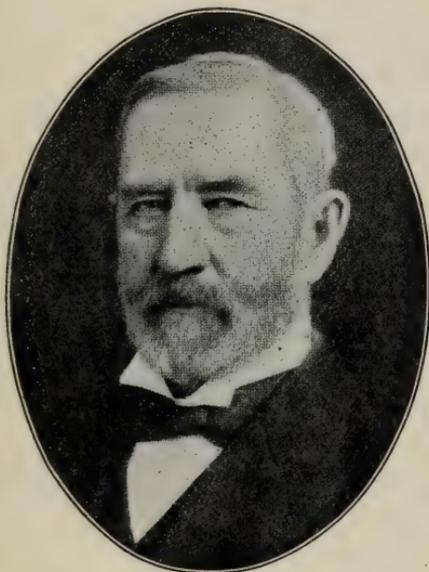
Mr. Lane. A:—Yes sir there is no place better than the pure open air. It is quite possible to have a stable in such a sanitary condition that it practically has no contamination. That all costs money. Stewart's place in New York, his stable is practically sealed, floor and walls and over head tight so they can be washed down with sanitary solution. King's system of ventilation. Very little bacteria can get in the milk. The next best thing is the open air.

By the President:—We will now hear from Mr. Wallace. He hardly needs an introduction. He is the editor of Wallace's Farmer that you all know about.

ADDRESS.

By Henry Wallace, Editor Wallace's Farmer, DesMoines, Ia.

A slight acquaintance with the history of farming during the nineteenth century will convince anyone that twentieth century farming, if it is to maintain the fertility of the soil and insure the permanent prosperity of the United States, (which after all is dependent on the prosperity of agriculture) must be



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Farmer, DesMoines, Ia.

very different and greatly superior to the farming of the century preceding.

At the opening of the nineteenth century western Pennsylvania, Ohio, a part of West Virginia, Kentucky, Tennessee, Mississippi and Louisiana, and all states west of these, were practically unbroken forests or rich rolling prairies, inhabited for the most part by wild men and wild beasts. The magnificent growth of these forests and the luxuriant herbage of the prairies

all indicated a soil of remarkable fertility. During the last century these forests have been swept away, the merest fragment of them remaining at the beginning of the twentieth century. With incredible toil the farmers of the last century felled the forests, burned the brush, cleared away the fallen timber, and pulled the stumps, removed the stones and converted these forests into cultivated fields. They have drained, broken up, improved and tilled the vast prairies, unbroken at the beginning of the last century, which have deluged the markets of the world with their products.

An energetic, industrious race were these nineteenth century farmers; but the result of their labors has been improvement to a greater or less degree of the soils they tilled. They were lumbermen, ditchers, miners, rather than farmers. They converted the richness of the soil into grains and livestock, and have become the feeders of the human family over the best portions of the globe; but as a class they failed in the first requisite of good farming, namely, to maintain unimpaired the virgin fertility of the soil.

These men, however, were not all poor farmers. Without agricultural colleges and experiment stations except in the later decades, without an efficient Agricultural Department until the last decade, and with much agricultural literature, some of them stumbled on methods of farming which met to a remarkable degree all the requirements of the scientific agriculture of the present century. But these clearheaded, resolute farmers were in the minority, as is evidenced by the fact that complaints of waning soil fertility come from all the older timbered states east of the Alleghanies and many west of them, from all the southern states, and from portions of the prairie states where cultivation has been general but little over fifty years.

The cry for commercial fertilizers, heard first in the New England states, now comes from Pennsylvania, Ohio, portions of Indiana, Illinois, Missouri and Texas, and is being heard here and there from Iowa and Kansas. This demand for commercial fertilizers measures the extent of the recognized waste of soil fer-

tility. It is only when the furrows of the land complain, when land sickness begins, that its proprietor calls for a physician; and whether land health is to take the place of land sickness depends on the wisdom of the physician and the willingness of the farmer to follow his advice.

Whatever may be said—and much can be said—to the credit of the farmers of the nineteenth century, it cannot be said that as a class they were successful in maintaining the fertility of the soil and thus putting the nation on a permanent basis of enduring prosperity; for it should never be forgotten that the abiding prosperity of the United States depends not upon the number of the population, nor the wealth of its cities, nor upon its mines, be they ever so extensive or valuable, nor upon its manufactures, nor upon the number and extent of its great railroad systems; nor upon the resources of its trusts; but upon the permanency of the fertility of its soil. There is a ton less of gold, silver, iron, copper, stone, for ever ton mined; and the Creator has finished His work of storing these in the bowels of the earth, to be discovered and utilized by man. He has not, however, finished His work of creating the products of the soil from the raw material of sunshine and shower. working through and with the men who till it; and it is upon this creative force that the future prosperity of the United States must depend.

If we inquire into the characteristics of the soil exhaustion of which there is so wide and general complaint in all the older states and in some of the newer, it will be found that exhausted soil universally lacks humus, that partially decomposed vegetable matter for which the Almighty, in preparing the earth for the home of man, so carefully provided by spreading the prairies each fall with a carpet of dead grass and the forest floor with fallen leaves.

This humus being gradually wasted by constant cultivation for a number of years without rotation, the soil loses its original capacity for absorbing water in a wet time and holding it for the use of plants during the periods of drouth. It no longer separates the particles of soil in order to give full room for root

development. Hence the universal complaint that exhausted soils puddle in a wet time and bake in a dry time, and that the country puddle in a wet time and bake in a dry time, and that the country suffers more under both drouths and floods than it did when in a state of virgin fertility. With exhaustion of the humus therein a corresponding exhaustion of the nitrogen of the soil. Furthermore, these lands wash more readily, and exhausted fields turn their tear-furrowed faces heavenward, as if weeping over the lack of wisdom on the part of those who till

It cannot have escaped the notice of close observers, that the greater the exhaustion of the soil the greater the number of weeds both noxious and comparatively innocuous, the reason being that the weed is an unregenerate plant, and can live and thrive under conditions where the improved grasses and bread grains cannot flourish. Hence with the exhaustion of fertility comes the opportunity for thorns and thistles—by which we mean weeds of all kinds—to take possession of the exhausted land, and in their way add to the fertility of the soil by slowly restoring the humus which the farmer has done his best to exhaust. It is a rough way of binding up the brokenhearted land, and the thrift of these polluterse of the soil is the punishment inflicted by high heaven on farmers who have failed to understand the language of the weed.

There has doubtless been in some of these lands, the furrows of which complain to their owners and to all passersby, more or less exhaustion of potash and phosphorus as well as nitrogen, particularly in the non-glaciated areas; but I believe this is far less than is generally supposed. Where this lack exists, it must be remedied by supplying these missing elements of fertility wisely and intelligently, and in connection with good farming and a supply of vegetable matter.

If the above outline of nineteenth century conditions be correct, it should not be difficult to outline the methods which must be adopted by twentieth century farmers, if they are to maintain their own prosperity and the prosperity of the nation, of which they are to so large an extent the keepers.

It seems to me that in outlining the requirements of twentieth century farming, it is best to call the farmer's attention first to the absolute necessity of maintaining the soil in proper physical condition for the growth and maturity of the plants which he cultivates. In order that he should see the necessity of putting and keeping his land in proper physical condition it is necessary that he should understand the root system of plants not merely to the extent of the root development of the various plants which he cultivates, but also the means by which they take their food, always in solution and in the most minute quantities. Hence the necessity of their occupying as much as possible of the soil, and hence the necessity of having the soil in fine tilth. He must understand not merely the root system and the general characteristics of the plants which he grows, but also the water-holding capacity of soils, and the necessity of maintaining a cistern over his entire farm when the plants make their demands for water, and also the necessity of putting a cover on that cistern in the shape of a mulch of dry dirt during as great a portion of the period of plant growth as possible.

These seem to me to be the very A B C's of farming, and without a knowledge of these it is not possible to succeed except on virgin soils, in favorable seasons or by accident. The root system of plants cannot possibly be properly developed without the soil being in first-class physical condition; nor can soils out of first-class physical condition in seasons of partial drouth ever supply the amount of water required for the full development of the plant.

There are many soils which are supposed to be exhausted, which, by a judicious system of tillage, will afford fairly good paying crops without the use of fertilizer, if once put in the proper physical condition. It is not true in a strict sense that tillage is manure; but it is true that tillage helps mightily even when soils are somewhat lacking in some of the elements of fertility.

I do not believe that the great Farmer of farmers, after spending countless ages in preparing this great country for the home of man, ever intended that its fertility should be permanently exhausted by one or two generations of so-called farmers.

who made it the chief end and aim of their existence to "hog-in" and appropriate to themselves the fertility which He was so long in preparing. No land that was good to begin with can be permanently exhausted by one or two or even three generations of farmers, however badly they may farm. The great Creator, however, wisely locks up the fertility, and when man has put the land out of physical condition by the exhaustion of the humus, who made it the chief end and aim of their existence to "hog-in" from starvation, awaiting the time when a farmer who understands the A B C's of farming, and thus has a key to unlock the soil, puts in his appearance.

This cry of exhausted land is not a new one. My father bought an exhausted farm, so-called, in 1835, some fields of which were so exhausted that they would produce but eight or ten bushels of wheat per acre; but by first putting it in proper physical condition and then applying lime, which (he did not know why) evidently corrected the acidity of the soil, applying manure when possible, and then sowing clover, he was able to bring it into a normal yield of from twenty-five to thirty-three bushels per acre, according to the season.

This reminds me of the two Jews, Solomon and Isaac. Their father had made a lot of money, then died and went to Abraham's bosom. Solomon prospered on what his father left him, but Isaac lost his money. When he spent all he went to Solomon and said "Brother you know our father left this money and you have made more, but I have not, will you lend me \$500.00?" Solomon said he would and offered it to him and said "I shall charge you 9 per cent interest." Isaac said, "But brother, our good father above would think you were charging too high interest." But Solomon told him "Well, Isaac, if the good father sees it at all, he will think it is turned around and will look like 6 per cent to him."

This, then, is the first thing to which the twentieth century agricultural teacher should direct the farmer's attention, the necessity of putting his soil, in seasons where it is possible and as

far as possible, in a physical condition suitable to the development of the root system of crops, and enabling them to secure from underground water sufficient moisture to bring the crop to full maturity. This may be and is difficult in all partially exhausted soils, and more difficult in some seasons than in others; nor can the soil be put in the very best possible physical condition without a supply of humus from some source or other.

If the farmer once understands the necessity for putting his soil in first class physical condition, it will not take long for him to understand that in order to do this he must have a rotation of crops. Whether the excreta of plant roots (if there be excreta) poison the land for the same kind of crop, or not, none the less all experience teaches that a rotation of crops is essential to good farming. In these later years we understand what our fathers did not: the necessity of having somewhere in the rotation a leguminous crop—clover, alfalfa, cow peas or beans—in order to increase the nitrogen in the soil, so essential to the development of plant life and to the growth of animals.

Therefore, no matter in what state in the union the farmer is located, there must be rotation of crops. No one rotation will do for every state, nor for every locality. What the rotation should be will depend on the location of the farm with respect to longitude, latitude, elevation and rainfall, on the kind of live stock to be carried, and to some extent on the disposition and qualifications of the farmer. For aid in deciding on the rotation he must rely on his agricultural paper, on the publications of the Department of Agriculture, on his agricultural college and experiment station. The agricultural paper, in fact, is the medium through which he is able to obtain easily the substance of things taught by the teachers above mentioned, with suggestions as to their application to his particular conditions.

There are large sections of the Mississippi Valley, and among them the naturally richest sections, in which it seems to be impossible to convince the farmers of the absolute necessity of a proper rotation. They continue to insist that a rotation of two crops of corn, followed by two crops of oats, or oats and winter or spring wheat meets all the requirements. In all prob-

ability many of them will continue to insist that this is all-sufficient, until failing yields, and the immense multiplication of insect pests, and the invasion of noxious weeds, force them too late to adopt a policy which, if adopted in time, might have brought them wealth and comfort instead of adversity and grief.

The craze for extensive rather than intensive farming has been with us, lo! these many years. The twentieth century will demand and enforce intensive farming. By intensive farming I do not mean necessarily farming on a small scale, nor producing the greatest amount of crop per acre regardless of either expense or profit; nor does intensive farming necessarily exclude extensive farming. There will be large farms in the twentieth century. They will not be farmed on the methods which most farms have been conducted in the century preceding, however, but with the object of producing the maximum of crop consistent with the maximum of profit. In other words, we shall no longer farm the upper four inches of the soil "with a lick and a promise," (to use an expression common in my boyhood days), but will take the entire soil and subsoil within reach of the plant roots either directly or indirectly tributary to plant production.

This means deeper plowing, as conditions and circumstances may require. It means above all else more thorough cultivation both of land in tillage and in pasture. It means great improvement in the agricultural machinery, and greater skill and intelligence in operating that machinery. Many of the types of machines approved at the beginning of the twentieth century will be put in the junk pile before the first quarter of the century is past. It means heavier and better horses. We are just beginning to understand the philosophy of soil tillage and the necessity of vastly increasing the area through which plant roots can forage.

It need scarcely be said that there must of necessity be a very considerable increase in the numbers, in the quality, and in the value of the livestock on western farms during the twentieth century. Influences are now at work which will force Ameri-

can farmers, whether they will or no, to abandon exclusive grain production and adopt some form of live stock farming. The growth of weeds, the multiplication of insect pests of varieties almost innumerable, the waning fertility of soils that have been long under grain cultivation, will absolutely compel farmers to become students of live stock farming.

The introduction of live stock means a decrease in the acreage under plow. For live stock, and especially cattle, must be kept on grass as great a portion of the year as possible; and if our pastures are to be profitable, they must produce a much larger amount of grass than they have done heretofore; which means that they must be cultivated on the same principles, but not necessarily in the same way that we cultivate our grain fields. This is true especially of our permanent pastures.

To illustrate what I mean: Why do permanent pastures grow up in ragweed every fall? not all of them, not all parts of them, for there are portions of the field in which blue grass takes the place of ragweed. Why? For various reasons, which I have not time to mention now. This can all be remedied, and easily, if the farmer by reseeding with clover and timothy every two or three years keeps his pastures full of healthy, thrifty roots to take the place of weeds. The same may be said of meadows. Such gross carelessness in the management of pastures as we see about us every day cannot long be tolerated in the twentieth century.

Following the methods above indicated, we shall be able to handle live stock in some form or other on land worth from one to two hundred dollars an acre. The kind of live stock, whether horses, cattle, sheep or hogs, will depend on the locality, on the markets, on the character of the land, on the climate and on the tastes of the farmer; but whatever class of live stock is kept, it must necessarily be of the improved type.

The necessity for rotation and grasses as part of the rotation will necessarily decrease the acreage in grain and in so doing enable us to give it more thorough and intensive cultivation; but it will not necessarily decrease the amount of grain that will be produced on American farms, particularly corn and winter

wheat. By following the methods above outlined, there should be no difficulty in making in the next ten years an increase of ten bushels per acre in the average yield of corn in the great corn growing states, and an equal proportionate increase in the average yield of winter wheat; while it is not difficult under twentieth century methods to add 50 per cent if not indeed 100 per cent to the yield of our pastures and meadows.

The breaking up of the great ranges, and the return of normal seasons to that portion of the west which has heretofore been called semi-arid, but which investors now hope will be "like the garden of the Lord, like the land of Egypt, as thou goest unto Zoar," will place upon the farmer in the great corn and grass states the necessity and duty of growing, to his own great benefit, the meats to feed the hungry nations. The time is coming when we will grow three billion bushels of corn a year, and six hundred million bushels of winter wheat, and perhaps one billion bushels of oats; and this will all be needed and at prices relatively higher than now. The century will not be half gone, in my judgment, perhaps not a quarter, when we will cease to be exporters of crude products and coarse grains, with the exception of the corn required for export to make Scotch whiskey and to balance rations for dairy cows in the dairy countries; nor is the time far distant when we will cease to export wheat or oats at anything like present prices. The limit which nature has put upon the area of agricultural land, even taking into account the possibilities of irrigation, will compel the production of both meat and grain which the world will demand on farms which are now tilled in some sort of way, but which yield far less than their possible production.

If it be asked what kind of live stock will feed on twentieth century farms, it requires no prophet to answer. The lard hog will be in evidence everywhere in the corn surplus states, and the bacon hog north, south and west of these states. The sheep industry will thrive on the agricultural lands, not in great herds, but as part of the live stock equipment. There will be a wonderful increase in the numbers and in the capacity of the special dairy cows. The development of our great cities, the increasing

wealth of their inhabitants, and the facilities for transporting milk and cream long distances, will make dairying a favorite pursuit of men who are sufficiently enlightened and educated by reading, by observation and by experience, to make this form of farming pleasant, as far as it can be made pleasant, and profitable.

The breaking up of the great ranges will not necessarily decrease the number of beef cattle produced on these ranges; but it will compel better care and better feeding, we hope with no decline in the breeding. It is quite probable that in the twentieth century the beef steer will be grown on the cheaper lands, not lands destitute of fertility, but lands which by reason of location, or the character of the surface, or distance from market, cannot be used with the maximum of profit for the growing of grain. These cattle will be finished on the corn lands and great grass lands of the humid region; for the world will demand better and better beef and more of it.

I anticipate a wonderful increase in the numbers and quality of what is called in derision the "all purpose" cow, but which is better described as the special purpose cow for the farmer whose acres are of such extent that he cannot profitably become an exclusive dairyman, and so high in price that he cannot devote himself to the growing of special purpose beef cattle. This man cannot afford to keep a cow for the chance of a calf, nor can he afford to let the grass from his pastures and the forage from his corn fields go to waste; nor can he well afford to pay the transportation to a distant market. Hence he must grow packages in which he may pack these products and thus condense freights; and he must do this from cows on which he has another profit.

In connection with this wore general practice of live stock farming, and in connection with greater specializing, there must come improved methods in feeding. The twentieth century farmer cannot afford to guess at the milk production of his dairy cows, nor at the content of butter fat; nor can he guess at the quantity or quality of the feed which he gives to his live stock. He must feed for the special purpose that he has in mind, and therefore, must have a better knowledge of what we term balanced rations than the average farmer of the century preceding

or of today. he must understand that the animal cannot work miracles; cannot transform flesh formers into fat, albuminoids into carbohydrates, nor the reverse. He must answer the prayer of the animal which might well be expressed in the words of Agur the son of Jakeh: "Feed me with the food that is needful for me;" that is, food naturally adapted to the object that you have in view in feeding.

All this will involve a much greater intelligence in the twentieth century farmer than that required of his nineteenth century brother. Fortunately the means for securing the desired information are available to the man who wishes to avail himself of them, so far as books, colleges, experiment stations and agricultural papers can give it. All these are of no avail, however, until there is an appetite created in the mind of the farmer for them. They that are whole, that is, think themselves whole, need no physician; nor would a physician do them any possible good. It is those that are sick and feel themselves sick, that will benefit by the opportunities for agricultural education.

It is perhaps fortunate that the farmers of the nineteenth century are not living in the twentieth, for it is not easy to teach an old dog new tricks; and therefore the hope of agriculture must ever lie in the young men and young women growing up on the farm; not the hope of agriculture merely, but the hope of the nation. For, say what you will about the educational disadvantages of the farm, it is after all the man with the farm education, the education that the farm gives him, that takes the lead in transacting the great business of the world. This, however, furnishes us no excuse for allowing the common schools in all these states to be so poorly equipped with teachers, so poorly attended by pupils, and so neglected as they are by farmers, whose children in the very nature of things receive but little better education than that which the country school gives them.

Some may ask: What about commercial fertilizers in the twentieth century? They will no doubt be used, as they are used now, in portions of our great country where the soil robber has done his work. Let us hope that they will be used more intelligently, with the specific object of supplying a known want

or lack in the soil, and always in connection with vegetable matter, whether grass roots or manure. It will, however, be a shame and disgrace to the great states of Iowa, Nebraska, Kansas, and large portions of Missouri, Minnesota and the Dakotas, if there shall ever be built up in them a profitable trade in commercial fertilizers. There is no necessity for it in the glaciated area of these states. Except in peaty soils, they have enough of essential elements of fertility, if farmers will so handle their lands as to keep them rich in vegetable matter and in good physical condition, to supply for all time to come the wants of crops of much greater magnitude than grow on these prairies. Whether these fields shall wave with the harvests that nature intended them to bear, or whether we shall duplicate the experience of the nineteenth century farmers of the older states, depends entirely on whether the twentieth century farmers have the ability to utilize the magnificent resources of our soil and climate.

In conclusion, remember that those who were permitted to hear the glad tidings of great joy that came to all the people, were not the soldiers in their tents, nor the priests in the temples, but the shepherds feeding their flocks by night, farmers like you and me.

You know, Moses was no good until after he had been with Laman forty years on his sheep ranch.

I thank you.

By the President:—That address is worth sleeping on. We have one more on the program, but we will have to call on him tomorrow I hope.

I want to call your attention before we adjourn to the meetings tomorrow. The one tomorrow morning is very important one, and also in the afternoon the class of cow judging at the Joliet Transfer barn. Tomorrow morning a butter judging test and the test is open to exhibitors of butter and prizes offered. That test is to be conducted by Mr. Lee of the University staff. Remember, in the Exhibit Hall in the morning, and at the Joliet Transfer barn in the afternoon. This barn is steam heated and seats will be provided and you will find it a comfortable meeting place. The lectures will be given by Prof. Fraser, Hopper and

Mr. N. P. Hull. there will be live cows for the lectures to illustrate the points they wish to make. I am sure that will be an interesting session and it ought to attract all of the men especially, because the ladies at that time will be at their own meeting in the Opera House.

If there are any resolutions to be handed in, please hand them to Mr. Kimsey, the Secretary, or myself.

Adjourned until Friday morning 10 a. m. in Exhibit Hall.

FRIDAY MORNING, JANUARY 18, 1907 at Exhibit Hall, Joliet, Illinois

By the President:—The meeting will please come to order for the class in butter judging.

Ladies and Gentlemen, I have the pleasure of introducing to you Prof. Lee who will conduct the butter testing.

BUTTER JUDGING.

By Carl E. Lee, University of Illinois.

I would like very much to have those who are going to judge this butter to take front seats here, if the others would please go back a few seats.

I did not expect to talk to you this morning on this subject of scoring butter, or give you any address pertaining to this subject.

I have been asked to say a few words before we begin the work of scoring. Most of you have looked over the program and the outline given pertaining to the butter. The reason that we had that printed in the program was because a good many butter makers do not know the terms that are used in scoring butter.

In a measure what causes these faults in butter? The outline given in the program is not an absolute one, one that will hold true in every case. What have we got in scoring butter that will hold absolutely true?

For example, take the burnt flavor. Do we know definitely everything that causes the burnt flavor? That is a question that might be asked. We know that if we overheat a starter, overcook it some call it, we get a cooked flavor, a 40 or 50 per cent starter a little of the same flavor in the butter. This burnt flavor in butter is not objectionable to some, but it is to me. I do not like a burnt flavor in butter myself.

If one judge would score it he would score it his way, and another judge would take the same tub and score off three points on flavor. Let us get this down clear in our mind, that the judging of butter is not an easy thing. We can easily see we cannot take five tubs of butter and get five different judges to score that butter and get the same scoring on each individual tub.

Butter is not anything we can hold and look at it and see what we have got. It is an imaginary thing. We get it in our hand and it changes its appearance, if warm blooded. It melts in my hand. Take a tub of butter and take out a piece and score that butter on a standard. In order to be able to score butter we must have a standard fixed in mind to get the idea of the standard that they have in mind. One judge wants a creamy flavored butter that we call rich creamy flavor. Some ask, what is rich creamy flavor? I cannot tell you, only it is the kind we want more of the more we eat.

You take, for example, people who are used to dairy butter, they like a certain flavor. And the sour, curdy flavor I believe it is like the man who preferred Limberger cheese over American cheese—no accounting for tastes. They all like a certain flavor. 45 points are allowed for flavor. Butter in order to score must be 93 or better. To one division 87 to 93, the next division 87.

The flavor most objectionable at this season of the year is the wintry flavor. It is the buttermaker making the butter

under natural conditions in the factory. He has not done anything to help the flavor. He has used no starter, simply let the thing take its time. In other words he has not hindered it. To get the cream in the vat and take it for granted next morning the cream is ready. This is called natural wintry flavor. In summer you can get a good grade of butter making it that way, but you get better now if you use artificial means. We can improve the flavor of our butter now if we use skim and half cream. Dilute that cream with good clean starter, even if you use 25 per cent, half as much starter as cream.

In connection with the wintry flavor, we find in the butter all the things that go with the conditions on the farm, the barn, the cows will be in the flavor, down to the feed the cows have eaten, the insanitary conditions on the farm.

Objectionable flavors come in handling the milk delivering it to the creamery. They hold the milk too long, and keep it closed up before it is set. So many of the creameries in operation today are taking in milk three times a week, some four and some only once a week. We naturally expect to find flavors that are objectionable and they are bound to appear in the butter, more or less.

There is a flavor found in milk called the curdy flavor. The common term probably used in connection with that is the sour cream flavor. It is due to handling cream when too thin, the cream being too sour before it goes to the buttermaker, and the starter being overripe. The acid has acted on the casein and produced a curding. The flavor produced by the action of the acid on the casein and we get that curdy flavor in the cream, and it is bound to appear in the butter. We can remove the curdy flavor sometimes by overwashing, but usually we have left a curdy flavor that is apt to stay there and not change.

There are so many little things to take into consideration in the making of butter, and to avoid those things, we want to do the things that do not produce those things.

There is a flavor found in butter in summer, and it appears in the cold storage butter, called the fishy flavor. The fishy flavor has produced as much trouble as the fruity flavor in cheese.

These two flavors the manufacturer of dairy products has got to contend with, the fishy flavor in butter and the fruity flavor in cheese. This fishy flavor in butter we do not know what produces it. Long before I knew what the fishy flavor was, we got a flavor that I used to call metallic. We used to get it with cream held in cans that were rusty. The tin had worn off and the cream had come in contact with the iron surface and we got that flavor in the cream. Farmers hold the cream too long in those kind of cans. Sometimes, in creameries where the cream vat tin has worn off, the cream will take on that metallic flavor, especially if the cream is held too long. We are apt to find that flavor in butter on Monday morning more than any other time during the week. The cream has been held from Saturday until Monday and taking on more acid and the acid has worked on the tin vat. The metallic flavor in butter is a distinct one from the fishy flavor. I have associated the metallic flavor with the fishy flavor, yet they are separate. The only one thing we find about the fishy flavor is, the flavor is apparently the same as salted fish. Probably the fishy flavor in butter is merely due to bacterial growth.

The question comes up, what shall we do, as makers of butter, to overcome that fishy flavor? That we do not know. This is true. I think we should avoid overchurning our butter, avoid over working it. We should avoid handling butter at too low a temperature and attempting to chill butter that is soft. We ought to harden it with cold water and then try to work it. We get the fishy flavor at those times. Why, I do not know.

The first two given in the outline of flavors, high acid, flat and milk. You know what causes that. Some prefer high acid and some do not. I think too much stress in the future, as in the past has been laid on high acid flavor in butter. I think we ought to be careful in making butter that we do not develop too high an acid. We want acid enough. We do not want butter with low acid. We do sometimes run high acid in butter by over washing the butter in cold water. Let us aim for uniform acid butter, not going to the extreme of high, or going down to the low.

The other flavors we might refer to, are the oily and tallowy flavors. These two flavors go closely together and we will consider them under one term. They are produced by various causes. The common cause is overworking the butter. We can work butter and not get that oily or tallowy flavor. You have found this true in handling very cold butter, especially in the winter months in cold creameries. It is attempting to work the butter under these conditions that causes this flavor. When you eat it it sticks to the roof of your mouth. We immediately say "Tallowy butter." When the conditions are such we want to avoid it. The trouble is in winter time, we do not try to make the conditions just right. We let anything go. We do just what we can do and nothing more. What's the use of working butter in a creamery room where the temperature in that room is 50, when it ought to be higher than that for right results. Work butter at this time of the year at 52 when it ought to be 58 or 60. Be a little more careful of the temperature when we churn. Watch the water and regulate these things. Don't chill it too soft. Get it down hard and try to work butter to print from the churn. You do not get right conditions. It is better to have the butter too soft than too cold to avoid that oily tallowy flavor that comes when the granules are too firm to work uniformly with each other. When too cold they slide by each other and get the oily appearance. Just the opposite from that, the oily, working butter that is too warm too soft, that is in the summer months.

The briny flavor in butter is produced, nine times out of ten, by over salting. We don't want it too salt. When we get the butter so, we destroy the flavor. If a poor piece of butter we can improve it by salting it to overcome that flavor. Salt the butter to suit the customer. We do not want to salt the butter so heavily that the good qualities of the butter are destroyed.

We occasionally find a piece of butter that is overworked. There are several here today that are overworked. The reason why I think that the butter is found overworked is because we have so much trouble with the wavy butter. To overcome that waviness in butter we work it some more. It is all right to

work the butter all it will stand. To go beyond that to improve the color is injurious; it does not help.

If we have the temperature right all the way through and the conditions are right for the dissolving of the salt, there is very little excuse to overwork the butter to avoid waviness. Sometimes we overwork butter because we have used a grade of salt that will not dissolve.

In connection with the body, we get a tallowy body and also a general oily appearance in the butter. I had a buttermaker say to me a short time ago, "How does it come that my butter is tallowy and it was scored perfect in body, I can't understand why that is?" This is true. There is not a fixed line. The body must come to a certain line, and when over that, we must cut it off. We cannot use terms like that. We must take into consideration the appearance of the butter. This is true, that we can find butter where the body is considered perfect, and yet the butter will be oily in flavor, but the body will not be tallowy. The Tallowy body is not the tallowy flavor. Two separate things and two separate terms.

Are there any questions?

DISCUSSION.

Q:—What do you consider a temperature too low for working?

A:—It depends on the condition of the butter. You could handle your butter at a low temperature, or you could handle your butter at a high temperature depending on how the cows have been fed; feeding ensilage and soft feeds, handle the butter at low temperature, if feeding on dry feeds a higher temperature. A good average temperature is 56 to 58 or about that, sometimes as high as 60.

Q:—Around 58?

A:—Yes, 57 or 58.

Q:—In working butter, when do you start the worker; sometimes before you get through you can't work it. Wash out with cold water?

A:—Probably too cold water. Probably the water in the

churn has chilled the outer granules. When mixing the whole mass together you lowered the temperature instead of increasing it.

Q:—When working butter, it is all right for two minutes and then after that, gets so hard?

A:—Sometimes the room is too cold and churn standing open and gets cold.

Q:—I draw up the butter and wash it. I warmed the water by putting the water in the cans and the temperature was all right. When taking the can and putting in another the temperature dropped from 62 to 56 so I believe my trouble was that while the temperature was all right at the top of the can, the bottom was too cold?

A:—The temperature was warmer on top if it stood on the cement floor and the heat came to the top of the can.

Q:—A difference of 6 degrees?

A:—Yes sir no more. If one would take the best care in the way of feed and sanitary conditions and general care, if he was as careful as he could be, the man that makes the butter would have very little trouble.

Q:—My lady makes the butter, made butter for twenty years. The customers, they regulate the taste.

A:—Handling butter that way, for certain customers, your aim would be to suit them. All the poor butter made today is not the fault of the buttermaker. Farmers are sitting back and thinking about what they are getting, and the buttermaker is getting all the trouble. There is no use trying to take any thing that is spoiled and make a good product of it. If I could get hold of some of those farmers show them where they are wrong, I could help the buttermaker. You attempt to tell a housewife how to wash the cans, and you will get into hot water yourself.

Q:—It is a fact just the same.

A:—Yes sir. I had the pleasure of getting a letter from a lady regarding the conditions of her milk cans. I had to tell her they were not clean, and I guess the house wife was insulted. She said "If you think my cans are so dirty, you are so dirty yourself you can't tell when they are clean."

Q:—What do you consider the proper acidity for ripening the cream?

A:—It will depend on the richness of the cream in the first place.

Q:—You take o heavy cream, about .47 to .57 per cent.

A:—The rule that has been laid down by certain writers for the proper acidity is that if we should subtract the per cent of fat in the cream from the total 100, will leave the milk serum. Subtract 36 from 100. Dividing that by 2 and what we get will be the number of c. c. solution of fat. That does not always hold true. For example, get 25 per cent cream, I dont think it would give the result as from handling 35 per cent cream. In cream containing 30 per cent of butterfat, we should have in the neighborhood of .55 per cent acidity.

Q:—How much from the Farrington?

A:—55 c. c. Some writers have put it a little higher than that 60 to 66. That is all right when butter is going direct to the market. My observations have been that when it is so high you can't get the butter on the market in good condition. There are so many other little things than acidity, that that is not always what produces the keeping qualities of the butter. Generally speaking 30 per cent cream should have about .55 of acidity.

The color of butter is another thing. We should color to suit the trade. No matter what color we aim to produce on our butter, we should have that color uniform as possible. We have quite a little complaint, and nearly every one taking part in the educational contest has more or less trouble with the wavy color in butter. We have been able to overcome it in a measure, but not entirely. We have given the general instructions how the work should be done in order to overcome that waviness or mottled condition of the butter. I have not been able to find any definite working plan that will give the absolute results every time. We may follow a certain rule and we think we have got a piece of butter that the color ought to be uniform, and we don't have it. Why is it? Because there are so many conditions to be taken into consideration that we do not get things identically the same when we think we have them the same. One of

the common faults I find with the average buttermaker, is, that the butter is too dry when the salt is added. One of the causes of the waviness in butter is that the salt is too solid, too hard. If the salt was near the same temperature as the butter in the churn, and enough water in the churn so that you affect the salt and handle it uniformly, we are then on the road to improvement. This thing would hold true after we had washed the butter and drained off the water in the churn. We cannot always tell the amount of water in the churn because the granules of butter are not always the same size. Even under those conditions you could not have the same amount of water at this season of the year if about 56 or 58 and water the same. When the water is all drained off you add a certain amount of water to the churn and then add the salt accordingly, using a little more salt. After we had added that water, and had worked down all the butter uniformly in the bottom of the churn and added the salt, revolve the churn a few times to mix the salt. Right at this point we strike a difference. We find that buttermakers who have worked at the profession for some time, do not mix the salt in the churn by turning the churn when the worker is not in motion. It does not give the results. We differ right there. A good many prefer to start a worker immediately. Not turn the churn before you start to work. Either will give the results we are after. I think with the average buttermaker to turn the churn without having the worker in motion is the custom. All this time have the cover on perfectly tight. All the plugs closed and work until the butter is half worked. Most buttermakers know when. Nine revolutions will have worked the butter. At this point when butter is half worked, if a sufficient amount of water in the churn, the salt will be fairly well dissolved. If no water in the churn the butter will have a gritty appearance. You will notice that. It might be during the months of May and June, when we are bothered more or less with the softness of the butter, we could not handle it that way.

Q:—I have my wash water and water on the butter as cool as I can get it.

A:—All right if butter is so cool.

Q.—I have no trouble during May and June.

A.—We have more mottled butter then because of the softness of the butter.

Q.—The way I do, I churn at 50. Will warm up some then the wash water is 50.

A.—We could handle lower water during May and June.

Going back where we left the churn. At this point, allow the butter to stand half an hour or an hour we could improve it. Complete the working with the cover left on the hook so the water drained off, so the butter will work right in the water. There is very little danger in getting too much moisture this season of the year. In allowing butter to stand half an hour you don't want to lower the temperature.

Q.—You are talking about salting in the churning in the creamery?

A.—Yes sir, or either for dairying. Combination churn.

Q.—We haven't all got combination churns.

A.—Salt the butter in the churn——

Q.—In salting in the churn, don't you use more salt?

A.—Yes sir, as a rule there is more moisture. In taking the butter out onto the table worker the surplus water is drained off, and in that case you use less salt.

Q.—More or less salt sticks to the side of the churn?

A.—When the salt is stuck that way it ought to be removed before the butter is completed.

The saltiness of butter has to be taken up enough time and we not consider it any more.

Now the package. Too many of the buttermakers are careless in preparing the tubs for market. I have seen this in the creamery— After the cream is put in the churn in the morning, churn started, and while churn is running he will go and get the tubs in shape. I consider when a man has done that he is not doing what he should in getting the tubs in shape. It is a good policy to get the tubs ready the day before. There are a good many for them to get ready. One thing be sure of, that you select a good lot of tubs, rings on tight. Putting the tubs in boiling water is a good plan. Soaking tubs in tank of water is some-

times resorted to, although we condemn that in our work. It is far better to set the tub by itself and fill with cold water. The common practice of sitting tubs one in another and filling the top one full of water is not a good practice. Don't soak the tubs too much. In soaking them over night, they are soaked too much. It has been brought out that we should paraffin the tubs and it is something everyone ought to do. Several years ago, when running a creamery we attempted to paraffin the tubs and a commission man told us they didn't want it done. They have been educated up to it now I think. It helps to hold the moisture in the butter. It prevents mould and makes a better appearing tub on the inside. Don't misunderstand me. If you paraffin tubs, don't think you need not line them with paper. Line the tubs with paper the same if you paraffin or not. Papering tubs is not a hard matter, but we find some too careless. The paper we buy today we find for 60 lb. tubs an inch longer than the inside of the tub. I have watched a good many buttermakers in the state paper tubs. They would catch hold of the paper after the tub was filled and then tear it off. Lay on a cloth and sprinkle on a little salt and all is done. That is not right. I think most of the up-to-date buttermakers are doing different, and following a certain method. Put in the lining paper measuring the difference, and smooth the sides down, the paper will then stay in place. Cut off a smooth surface, turn the paper in and put on the circle and then put on a little water and salt, and see that the salt is uniformly spread, and then put on the cover and you have a neat tub. In tinning up tubs ready for shipping, usually the first tin will go where it happens to strike the tub. The first tin should go on at the right angle of the wood, go on where the wood joins, where the first seam comes. There should be four tins on top. Some say three is sufficient, but four are right. If poorly tinned when turning over we find the cover loose and the tin pulled out. The tack went in at an angle instead of straight. Put a tack in each end of the tin. Take time to put another tack in the hole you notice in the tin. The tub with three tins and six tacks on the cover and six on the tub will hold it all right. I thank you for listening to this part of the program.

We have tubs of butter here, 47, 14, 21 and 22. The total of your scores as compared with the scores by the judge will award the prize. Any one that has butter on exhibition here at this convention is eligible to the contest, and I advise every one to take part in the scoring. Go over this butter and put down your score. If you put 94 and the judge puts 90, you will find out why the difference. If you don't put down a score in black and white then you won't know later on what the judge scored it.

DAIRY BUTTER.

By Chas. Foss, Cedarville, Illinois.

It is needless to say that poor dairy butter is a drug on the market. While on the other hand good dairy butter is always in demand and will always bring a good price. Unless one has the inclination and apparatus to make the very best dairy butter he had better not make any.

One of the first essentials to butter making is cleanliness. Clean food, clean stable, clean cows, clean hands, clean apparatus and utensils. My cows are kept in "Bidwell Stalls" both day and night during the winter. Each cow's stall is carefully adjusted so that she cannot become soiled. Silage is never fed until after the milking is done, and the milk has been removed from the barn. If their udders become soiled they are washed. As soon as the milking is done the milk is taken from the barn to the creamery where it is immediately separated, the skim milk is fed to the calves and pigs and the cream is immediately taken to the spring where it is cooled down to about 48 degrees F. The cream is kept in cool cans and while it is being cooled the cover is partly removed from the can to allow the animal odor to pass off.

The Creamery.

The creamery is 10 ft. x 16 ft. built to the end of the barn, but has no opening into the barn, making it necessary to go

outside of the barn before going into the creamery. The idea is to have the air in the creamery to be as nearly perfect as possible.

The creamery is doubled sided on the outside with two thicknesses of building paper between the siding and is sided and ceiled on the inside with matched boards.

The sides and ceiling are painted and are washed twice a year; the sides at the bottom are washed oftener.

The floor is made of concrete sloping gently to one corner



CHAS. FOSS,
Cedarville, Ill.

where it has a tile drain to allow the water used in washing to immediately pass out.

The creamery is equipped with a No. 6 Sharpless tubular separator, a Victor Combination Churn, a one and one-half horse Perkins air cooling gasoline engine, a stove, a rack for cream cans, a pair of scales and a cupboard in the wall for butter jars and the butter in winter.

Care of Separator, Churn and Milk and Cream Cans.

The milk cans, pails, strainer, and separator are thoroughly washed twice a day. The washing is done as follows:—The cans and pails are first rinsed in cold water, removing as much of the milk as possible, then they are washed with warm soft water containing washing powder to cut the grease, then rinsed with cold water to remove all soap and lastly they are rinsed with boiling water, then placed out of doors with the opening to the sun. Care must be taken to have every particle of milk removed before scalding. If any milk remains the scalding coagulates the albumen in the milk and causes it to adhere to the cans. In washing milk utensils never use a cloth, but always use a stiff brush.

The churn is washed by first putting a pailful of hot soft water containing washing powder into it, and then closing the churn and revolving it for a few minutes. Remove this water and wash another time with boiling water but no washing powder. After draining the water out of the churn it is turned so that the opening will be at the side; the cover is removed and in this position it is left until the next churning. The cream cans are washed in the same way as the milk cans. Care must always be taken to keep the churn and separator, and cans in a sweet condition; in order to do this no milk or butter dare remain in them.

Each morning and evening after the washing has been done the floor of the creamery is scrubbed. This is very easily done if it is done immediately after the washing is done. In this way everything connected with the dairy is always kept in a neat and clean condition.

The Spring.

I have one of the largest and best springs in the country, the water running at the rate of more than a barrel a minute. The temperature of this water is 49 degrees F. in the summer and 48 degrees F. in winter. This spring is walled up and a house was built over it. In this spring the cream is cooled and kept until it is ripened and the butter is kept in the summer from

the time it is churned until it is delivered. I use no ice whatever.

The spring answers for cooling purposes much better than ice. The temperature of the water is always uniform, the air in the spring house is always pure. It is much cheaper than ice—doing away with a refrigerator and ice house.

Were it not for the spring a refrigerator and an ice-house would be indispensable. Good dairy butter cannot be made unless you have the proper facilities to keep the cream at a low temperature.

Ripening of the Cream.

I churn twice a week—on Tuesday and Friday of each week. The cream is ripened on Monday and Thursday of each week. The cream from one churning to another is kept in the spring at a temperature of 49 degrees F. in summer and 48 degrees F. in winter. It is essential that the cream is kept at this temperature. If it is kept at a much lower temperature it may develop a bitter flavor, and if kept at a much higher temperature it becomes stale.

The fresh cream must never be added to the older cream until it has been cooled to 49 degrees F.

Just before ripening the cream is all thoroughly mixed so it will be uniform. The cream thus mixed always tests less than .2 of one per cent acid. After the cream is thus mixed a 10 per cent starter is added and the cream is then placed where it will warm up to about 65 degrees F. to 70 degrees F. It is held at this temperature for about eight hours, after which it is allowed to cool off to about 62 degrees F. The entire time required for ripening is 24 hours. The cream is ripened to about .6 of one per cent acid. This is the method used in winter.

In the summer less starter is used and a little higher temperature—70 degrees F. to 75 degrees F. It is held for about 6 to 8 hours at this temperature, after which it is placed in the spring and cooled to 50 degrees F.

The time for ripening in summer is about 12 hours. It matters very little whether the cream is ripened at 65 degrees F. or 75 degrees F. so long as it is not allowed to develop too

much acid. My reason for using a higher temperature and less starter and less time to ripen the cream in summer is that cream must be churned at a much lower temperature in winter than in summer and ripened cream cools off very slowly. By having a little higher temperature the cream has developed sufficient acidity that it can be placed in the spring in the evening and will be thoroughly cooled to 50 degrees F. by morning. During the time that the cream is ripening, it must be thoroughly stirred several times, so that it will develop a uniform degree of acidity. If the ripening is not uniform the churning will not be exhaustive. In the winter the churning temperature must be higher and by not allowing the temperature to go so high, it can be kept from acquiring too much acid until the next morning and the temperature will then be about right for churning.

The Starter.

I use a home made starter made as follows: I take the milk from a cow that has not advanced too far in her period of lactation. Set this milk at a temperature so that it will be coagulated in 24 hours. Before milking the flank and udder are carefully brushed, the fore milk is rejected and the pail and strainer are scalded.

During the ripening process this milk should be stirred occasionally and should be loosely covered. This starter is propagated from day to day by adding some of the starter to some fresh skim milk to coagulate it in 24 hours at a temperature of about 65 degrees F. On the days that the cream is ripened the balance of the starter is used for ripening the cream, or so much as is required to develop the proper degree of acidity. On other days the starter not needed for propagation is thrown away.

Care must be taken in propagating the starter. A poor starter is worse than none at all. A starter that has developed gas bubbles in it should not be used.

Before using the starter always reject about an inch from the top of the starter. It is not so good. After rejecting an inch from the top of the starter it is thoroughly stirred before it is added to the cream.

The length of time that a starter can be propagated depends on how carefully you handle it, and how clean your milk and milking utensils are. I have used a commercial starter but could see no difference in the result.

By carefully using a good starter a more uniform butter can be made and a better flavor can be developed.

The starter and acid test are indispensable for good butter making.

The Churning.

After the cream is properly ripened and cooled to the proper temperature it is taken to the creamery where it is churned. The temperature of the cream when placed into the churn is from 60 degrees F. to 62 degrees F. in winter and about 50 degrees F. in summer.

The temperature of the butter-milk after churning is about 58 degrees F. in winter and 55 degrees F. in summer.

The time required for churning is from one-half to three-quarters of an hour.

The churning temperature depends on the season of the year, the kind of feed, the richness of the cream, the amount of acid in the cream and the stage of the lactation period.

Before the cream is churned the churn is scalded with boiling water and then cooled with cold water after which the cream is placed in the churn and churned until the butter granules are the size of a kernel of wheat. The butter-milk is then drawn off and the butter washed in two wash waters, using enough water at each washing to float the butter nicely. In washing the butter the churn is revolved several times before the water is drawn off.

Salting the Butter.

After the butter has been washed and the water drained off, salt is added at the rate of $1\frac{1}{4}$ oz. to the pound of butter, the churn is revolved several times and then the worker is started.

The working usually requires about 8 minutes. This will depend, however, very much on the judgment of the butter-maker. After the butter has been worked for about 5 minutes the worker is stopped, the brine drained off and some water

is thrown into the churn to rinse out the salt that may be in the churn, the worker is then again started and the butter worked until it is finished. The salting and color of dairy butter must be made to suit the demands of the trade. My trade demands a somewhat lighter color than creamery butter. If a combination churn is used, more salt must be added than if a barrel churn and a separate worker is used.

After the butter is worked, it is packed into 2, 3, 4, 5 and 6 pound butter jars, each jar is put up expressly for one family. During the summer the butter is immediately taken to the spring where the jars are placed into a galvanized iron tank, through which the water flows. Here the butter is kept until delivered.

The butter is delivered once a week—on Saturday forenoon of each week.

The price I get for this butter is 30 cents a pound from the first of October to the first of June. The remaining four months I receive 25 cents per pound. My business has increased from 30 pounds a week to over 80 pounds in 3 years, with many more orders that I have never been able to fill.

I have tried to put up the goods that the people wanted and they have done the advertising.

FRIDAY AFTERNOON, JAN. 18, 1907

Joliet Transfer Barn

ADDRESS.

By Prof. Fraser, University of Illinois.

There is one way to determine the value of a cow. That is, weigh and test the milk for a year. No man can tell by looking at a cow, how much milk she will give in a year, and the one way of determining the value is to test her. Weigh the milk one week in nine and test for butterfat, and at the end of the year you can tell what she has done. Do that for two or three years. It

is the way we recommend to determine the good cows, to tell whether they are good or poor, and you can tell after that is done. There are two reasons why we should know something about a cow from looking at her. One I mentioned, and the other is: Many times you buy cows for certain reasons and have no opportunity of testing them. If fresh, the thing to do is to see her milked and test the butterfat. Supposing the cow is dry, then you can't tell much about her.

When we come to the market, we frequently have to select the bull from looking at him. It is not the ideal way. You should know his ancestors and then go and get an individual. Keep him until you have tested him and he has daughters and then test them.

When we consider how some of the dairy cows are bred, it is not surprising that we have as poor cows as we have. Dean Davenport went over the breeding part yesterday and we will pay no attention to that part at the present time.

There is only one way really to make money out of the dairy cow. I take it that we are to talk of the dairy business pure and simple. A man in the dairy business, he ought to be in it for the money he can make in it. If he has only one cow or five, he wants to get all the money possible out of them. The way to do that is to have cows of large capacity, and after fully matured, push them for all they are worth. Feed them all they will eat. The proper feed is a balanced ration. A cow of small capacity and not fed good, why, you had better do something else.

We will start in with the score card and tell you the best I can. Turn to the score card.

First I want to tell you what the score card is used for. You go and score this cow, and bring another cow and score that one 100, and that is what they are worth. That is not so. The highest is not always the best. The score card is only a means to an end. It will not determine the value of the cow. The purpose for which it should be used is to call attention to the principal things of a dairy cow. You know it is not always the dairies scoring the highest that have the cleanest milk.

You will notice on the score card there are three distinct

division. First, indicating milking qualities, 30 points; indicating feeding qualities, 30 points. One is considered to be as important as the other. Indicating constitution and general health, 25 points, and symmetry, or general balance between the parts, 15 points.

Taking the first thing, udder. You will notice that the udder is of considerable importance, 14 points. What kind of an udder do we want? A capacious udder, of course. We want it full and attached high at the back and extending well forward under the belly. Quarters evenly developed. Not a big, large rear udder. We want them well balanced, or flat on the bottom. We do not want the front udder larger than the rear udder, the front lacking rather than the rear udder. Before milking the udder should be full and distended. After milking you will notice that it hangs flabby. The milk is secreted while the cow is being milked. That being true, it simply shows a better granular structure.

We have a very poor light here. I think this cow is quite a ways from freshening. If an udder of that kind, it would count less than 14 points.

The next question is teats. They should be uniform in size and length, and placed well apart. We want the teats uniform not big ones in front and little back ones. Even length we also want. One thing we want in a cow, I mean a dairy cow, either pure bred or grade, you must have teats with convenient size and length. We want them placed well apart. Not like the fingers on the hand, but placed well apart. Nearly equal diameter from base to point. Some Holsteins have teats that are very conical. We want teats free from lumps, warts or extra orifices or leakage. Some milk easy, yet they leak. You do not want a cow that milks so hard a man don't want to milk her. If a cow leaks very badly you would not want to raise a heifer calf from her, neither from a hard milker. Those things have considerable important bearing.

Q:—A hard milking cow, haven't they got an instrument expressly for that?

A:—In the hands of the average farmer it would be better to leave that alone.

Q:—I have never tried it, I have read of it.

Prof. Fraser:—After I have run over this scorecard, we will try and have a discussion.

Before passing from the udder I would say that it should be soft and pliable. Sometimes you have a cow that has no loose skin at all around the udder. If a good milker, she is going to have an amount of soft pliable skin.

MILK VEINS. Those milk veins run from the udder under the body, back of the shoulder and go to the heart. What are the milk veins for? If a vein, it must carry the blood from the extremity back to the heart again. The udder is a secreting gland and if well supplied with milk you must have good large milk veins. They wind back and forth before entering the milk well. The milk wells are the holes into the abdomen. That is because you need a large vein. Rump we want broad at both hip and pin bones indicating pelvic capacity.

Temperament strong indicating maternity. We have a cow there at the University, that if you couldn't see anything back you would say she was a steer. You want a cow with indications of maternity. If you think it looks like a cow, I think you know what that means. Then give 30 points to her.

The next is **FEEDING QUALITIES.** The first thing under that heading is Barrel. The portion of the animal back of the shoulders and in front of the hips. The barrel should be long, simply want to get capacity there. The longer you have it the fuller the capacity. You want it deep for the same reason, and full at the paunch. Large in all respects. Why? I think that is evident to most of you for the reason that the rough feed is the cheaper feed for the dairy cow. For rough feed and making milk out of it we must have a large capacity to hold it. You can't put a large amount of rough feed into a small space. It is always the cow with the large capacity that in the end is the economical producer. Plenty of space between the flat space and hip. 10 points for that because it is the next important point we have.

BONE should be medium indicated by clean face and legs, short cannons and slim tail. The cannon, the bone from the ankle to the toe. The reason we want that is to show quality. We do not want too fine a bone.

The WITHERS should be narrow, smooth over top; not higher than rump.

We want a wide, full muzzle, as that is an indication of a good feeder. A good wide muzzle and good full loose lips. You never saw a cow a good feeder that didn't have a wide muzzle. I mean in proportion to size. She might be a good feeder if small all over, yet her muzzle would not be as large.

FACE should be broad between the eyes, a good broad face.

EYES full and clear. Why? A large full eye indicates health and capacity. They should be set well forward, not in the side of the head. Clear and quiet. You don't want a nervous eye.

NECK medium to thin on top and fair length. A good milker to put her feed into the milk pail should have a slender neck.

This cow is being judged by the way she acts. We want our bulls to look masculine and our cows to look feminine.

THROAT clean and not a lot of extra skin. DEWLAP light.

HANDLING. Skin medium thick, mellow and loose. If a thick hide like a big bull it does not indicate feeding qualities. You don't want it too thin and papery, that indicates too much to the other extreme. Hair fine and soft and not wiry. Inside of ears furry. You want soft, silky hair. If the cow has been handled well and taken care of she will have good hair. We have gone over the questions indicating feeding qualities.

We will now take up those indicating constitution and general health. She must have constitution, or she will not live a great while. What are the things that indicate constitution?

CHEST is the first thing. It should be deep and full showing plenty of lung capacity. To judge of an animal's chest capacity, you don't want to stand off and look at them. Get

close and look over them thoroughly. You may have depth through there and side to side, yet cut way up and having depth this way (indicating animal). We must take into consideration up and down through the chest and from right to left. 8 points for that. If a cow that is an excellent cow, and lacks chest and constitution, she will be a deficient animal.

LEGS. We want them fairly straight, neither knock-kneed nor sickle-hocked, too much ankle. They will attach that peculiarity.

BACK straight, sometimes drooping with age. I like to see a good, straight back. It denotes strength. If drooping, it denotes age. Sometimes, if carrying a big bag, she may droop down in the back. Two points.

PASTERNS want to be strong and upright. Some cows bend clear down on them. If naturally weak, that is quite an objection. It is an indication of weakness.

The next is **GENERAL APPEARANCE**. Thrifty and vigorous. We don't want a scrawny cow.

The next thing **CARRIAGE**, active but not nervous. We want a cow that can get around actively, yet not so nervous. 6 points. We have gotten 85 points so far.

Now we give 15 points for symmetry. It is the weakness of the scorecard. We can't go over a card and score another cow and say that is the best cow. Why can't we do that? An extreme case. Queen would score very well straight down through here, with two exceptions. The vital exception, the udder and milk veins. Queen has good teats, fine form and barrel, but she lacks udder and milk veins. Suppose you marked her absolutely zero on udder, cut ten points on udder, three on milk veins, you would cut her only 13. If not, has 15 at the bottom and we would mark her 87 points. Yet she is a cow that in seven years made 156 pounds of butterfat in a year with the best kind of care and feed, an absolutely worthless cow.

Q:—Did she lack symmetry?

A:—Symmetry means evenly balanced between the parts. If she hasn't any udder, you wouldn't say she had symmetry.

Q:—And general appearance?

A:—Including the whole of the cow. You have to include the udder. If lacking very much in udder, she is then exceedingly inefficient. You mean general symmetry of the animal form? In a steer that would be all right, but I am talking of the dairy cow.

The object of the scorecard is to draw attention to the important things which we should look after, the general good symmetrical form, with a good barrel and udder. One is as important as the other.

We have to keep cows two years before they freshen at an absolute expense. If only going to live one year, then we have not to produce enough in that year to pay for her feed and the expense of raising a cow to 2 and one-third years old. It will take a pretty good cow to do that. Suppose, like Rose, with a good 14 years of milk record behind her to pay that back. The difference would be in simple constitution. Dr. McIntosh says there is no disease, just lacking constitution. She was a wonderfully effective machine if she had had a constitution. That is the reason why we must test cows to determine the value of them. Test the milk at the end of the week and see how much she absolutely gave in milk and butterfat. Some people claim that is all you have to do. Use your good sire on best cows.

Q:—Judge a cow by her butterfat or the quantity of milk?

A:—The quantity of milk and butterfat both. If selling butterfat and dump your skim milk in the gutter, but people are not doing that way.

Q:—Suppose the milk is the way it is, would a cow like Queen pay for her keep?

A:—It would depend on what price you were getting for your milk.

Q:—What did it test?

A:—I could not say exactly, 3.6.

Q:—About the average?

A:—The average Holstein.

I want to repeat what I said before. There is just one way given to make money out of a dairy cow, big money. If you are

going to milk cows from the dairyman's standpoint, there is one way to make money, and that is to have the best cows you can breed and produce and then feed those all a good feed and a good properly balanced ration, and get everything out of them you can, and take good care of them. You will find a wonderful difference out of a cow fed all she will eat and good care taken of her and one with no particular care. If you are going to push them, have a cow with good capacity and constitution or they cannot stand it. I mean fully matured animals. The only way to make money is to push her for all she is worth, of course, within reason. If you get a really effective cow and do that way, there is more money in the dairy business than we realize yet. There is a gentleman here who will bear me out. He is making 50 cans of milk every day along now on 280 acres of land. What kind of cow is he milking and feeding to do that? If J. P. Mason is here, let him talk.

RESOLUTIONS AND NOMINATIONS.

By the President:—We have some very important business to transact now.

We will listen to the report of the Committee on Resolutions. The partial report has been made.

Mr. Kimsey:—We gave a partial report yesterday, but for the benefit of those who did not hear them we have recapitulated them here.

RESOLUTIONS.

Resolved, That a committee of three be appointed by the President on legislation, of which the President shall be the chairman. Said committee to look after the appropriations needed by the Illinois Dairymen's Association, and all other matters affecting the dairy industry of the state that may, or should, be presented to the present General Assembly.

The success of the work of this Association, not alone in this thirty-third annual convention, but in the year's work of the Association as well, has depended in no small measure upon the individual work of its officials; therefore appreciating the untiring and unselfish labor of President Wiggins and Secretary

Caven to forward the interests of the dairymen of the state, be it

Resolved, That the hearty thanks and appreciation of the Association be hereby extended to Lewis N. Wiggins and George Caven as our President and Secretary for their zealous work in behalf of our Association and of the dairymen of Illinois.

Resolved, That we request the legislature to increase the appropriation for the Dairy and Food Department, to enable the department to enlarge its inspection of dairy farms, and with authority to demand sanitary conditions in the production and distribution of dairy and all food products.

Resolved, That the recommendations for advancing the dairy industry of the state, contained in the able and comprehensive address of President Wiggins, are worthy of the favorable consideration of all interested and should be made effective by every progressive dairyman.

Resolved, That we heartily approve of the advanced and businesslike methods for promoting the dairy industry of the state, recommended by President Wiggins in his annual address, and that the same be, and are hereby, approved and adopted by the Illinois State Dairymen's Association in annual convention assembled.

Resolved, That the Illinois State Dairymen's Association most heartily approve the action of Prof. Davenport, director of the Agricultural Experiment Station, in the appointment of a special representative in each county in the state to aid in the work of testing dairy cows, and the promotion of the dairy industry of the state.

Resolved, That the attention of the dairymen of the state be directed to the great importance of the early testing of their respective herds and the reporting of all tests to the Director of the State Experiment Station.

Resolved, That the Director of the Experiment Station be invited to publish a bulletin annually in which the tests may be announced of all cows that have produced in twelve months 225 or more pounds of butter fat.

Whereas, The combination of National Dairy Show, annual

convention of the National Creamery Buttermakers' Association and National Convention of Dairymen in Chicago last year was a great success, and

Whereas, We look upon Chicago as the ideal place for such a gathering, because of its central location, therefore

Resolved, That we regret the decision of the National Creamery Buttermakers' Association to break this combination and hold their next convention in St. Paul, and

Resolved, That we ask them to reconsider their action and meet again in Chicago with the National Dairy Show in October.

Knowing that the success of any meeting is due in a large measure to the attitude assumed by "the press," and appreciating their universal willingness to assist in giving this meeting widest publicity, therefore be it

Resolved, That the thanks of this Association are hereby extended "the press" of the state as a whole, and to papers of Joliet in particular for the loyal and untiring assistance rendered.

Resolved, That our thanks are hereby given to Acting Mayor Lager for his hearty welcome; to the citizens of Joliet for their generous hospitality; to those who so kindly assisted upon the program by favoring us with readings or music; to Mr. Parks of the Herald, who labored so earnestly in the illustrated lecture; to the Will County Farmers' Institute for their co-operation in the meeting, and to the local committee, especially Messrs. Wilson and Teague, for their indefatigable zeal in providing local arrangements.

Resolved, That we recognize the excellent work accomplished in the past and being done at the present time, by the National Dairy Union, in looking after legislation to protect the dairy interests of the country, and urge dairymen and creamerymen of the state to give the National Dairy Union personal and financial support.

Your action yesterday in approving the address of our worthy President, and adopting the recommendations made in the same as regular resolutions of this Association, provided for the following, which are here briefly enumerated in response to several inquiries:

1st—Recommending a larger appropriation by the General Assembly for the Dairy Department of the Experiment Station.

2nd—Commending the action of the College of Agriculture in its endeavor to establish "Test Associations" in each county, and recommending the printing annually of a "Bulletin of Performance," to include list of cows testing 225 pounds of butter fat or more per year.

3rd.—The division of this state into three divisions, viz.: Northern, Central and Southern, for the purpose of holding annual Dairy Associations, the State Association to be held in rotation between the three.

4th.—The appointing of an "Advisory Committee" by the President of this Association to co-operate with the State Experiment Station in conducting experiments of interest to the dairy interests of the state.

5th.—The maintaining of headquarters at the State Fair, with arrangements for a short program for part of the time.

6th.—The formation of a "milk and cream" exhibit at the State Fair, and offering prizes for same by this Association.

7th.—Commendation of the work of the Pure Food Commission, and especially of First Assistant Schuknecht, and recommending an increased appropriation by the General Assembly for the purpose of providing a larger field force and the more vigorous prosecution of offenders.

8th.—The repassage of a "Pure Feed Stuff" bill, carrying with it a sufficient appropriation to effectively enforce its provisions.

Realizing the importance to the continued advancement of the dairy interests, in the absolute cleanliness of both the products of the dairy, and equally therewith, the sanitary conditions of the stables and dairies where said products are produced, therefore be it

Resolved, That we heartily appreciate the efforts of the United States Department of Agriculture at Washington in its endeavor to correct, by publicity, the present faulty conditions in so large a percentage of the dairies of the country; and

Resolved, That we favor the adoption of the scorecard

system as used by the United States Department in the examination of stables and dairies in the state, and the publication of a bulletin showing scoring of all plants examined, and

Resolved, That we favor the passage of a law by the present General Assembly of this state, giving the Pure Food Commissioner and his assistants plenary power to enforce proper sanitary conditions in all places within the state where dairy products of any kind are produced or manufactured, and

Resolved, That the thanks of this Association be and are hereby extended to the Department of Agriculture, and especially to Assistant Chief C. B. Lane for his able and instructive address at this our thirty-third annual convention.

With the vast and growing importance of the dairy interests of this country, and the far-reaching influence of these interests upon the physical well being of so large a proportion of the American people and feeling that the dairy interests are of such vital importance to prosperity of this country, therefore be it

Resolved, That it is the sense of the Illinois State Dairymen's Association that the Secretary of the United States Department of Agriculture request Congress to create a separate and distinct bureau for the dairy interests, and further

Resolved, That a copy of the above resolutions be sent to the Secretary of the Department of Agriculture and to Chief of Dairy Division Walter R. Kimsey, DuQuoin; C. F. Mills, Springfield; D. C. Smith, Lake Zurich, committee.

Mr. Kimsey:—I move the adoption of the resolutions as read. Seconded.

All in favor say "Aye." Opposed? None. Carried.

By the President:—I call for the report of the Nomination Committee.

Mr. Kimsey:—The chairman of the Nomination Committee was called home, and asked me to read the report.

For President, L. N. Wiggins; Vice President, J. P. Mason; Directors, A. F. Jensen, Effingham; E. L. Wilson, Manhattan; M. S. Campbell, Genoa; W. E. Janes, Hinsdale, and W. R. Kimsey, DuQuoin.

Mr. Kimsey:—Mr. President, I move the stenographer be authorized to cast the ballot for the Association.

All in favor say "Aye." Contrary? None. Carried.

By the President:—I thank you for the honor conferred. I consider it a working proposition. If you don't think so, try it. The point is this: If we are able to continue in the dairy business in this state in a practical way, we have got to stick together and help one another all we can. I hope you have all joined our Association and got this book. If not, please get one and give it to a man who don't want to read it, and make him. I can heartily recommend the stand taken by our University. If there are any questions or any meetings you want to organize, if you will call on the officers of this Association we will be glad to help you. You are all members of this Association; if not, you ought to be. So step over to the hall and get a book

I thank you.

CARING FOR A DAIRY COW.

By N. P. Hull, Diamondale, Mich.

Ladies and Gentlemen:—I am glad to be with you today. I met with your Association last year, and I felt as though I would like to come back again. I guess I felt like a certain boy who was going to school. It seems that the teacher had been teaching them to punctuate, and she did not know whether they were catching on or not, so she wrote a sentence on the board, and asked them to punctuate it. This is what she wrote. "I saw the beautiful Mary Ann crossing the muddy street holding her skirt and showing a pretty foot and neatly turned ankle. She turned to her class and said, "How would you punctuate that Henry?" He said, "I would make a period after ankle." She then turned to Timothy and asked him. He looked a minute and said, "I think I would make a comma after street." "How

would you?" she asked another. He thought a minute and said "I would put a semicolon after skirt." Then she said to a boy at the foot of the class, "John, how would you punctuate that?" He said, "I would make a dash after Mary Ann." That is how I felt when I had the invitation to meet with the dairymen of Illinois.

Now, I believe in this matter of the care of the dairy cows.



N. P. HULL,
Diamondale, Mich.

There is no man here present, but what will agree with me, that to go back for four hundred years, and considering the dairy herds then in existence, that we have by some method at least, developed a different animal for the dairy than of those days. They will also agree with me that it has occurred through correct selection and mating and through proper feeding and proper care.

And today, if you and I are to carry on this work, we must do it right along these lines. Then, about this matter of selecting, there should have been more said at this convention on

that subject and on proper mating. It seems to me there should be more said at all conventions on these important subjects.

I want you to follow me closely. If you think some of the things I say to you are not true in Illinois, I would be very glad to have you tell me so. We will talk this matter over. I believe I am right. But you have been attending the same school I attended, and the school was a barn full of dairy cows. If you have observed as closely as I have observed, your opinion is worth as much as mine. So I say, if I make any assertions that you think are not quite true, call my attention to them. We will do it kindly if we can, and discuss it. If we can't do it kindly, we will scrap it out someway. I love a scrap. One reason I like my wife so well is that she and I are eternally scrapping.

Caring for the dairy cow. Why? Because we will make more profit out of the dairy business by caring for her. Why unless for the profit there is in it? If I couldn't see at the end of the year I was better off for keeping and caring for them, I would get out of the business. Yes, I want to know, I am better off at the end of the year, and I also want to be as much better off as possible.

If I am handling one cow, or forty cows on my farm, I want to handle them so they will turn as much profit as possible.

What do we want to attain to? Regularity. Comfort for the cow, and cleanliness for the sake of the consumer. Those are the three essentials to keep in mind.

What do I mean by regularity? Regularity in feeding and milking because simply we wish to get more milk at the cost of feed and we will too. A good friend of mine said that if you are going to do business, do it in the cow's way. The cow ought to be a creature of habit, and she will reach a high standard, when you train her to that regular habit. We calculate to commence milking at five o'clock in the morning and at five at night. I have a man that is as good as a clock. You can see him with his watch in his hand standing at the barn door waiting for it to be just five before he commences. There have been times, of course, when circumstances prevented, and I have always found out that when such circumstances prevented, we

invariably get less milk in the next twenty-four hours. Yet it costs just the same to feed those cows. Yes, just as much, though getting 30, 40 or 50 pounds less milk. That is only a small part of the day's milk. But the point is this, that loss has to come out of the profit. Had he milked them regularly we would have gotten it without any increased cost. That made a difference in the profit. Milk regularly.

Feed regularly. It is just as essential to feed regularly. The cows will be ready at those times if you make her a creature of habit, so I say milk and feed regularly.

In the matter of watering. Water regularly. The best system, although I don't use it, is to have the water before the cows so they can drink when they want to. They won't drink so much at one time, but they will drink oftener.

We in the dairy business are practicing upon the motherhood of the cow. The one great thing in the matter of care is this, make the cow comfortable. I say it again, make her comfortable. A lot of men are not doing that in Michigan, and I suppose the same is true in Illinois. I hope not though, but it is true in our state. Your average production is about the same as in Michigan. There is a leak somewhere. One great leak is in the failing to make the cow comfortable. I was at a farm in Michigan one cold day lately, and noticed the cows out in the cold all huddled up. I asked the man what he had a barn for, and he said to keep the cows in at night. And he did keep them in at night, even if the thermometer showed the temperature to be above freezing, but they went out doors in the daytime if the thermometer was down below freezing or twenty below zero. I can't see why the cows needed to go into the barn at night, if they ought to be out in the daytime when it is so cold. That reminds me of the boy in the Sunday school class. The teacher was explaining about the ears and eyes, and all about the wonders of the Creator. She spoke about the ears, and she showed them how the Lord made ears to hear with, and the eyes to see with and the nose to smell with and your feet to run with. One little boy commenced crying. "What's the matter?" she asked. "I ain't made right." "Why yes you are." "No I ain't." "Why Johnnie

what makes you think you are not made right?" "My nose runs and my feet smell."

In the matter of keeping the cow comfortable, men have said to me, "Why, those cows certainly have to go outside for exercise." That is the reason they turn them out. A certain surgeon said to me "All right Hull, you keep your cows in the barn, and I will have to come and cure them of tuberculosis." Not for a minute he won't have to. I have kept my cows in the barn for years and never had a case of tuberculosis. I never lost but two cows, one from milk fever, and one from swelling in the head, but not any from that cause. He said they had to have exercise. That's right, they ought to have exercise. It requires as much energy to produce 30 lbs. of milk as it does for a horse to plow two acres of sod ground. For heavens sake don't think that cow has got to go out doors and run around for exercise, when she has done as much work as a horse plowing two acres of ground. Keep her comfortable, and if you let her out in the cold to wander around she is not comfortable. My cows are never outside when it is below freezing. Before I had a covered barn-yard to turn the cows out in, they were out only a short time, long enough to get a drink and then went back into the barn again. Occasionally a cow came back cold. I found invariably, if cold, she gave less milk, and I could not afford to have that cow give less milk. So I had that yard enclosed, and that herd don't go out until the spring, and they do not know what it is to get cold. They are turned out for half an hour in the morning while we put the ensilage in the manger, and 20 minutes in the afternoon to move around, and that is all the exercise of that kind they get, and it is all they need. They are expending their energy in elaborating milk.

I am talking strong, but if any man questions this thing, that the mother to yield abundantly of this life sustaining fluid must be kept comfortable, let him ask his good wife or mother, and she will tell him, that when she was furnishing the food for her little one if she were chilled or made uncomfortable invariably this food supply was lessened. Yet we who are practicing upon this motherhood have gone on neglecting the first great principle

of maternity for years, and then wondered why there was no profit in the business.

When Mr. Mason told what his cows were doing, a man over there went this way (whistled.) This thing will make a good many of you whistle. Whistle away, some of you doubting Thomases. If you could go back with me for 300 years and see those little dun-colored cattle of Old England, giving hardly enough milk for the calf, and I should tell you that in 300 years we would have a cow giving 1000 lbs. of butter in a year, you would whistle too, but the cow Sunbeam did that. Think of Abe Lincoln. If you had seen him when he was a boy, and some one had told you he would live to be the President of the United States, you would have whistled at that. And your whistling won't prevent Mason getting better cows and larger profits than he has yet gotten, either.

There is more money in dairying than in other lines of business, and a steadier income. That is true. But, understand, that if you are going to get that, you must feed your cows generously, and give them good care. The great thing in the matter of the care of the cow is to keep her comfortable, and she is not comfortable when cold from running around outside, as I have said before.

Another matter in the care of the cow, is to keep her healthy. Why do we need to keep her healthy? We want good milk. A man in Michigan said the cows won't be healthy in the barn. They are healthy. I have in that barn all the necessary elements to make it so. Plenty of windows to let in the free sunshine, and there is no reason why the conditions of health are not just as good as outside. If you have some system by which the air can be changed, and get a good supply of fresh air and sunshine, what is there about those stable conditions and keeping the cows in there warm and comfortable that prevents them from being healthy? They do not keep warm and comfortable if they are outdoors, with the wind so cold scurrying across the prairies.

Why do we need the sunshine? Put yourselves in houses as dark as your barns, and you would not be healthy. Have plenty of windows in your barn, let the sunshine in, and it will destroy

the disease germs and the germs that spoil milk. Have some system of ventilation—King's is a good one. The air can then be changed and kept fresh and pure.

Over in Michigan, there's a man who said to me, "That's all right, you have a big yard and conveniences. It is all right, to talk about feeding and milking those cows regularly and keeping them comfortable, but then we haven't those conveniences." I presume some of you are thinking that same thing here. I wasn't born with a gold spoon in my mouth. My father died when I was four years old. We had a little log house and were in debt. We never would have had that barn hadn't we made those cows earn it for us. You never will surround your lives with pleasant things by keeping cows, unless you make those conditions right. Keep that mother cow comfortable and keep her healthy, and do your work regularly.

When I started in the dairy business, I had a little shed leaning up against the barn. I got building paper and started to put the thing in shape to make it warm for the cows. Had window light and God's fresh air, which is just as free to you as it was to me, and let in enough of that to furnish a supply of pure fresh air. When I had done that, I had done all that was necessary, as far as stable was concerned, to make those cows yield profitably. Had I said, "Why, I haven't the conveniences," I might still be saying that. You can have them as well as I.

Get good cows and feed them good. The professor has told you it takes about so much to run a cow's machinery. The wise man who has paid for running this machinery, will furnish it with all the nutrients it can possibly convert into milk. Keep the good mother comfortable and furnish her with a good supply of sunshine and fresh air, and she will help to build buildings and surround you with comforts and lay aside something for old age.

I remember sitting with a man one time, and he was telling what his cows were yielding him, and I was surprised. He was from northern Michigan, and I knew they had not been getting much from their cows up there. I went home with him and saw his equipments. He was getting \$60.00 per cow. I wondered

how he could do it. The most of them up there were not making money at all. He aimed to have his cows freshen in the fall. He had a log stable, but that stable was warm, and had windows in it to make it light, and he had plenty of fresh air. "How do you water those cows?" I said to him. He said "There's a spring down there that never freezes over. I let them go there if it is not too cold. If it is too cold I bring water from the house." "Isn't that a lot of trouble?" I asked him, and he said "It is some trouble, but I can't afford to let them go out when it is too cold, I get less milk."

If you put a part of your life into this business, put it in such a way that you may have something to show for it at the end of the year. Feed your cows regularly, keep them warm, comfortable and healthy, and you may reasonably expect them to yield profitably.

Mr. Mason. Q:—Do you believe in feeding your cows all the feed they will take?

A:—Most certainly I do sir. It will take about \$20.00 worth of feed to keep a cow a cow, that is, it requires about \$20.00 worth of feed as a rule to maintain a dry cow weighing 1200 lbs. When I first started in to keep an account of my herd, I was feeding about \$30.00 worth of feed, and it took about \$20.00 worth to run the machinery. That machine made me about \$40.00 worth of milk. As I studied that proposition, I thought it was too expensive a machine or I wasn't handling it right. So I studied to know what to feed and how to feed it. And after years of thought and experience have concluded that a cow must be induced to eat all she can digest and assimilate, and in the last five years our cows have consumed an average of about \$40.00 worth of feed. It takes only about the same \$20.00 worth of feed to run that machinery which is a dead loss, except for manure. Instead of converting \$10.00 worth of feed into milk, she is now converting \$20.00 worth into milk and now making me \$80.00 worth of milk. If \$10.00 worth of feed will make \$40.00 worth of milk, why not \$20.00 worth make just as much again? By studying to know what to feed, I am getting as much profit in one year, as I did in four years before. We

have only one life to put into this business, and I have found it as easy to get the profit in one year, as I used to get it in four.

Let me put the proposition to you in another way: Take the threshing machine. It will cost a man \$10.00 per day to run it. We thresh for 2 cents a bushel. Suppose that man threshed 500 bushels. He would have nothing to show for profit. Let him thresh 750 bushels. Then he would have \$5.00 profit. Put in a little more fuel under the boiler and feed that machine regularly, and he can thresh 1000 bushels. He don't thresh twice as much grain, but there is twice as much profit. There is no thresher but what knows that is good practice. He wants to run the machinery up to the maximum capacity.

Q:—A Member:—How do you tie your cows?

A:—A swinging stanchion.

Q:—You believe in feeding your cows all they will eat?

A:—If I have got to work all day, I have got to eat, and so has the cow. A lot of cows in Michigan and in Illinois are expected to do a day's work on half feed.

Q:—What are you feeding your cows?

A:—35 to 40 lbs. of corn ensilage, 10 lbs. clover hay and same amount of shredded corn fodder, 2 lbs. cotton seed meal and 4 lbs. of continental gluten feed. They cost me about 17 cents a day to feed and they are paying me, I think, about 49¼ cents a day now.

Q:—And you aim to make the largest amount in the winter?

A:—Yes sir. That keeps the regular farm help busy that way. Have them dry in July and August when we are the busiest on the farm and the flies are the worst. You will find you can keep your help better.

Q:—What breed of cows are yours?

A:—Holsteins.

Mr. Campbell. Q:—Have you ever tried to increase this ration to see if there is any more profit?

A:—When feeding the cows myself, I studied every cow and then fed a little more until she would not pay any more and

then I stopped. Over every cow I had the number of measures of meal I wanted fed and I measure that way and they are fed that way.

Q:—You use silage?

A:—Yes sir. The corn in the silo 100 bu. per acre, 6 lbs. of concentrates besides that. A fairly liberal ration.

Q:—Plenty of carbohydrates in that ration?

A:—Yes sir.

Q:—You can get along without bran?

A:—Yes sir. The carbohydrates keep up the flow. If the cows are using their energy running around to keep warm they can't put it into milk.

Q:—I suppose there is more money lost in your state and mine, by lack of good care and feeding than because of poor cows?

A:—A lot that have been condemned as poor cows never had a decent chance of being anything else but poor cows.

Q:—Do you water your cows twice a day?

A:—I believe in having water where they can reach it and get it when they want it. A small tank in the covered yard supplied with good water is our way. It is the best policy to have the water before them.

Q:—Do you feed that grain twice a day?

A:—This grain twice a day. Put in the silage and the grain on top and stir it in, and the grain will go among the silage. It is all brought back and remasticated. Clover hay at noon.

Q:—Do you give the grain before you milk?

A:—In the morning we give it after milking, and at night we give it before we milk.

Q:—Do you have trouble with ensilage flavor by giving it before you milk?

A:—No sir there is no odor in the milk. We are selling milk to Borden's. At the condenser is a man who is the official smeller, and he ought to have a good smell, and never a can of milk returned for smelling of ensilage. We give it in the evening before milking. Just as soon as the milk is drawn it is carried from the barn. If you put corn in the silo when too green

it gets too acid. I would not want milk around then at all. Get sweet silage and well-ventilated barns and you won't have any spoil.

Mr. Mason. Q:—Did Borden's object to this silage there?

A:—No sir. The Borden people have three factories in Michigan and advocating feeding of silage. I had a letter from Effingham wanting to know if they objected to it. They objected to it down there. I know of no reason why they should object. The doctor objected to it at first, claimed it wasn't wholesome. We got some samples and asked them to pick out the ones that the cows had been fed ensilage. They tested and smelt and picked out what they thought to be silage fed milk. Out of a possible 100, 40 per cent of their conclusions were correct and 60 per cent were not.

Q:—Isn't that all guess work?

A:—Yes sir.

Q:—What is your average price, 6 winter months, a hundred?

A:—Nov. \$1.30, \$1.40 for December and January, February \$1.35 and April \$1.30, March \$1.20.

Q:—What do you pay your help over there?

A:—\$350.00 to \$400.00 a year and find a house and garden plot. The dairy on my farm solved the labor question. Hadn't I those cows. I couldn't find work all the year round. By having the cows freshen in the fall you can keep your help. You want him to feed and milk those cows and take out the manure. You have got to have houses for them to live in. You can't depend on the young man. If I were single I would go to see my girl every Sunday night, and wouldn't want to milk Monday mornings. My wife keeps me home. Those married men are better hands on a dairy farm and are more liable to stay. They won't move so quickly. The best of us get hasty. Some of my men have said they don't feel good, and sometimes when wages are high and jobs are easy to get, if they get a little grunty they will go. But if he is a married man and his family is in your house, why he doesn't get grunty and move off. We have got to have houses. It is one of the crying ne-

cessities of the present time. It is one of the main reasons why the young men are leaving the farm. They are bound to get married, and if there is no house for them to live in in the country, they will go to town.

Q:—What condition should the corn be in to put in the silo?

A:—It should contain the greatest amount of food value, and that is just when it comes to maturity. Just as the ears begin to glaze. Harvest when putting in the silo, a few days earlier than when going to shock it.

Q:—You say milk regularly. If I milk at four in the morning and five in the afternoon, would it make any difference?

A:—No special difference if you don't change. I had one man that didn't vary five minutes in commencing to milk, five in the morning and five at night. You would find him at five o'clock in the morning with his watch in his hand waiting for it to come just five. He was five minutes late one night and it almost broke his heart. Those cows did not vary five minutes in being milked, and they kept up better in their flow than any other cows I ever had.

Q:—How many tons of silage to your acre?

A:—From ten to eighteen tons.

Mr. Hull:—I thank you.

By the President:—Our program is not over yet. Mr. Hopper of the University of Illinois will continue this cow question. He has done a great deal in the southern part of the state.

TESTING DAIRY COWS AND TESTING ASSOCIATIONS.

Mr. President, Ladies and Gentlemen: I will not detain you a great while. It has been shown in a previous discussion that certain exterior physical characteristics are often a very safe guide as to the production of a dairy cow. However, these outward indications are sometimes misleading and it becomes

necessary to have a more accurate means of determining a cow's productive capacity. In past years, the abundance and cheapness of rough food on the farm, the poor quality of the stock and the general lack of remuneration for the care of such cows, were excuses of some validity for lack of knowledge of the individual's productiveness. The dairyman of the past has been allowed to "go it easy." All this is changed now. The increase in the



PROF. H. A. HOPPER,
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value of land, the increase in cost of supplies, the greater difficulty in securing labor and the larger demand for dairy products which is increasing each year, magnifies the necessity of testing each cow and keeping only those that are profitable. We cannot rely safely upon judgment.

Importance of Testing.

When a man neglects to keep his business affairs firmly in hand so that he may know his standing, we call him deficient in ability. We would expect such a dairyman to keep an unprofitable herd. On the other hand I have known numerous dairymen who were careful about most of their business affairs but who persisted in keeping unprofitable cows in their herd because they were unwilling to use a dollar's worth of time to add a hundred dollars to their profits. In the past a cow was simply a cow; now she is either a faithful servant or a thief.

In either case we must know, for if she is profitable we want to treat her in a way to make her still more so, but if she is a "robber" and living on the good works of her companions, that should be known and the owner dispose of her accordingly. Allow me to call your attention to the results obtained by testing a mixed herd for one year. There are many herds of this kind and a bit of study will show where most of the profits go in such instances.

**Shows Profit per Cow When the Average Cost for Food is \$35.00
Per Year.**

No. of cow.	Pounds milk.	Percent fat.	Total fat.	Value B. F. at 25c lb.	Cost food.	Profit.
1	5082.4	3.61	183.70	\$45.90	\$35.00	\$10.90
2	3412.1	3.78	128.96	32.24	35.00	-2.76
3	4114.5	3.72	148.61	37.15	35.00	2.15
4	4417.0	4.29	189.83	47.45	35.00	12.45
5	4131.8	3.76	155.51	38.88	35.00	3.88
6	4397.2	3.77	165.97	41.49	35.00	6.49
7	4190.8	3.25	136.58	34.14	35.00	-.86
8	5506.8	4.77	264.01	71.00	35.00	36.00
9	4842.7	2.89	140.21	35.05	35.00	.05
10	5152.2	3.71	191.58	47.90	35.00	12.90
				\$431.20	\$350.00	\$81.20

Average profit per cow \$8.12.

Omitting No. 8, average profit per cow \$5.02.

Fewer Cows—More Money.

1	5082.4	3.61	183.70	45.90	\$35.00	\$10.90
4	4417.0	4.29	189.83	47.45	35.00	12.45
6	4397.2	3.77	165.97	41.49	35.00	6.49
8	5506.8	4.77	264.01	71.00	35.00	36.00
10	5152.2	3.71	191.58	47.90	35.00	12.90
				\$253.74	\$175.00	\$78.74

Average profit per cow \$15.74. Gain \$7.62.

The usual answer to the question, how to test, is to provide one's self with the Babcock outfit and some scales and determine each cow's butter-making capacity. In discussing the value of the test and scales in improving the herd, one of my students recently mentioned the ax, so that the list of instruments for this purpose should now read, the Babcock test, the

scales and an ax, and the addition I think is a good one, especially a vigorous application of the last mentioned, when we know for sure where it ought to be applied. It is a startling statement though founded upon fact, that there are 300,000 cows in Illinois today, devoting what small misdirected energy they have to milk production that can more nearly balance their accounts with their owners now by presenting their hides, than can they at any future time. To detect such cows the owners should take composite samples from each once in nine weeks or thereabouts, and test them to determine the average percentage of butterfat in the milk of the individual. To obtain accurate results the milk from each cow should be weighed continuously, but good results can be obtained if weights are taken only during the weeks when sampling is done. When proper arrangements are made the time and labor required to test a herd are insignificant. In fact, the better dairymen weigh continuously and test every week.

Test Associations.

The test association has grown out of the effort of dairymen and teachers to make the testing of cows in dairy communities more general and less burdensome. These organizations were first known in Denmark and have so thoroughly demonstrated their great value there in raising the production of herds that their introduction into this country is sought with considerable hope of realizing equally good returns. The state cannot test all the cows, it is too large a task; the creameries will not; therefore, the owners must do it if it is ever done. About a year ago the first Cow Testing Association to be found in this country was started in Michigan. It marks an important epoch if it can be followed up with still others. The management of the different associations varies in different places. Usually the members hire a competent person who has not only the ability to test milk but is likewise familiar with the principles of feeding and the care and management of a herd. His value is increased with the ability to instruct those with whom he comes in contact. The association should control cows enough to fully occupy the time of the tester. The salary of the tester is the

largest item of expenses. The herds that he is to test should be arranged in a circuit, his board, lodging and transportation being furnished by those for whom he is working. Usually each member pays in proportion to the number of cows tested, the tester keeping an accurate account of each cow's production and reporting the same to the owner. With an annual report of performance from a disinterested person and a knowledge of what the cow has consumed as every intelligent feeder must have, it is easy to decide which cows to retain and which to dispose of immediately.

Cheap Investment.

Fire, accident, and life insurance are looked upon as sane and businesslike investments. Why not make the herd insure itself against loss? It is possible to secure a competent man to do the work in the way indicated at fifty dollars per month. If each herd is tested once in two months, it will be possible for him to handle 20 herds of 40 cows each or 800 cows per year. These figures assume that the herds are within easy driving distance and arrangements are fairly convenient, for the tester should not be compelled to go so rapidly that observations cannot be made and time had for free discussion with the owner. The financial statement for a separate herd would be about as follows:

Cost to test a herd per year	\$30.00
Cost to test one cow per year .....	.75
40 cows worth \$60.00 each	\$2400.00

\$30.00 is $1\frac{3}{4}$ per cent on the investment in cattle of producing age. No safer or better means can be devised to protect the best interests of the herd. If no men are available to conduct the test, they may easily be obtained by sending the bright boys of the community to the Agricultural College where they are soon taught how to keep herd records, test milk and many other useful things.

Co-operation the Key.

When the nation's honor is at stake and the foundations of personal liberty are threatened, men go to war gladly to protect their homes. They cooperate to resist a common foe. Why should they not unite also in a war upon the "robber cow" and break the chains that bind so many, helplessly, to a profitless servant? These foes are everywhere, in every county, upon every farm. Dairymen need cooperation in testing, in breeding, in buying, in selling, for in this way they can best protect their interests, individually and collectively. The testing problem is theirs; what they do with it in the near future, will determine in a large measure the progress of the industry.

Herbert A. Hopper,
University of Illinois College of Agriculture.

By the President:—Are there any questions on this testing by means of testing associations?

This is a very important matter. This is the last lecture for today. I wish you would all think about what Mr. Hopper has told you, and if any questions come up that you want to know more about it, write him at Urbana, care of the University and he will gladly tell you more.

We will now adjourn. Tomorrow morning at the Opera House, Mr. Hopper will give us another talk on "The Farmer's Cow," and I hope you will all be there to hear it.

The Farmer's Cow.

Men engaged in different lines of agricultural activity require different means to accomplish their ends. In accordance with this fact it has come to be generally understood that the producer of beef should employ blood derived from beef producing breeds, while the milk producer and creamery patron should look to the dairy breeds for greatest profit. It has been well

established that animals adapted to a particular purpose are more remunerative because their energies can be better applied. In the same way a man trained for a particular profession is expert in his work and consequently able not only to accomplish more but to do it better than the untrained. Breeding and selection in cattle for particular purposes have wrought the same changes in them that the breeding and education of men has accomplished in the human family. A dairy cow's function is the production of dairy products, and if she can produce 450 pounds of butter fat in a year she is entitled to be called "A Dairy Queen." We usually speak of her as a dairy cow but one that by her inherent powers tends to utilize her food for the elaboration of flesh we call a beef cow. On many farms there are herds not bred for a particular purpose. Many times the owners do not recognize these distinctions and because of interest in other things even though the herd is kept for its milk, the performance, care and breeding of the cattle received comparatively little attention. Such herds for convenience we will call farmer's herds.

What Is the Farmer's Cow?

Too often the farmer does not place great enough importance upon the improvement of the herd. It is not desired to cast any reproach upon the farmer or his cow, but the facts in hand point to the following conclusions. A "scrub" bull usually heads the herd. He is often a son of a favorite cow in the herd and is doubtless related more or less closely to many of the other individuals. His dam has had greatness thrust upon her instead of earning it, for her superiority rests more upon fancy than upon fact. She may or may not be a good cow for she has never had a chance to show what she could accomplish under good conditions. Her condition is duplicated by every other cow in the herd. No breeding record is kept, so that instead of freshening in the fall and producing milk when it commands a high price, they drop their calves in the spring when milk is cheap. Soon the heat and flies, together with drough, conspire

to reduce the production. Later in the absence of proper food and protection from the cold, "Jack Frost" effectually closes the lactation period. In the meantime the cow has perhaps been in milk 250 days and yielded 130 lbs. of butterfat, in which case she is already unable to square the account and has three months' board still to pay.

The following table presents figures obtained from testing some thirty herds supplying milk for various purposes. The fact should be borne in mind that they were being kept for their profit as dairy animals. The figures given show the average milk and butterfat yield per cow in the different herds and are grouped under the different headings according to the interest taken by their owners in their improvement and management. The average production in the farmer's herds is 177.6 lbs. butterfat per year, while in the dairy herds, the average yield is 264.1 lbs., giving a difference of 86.5 lbs. in favor of the latter. This at 25 cents per pound amounts to \$21.62 per cow, which in a herd of twenty cows means a difference of \$432.40 in favor of the dairyman.

TABLE I.
Average Yearly Production Per Cow.

Farmer's Herds.			Dairy Herds.		
Herd. No.	Milk.	B. fat.	Herd. No.	Milk.	B. fat.
7	4524.7	170.5	1	5753.0	261.6
8	4485.7	192.5	2	7376.4	267.7
12	4503.6	175.5	3	8056.7	275.7
15	5127.8	206.8	4	6219.7	242.3
16	4607.5	182.5	6	7873.1	285.2
17	4354.6	172.6	10	5430.8	227.3
23	3314.1	142.0	11	5969.4	205.0
			19	5409.6	242.9
			20	6106.3	235.0
			21	5970.9	242.8
			24	5921.4	350.1
			27	6111.7	232.9
			28	8468.6	274.6
Average	4416.8	177.6	Average	6512.8	264.1
	264.1—177.6=86.5.				
	86.5@25c=\$21.62.				

TABLE II.

Comparing the Production of Cows that We Sold With the Production of Those Substituted for Them.

Cows Sold.							
No. of cow.	Date of calving	Test week ending.	Pound milk.	Percent fat.	Lbs. butter fat.	Year's milk.	Record. B. fat.
2.....	Aug. 16	Dec. 26	81.8	5.0	4.09	.....	.....
3.....	Oct. 8	Dec. 26	95.6	4.2	4.01	.....	.....
4.....	Oct. 16	Dec. 26	156.1	4.3	6.71	.....	.....
5.....	July 20	Dec. 26	90.9	4.6	4.18	.....	.....
6.....	June 15	Dec. 26	132.0	4.0	5.28	.....	.....
7.....	July 25	Dec. 26	119.6	4.2	5.02	.....	.....
8.....	Oct. 5	Dec. 26	116.7	4.2	4.90	.....	.....
Average			113.24	4.3	4.88	.....	.....
Cows Substituted.							
10.....	Jan. 31	Feb. 27	202.9	4.2	8.52	7547.8	308.07
11.....	Feb. 25	Apr. 29	158.7	3.2	5.08	6719.1	221.13
12.....	June 25	Sept. 2	196.6	3.4	6.69	7590.2	261.50
13.....	Sept. 15	Nov. 4	220.5	3.0	6.62	8972.5	263.52
14.....	Jan. 10	Mar. 10	256.9	3.4	8.73	9454.3	324.08
15.....	Dec. 26	Jan. 6	210.9	4.7	9.91	.....	.....
16.....	June 18	July 14	189.0	4.0	7.56	.....	.....
17.....	June 6	July 14	277.8	4.6	12.68	.....	.....
18.....	Sept. 17	Nov. 17	263.3	2.8	7.37	.....	.....
19.....	Nov. 4	Nov. 17	264.8	3.4	9.00	.....	.....
Average			224.14	3.6	8.21	8056.78	275.78

Cows Nos. 1 and 9 did not complete a year.

This condition could be found in many herds. The wise farmer will protect his own interests and test his cows.

Table II. shows what happens when a farmer becomes a dairyman. The owner of this herd after testing twice, discovered that his cows were yielding only 4.88 lbs. of butterfat per week. They were ordinary nondescript cattle which he sold and replaced by high grade dairy cows. Both the old and the new are compared in Table II. showing that with all things comparable the latter were practically twice as good as the former. This man began to see the dawn of prosperity and bought more high grade cows with the result that now he has an excellent herd yielding between 8,000 and 9,000 pounds of milk and well above 300 pounds of butter fat. His original herd would always have kept him in the rut.

TABLE III.

No.	Total milk.	Percent fat.	Total fat.	Av. milk per day.	Av. fat per day.	Value milk at \$1.15 per 100.	Value B. F. at 25c lb.	Age.	Breed.
Best cow...24	4337.2	4.96	215.55	18.53	.921	\$49.87	\$53.88	7	Gr. Jersey.
Poorest cow.....26	1845.8	4.24	78.34	5.46	.237	21.22	19.58	2	Native.
Av. of herd... No. Days cow. in milk.	3314.1	4.28	142.05	13.43	.576	\$38.11	\$35.51		
1.....207	2399.4	4.64	111.34	11.59	.537	\$27.58	\$27.83	2	Jersey
2.....236	2577.8	3.26	84.04	10.92	.356	29.64	21.01	2	Jersey.
3.....236	3495.2	4.22	147.69	14.81	.625	40.19	36.92	2	Gr. Jersey.
4.....234	3521.1	4.75	167.30	15.04	.714	40.49	41.82	5	Gr. Jersey.
5.....258	3019.7	4.70	141.95	11.70	.550	34.72	35.48	4	Gr. Jersey.
6.....255	3804.5	4.92	187.37	14.91	.734	43.75	46.84	5	Jersey
7.....230	2933.7	4.54	133.21	12.75	.579	33.73	33.30	6	Gr. Jersey.
8.....232	2903.9	5.21	151.57	12.51	.653	33.39	37.89	2	Jersey.
9.....246	3931.5	3.66	144.02	15.98	.585	45.21	36.00	8	Holstein.
10.....230	3222.8	4.00	129.11	14.01	.561	37.06	32.27	8	Gr. Jersey.
11.....249	3654.0	4.07	148.76	14.67	.597	42.02	37.19	5	Jersey
12.....246	3496.3	4.75	166.36	14.21	.676	40.20	41.59	5	Gr. Holstein
13.....227	4249.7	4.19	178.10	18.71	.784	48.87	44.52	5	Gr. Jersey.
14.....365	3543.2	4.42	156.64	9.70	.429	40.70	39.16	6	Gr. Jersey.
15.....206	3154.4	4.61	145.85	15.79	.708	36.27	36.46	2	Native.
16.....251	3016.9	3.93	118.84	12.19	.473	34.69	29.71	2	Gr. Holstein.
18.....233	3004.2	4.00	120.27	12.89	.516	34.54	30.06	4	Native.
19.....249	4336.0	3.23	140.37	17.41	.563	49.86	35.09	6	Holstein.
20.....213	3320.9	4.09	135.95	15.59	.638	38.19	33.98	5	Gr. Jersey.
21.....273	4187.3	4.43	185.76	15.33	.680	48.15	46.44	5	Gr. Jersey.
22.....206	3114.1	4.28	133.48	15.11	.647	35.81	23.37	5	Gr. Jersey.
23.....239	3190.8	3.94	125.81	13.35	.526	36.69	31.45	4	Native.
24.....234	4337.2	4.96	215.55	18.52	.921	49.87	53.88	7	Gr. Jersey.
25.....276	2594.2	4.23	109.77	9.39	.397	30.03	27.44	4	Angus.
26.....338	1845.8	4.24	78.34	5.46	.237	21.22	19.58	2	Native.
	82854.6		3557.45			\$952.85	\$879.25		

A herd in which quantity of cows was given more weight than quality.

In Table III. you will note the yearly performance of 25 cows. This herd shows what may be expected when the cattle are inferior as is so often the case. The best yielded only 215.5

pounds of butterfat while the poorest produced only 78.3 pounds. The average of the herd was 142.00 pounds of butter fat which indicates that the cattle did little more than pay their keep. In contrast to this is the report of a neighboring herd given in Tabue IV. The first five cows yielded over 400 pounds of butter fat per year. The best one producing 477.3 pounds of fat; the poorest 161 pounds. The average of the herd is 350 pounds of butter fat per year. These figures tell the story as plainly as words. Note the difference in these herds and then let each decide whether he will keep a so-called farmer's herd or be a dairyman.

TABLE IV.

	No.	Total milk.	Percent fat	Total fat.	Av. milk per day.	Av. fat per day.	Value milk at \$1.15 per 100.	Value B. F. at 25c lb.	Age.	Breed.
Best cow...	1	6911.4	6.91	477.3	21.80	1.50	\$79.48	\$119.32	6	Jersey.
Poorest cow.....	9	3477.6	4.64	161.46	28.22	1.35	39.99	40.36	15	Gr. Angus.
Av. of herd..		5921.41	5.91	350.17	21.10	1.25	\$69.09	\$87.54		
No. Days cow. in milk.										
1.....	317	6911.4	6.91	477.3	21.80	1.50	\$79.48	\$119.32	6	Jersey.
2.....	337	6746.8	6.00	405.0	20.02	1.20	77.58	101.25	7	Gr. Jersey.
3.....	288	6734.1	6.38	429.7	23.37	1.49	77.44	107.42	6	Gr. Holstein.
4.....	323	7349.1	5.58	410.35	22.75	1.27	84.51	102.58	7	Gr. Jersey.
5.....	294	6739.7	6.19	416.93	22.92	1.41	77.50	104.23	8	Jersey.
6.....	272	5485.0	4.85	266.00	20.16	.977	63.07	66.50	8	Gr. Shorth'n.
7.....	307	5562.1	5.63	313.44	18.11	1.02	63.96	78.36	1	Gr. Shorth'n.
8.....	263	4286.9	6.33	271.40	16.30	1.03	49.29	67.85	15	Gr. Shorth'n.
9.....	119	3477.6	4.64	161.46	29.22	1.35	39.99	40.36	15	Gr. Angus.
		53292.7		3151.58			\$612.82	\$787.61		

Why Is the Farmer's Cow Unprofitable.

There are many reasons for this. It is a well recognized principle that returns from any effort are in proportion to the energy and business foresight put into it. The reason that so many herds are unprofitable is to be attributed to the men

rather than to the cattle. There is a crying need for intelligence in the management of our herds. Thoughtful wide-awake men who will not persist in standing in their own light will do more for the industry than anything else. Wherever a census of creamery patrons has been taken, it develops that those who will not read dairy literature are invariably receiving the lowest returns per cow. Recently the owner of an inferior herd asked \$100.00 in lieu of the annoyance incident to having his herd tested by the Experiment Station without expense to him. Verily, to some, darkness is preferable to light, so much so that they are willing to pay the difference. Many cows are inferior and should be removed. Many are improperly fed and not comfortably housed which greatly reduces their returns.

The scales, test and an ax need to be carefully employed and after the poor ones have been sorted out the good ones may be bred to a pure bred sire, which if continued for several generations will result in a startling improvement. Before we will get this improvement, there must be a greater appreciation for better blood, and a willingness to accord it conditions in which it can do its best work.

Herbert A. Hopper,
University of Illinois College of Agriculture.



Directors' Meeting at Springfield.

Directors of the Illinois State Dairymen's Ass'n met at the State Fair in Oct. 1906. The session being held in one of the dairy barns. Pres. Wiggins presided and the Secretary made a report in the matter of location for the next state convention. After a discussion of the report, it was decided to hold the next convention in Joliet in connection with the meeting of the Will County Farmers' Institute, Jan. 16-17-18-19. The Secretary was instructed to arrange the program and make all preparations for the convention and to co-operate with the institute so as not to have a conflict in program.

Directors' Meeting at Quincy.

Directors of the Illinois State Dairymen's Ass'n met in Quincy during the February convention of the State Farmers' Institute, 1907, Treasurer Coolidge and Secretary Caven, Directors Wiggins, Mason, Jansen, Campbell, Kimzey being present.

Upon motion the President was directed to appoint a committee on location of the next annual convention, and to determine the time for holding such meeting.

President Wiggins made an oral report of the work the association had been lately doing and presented a copy of a letter he had written to the State Board of Agriculture in regard to the dairy exhibits at the state fair and the management of the dairy building.

That copy is here presented as follows :

Springfield, Ill., February 18th, 1907.

To the Honorable

State Board of Agriculture,
Springfield, Ill.

Gentlemen:—For a number of years, our State Fair, as well as the various Dairy Associations, have offered premiums for exhibits of cheese and of butter at their respective shows, but

it is only within comparatively recent times that the importance of creating a classification for milk and for cream, in which the necessity for sanitary conditions in its production and care could be emphasized, has been realized.

At the annual meeting of the Illinois State Dairymen's Associations held in Joliet in January of this year, it was the desire of the members and dairymen there present expressed by the unanimous adoption of a resolution to the effect, that your Honorable Board do make such a classification for the State Fair to be held this fall.

Should you see fit to grant our request, the National Department at Washington, D. C., has agreed to send an expert without expense to your Honorable Board, to score the exhibits which may be submitted.

We submit herewith the classification followed by the National Dairy Show in 1906, and which proved eminently satisfactory to the dairymen:

CLASSIFICATION OF THE EXHIBITS.

The exhibits were divided into three classes as follows:

Class I. Certified Milk:—This comprised all the milk sold under a guaranty as to its purity, chemical composition, and bacterial content, most milk of this class being produced by expert dairymen in various localities under the direction of the local milk commissions.

Class II. Market Milk—A large percentage of the milk supply of our cities was covered by this class, which of course included all milk that is not sold under any guaranty as to its character.

Class III. Cream—This was to be sweet cream, unpasteurized and free from preservatives. In fact it was specified that none of the products should be pasteurized. Pasteurized products were not included, principally because the work was more in the nature of an experiment and it was thought best not to include too many classes in the first attempt.

Trusting that you will realize the importance of aiding better sanitary conditions of milk products by offering suitable premiums for the above classification, and assuring you of the hearty support of the dairymen of the state in making this exhibit a success, I remain,

Respectfully yours,

L. N. WIGGINS, President.

Ill. State Dairymen's Association.

He also presented a copy of the bill for the regular appropriation to the association which bill was later passed by the legislature supplying the money under which the association is doing its work this year and will do its work next year.

The following is a copy of the bill.

A BILL.

For an act making an appropriation for the Illinois Dairymen's Association.

SECTION I—Be it enacted by the people of the State of Illinois, represented in the General Assembly: That the sum of Two Thousand Five Hundred Dollars (\$2,500.00) per annum for the years 1907 and 1908 be and the same is hereby, appropriated to aid the Illinois Dairymen's Association in compiling, publishing and distributing its reports, and other necessary expenses.

SECTION II—The Auditor of Public Accounts is hereby authorized to draw his warrant upon the State Treasurer for the sum in this act specified, on bills of particulars certified to by the officials of said association, to the order of the president of said association, and the State Treasurer shall pay the same out of any funds in the treasury not otherwise appropriated.

The election of a secretary for the ensuing year was the next business and Geo. Caven was reelected to that position. Adolph Meyer of Greenville was duly elected treasurer to take the office when the business of the year had been closed, or on July 1, 1907, when the new appropriation became available.

President Wiggins reported on the operations of the feed-

ing stuffs law in the state and the conferences he has had with the state food commission in regard to the matter.

He also reported on the examination of students at the university to determine their ability as testers of cows in the state and announced the names of those who had successfully passed such an examination and were entitled to certificates of efficiency, the same to be issued by the Secretary of the association and after being properly signed to be sent to the following students:

Chester Wright, Bloomington
Geo. A. Turner, Hebron
Roy P. Rogers, Farina
Frank M. Chase, Harvard
Harry Coon, Farina
Howard Case, Alta
W. E. Cox, Urbana
W. H. Sanman, Havanna
H. B. Irish, Farina
H. F. Denny, Augusta
Edw. Zummier, Metropolis
Sumner Livingston, Alta
Ed. Mongerson, Wasco

On motion the Secretary was empowered to make usual offers of prizes for tests of dairy cattle at the state fair.

On motion it was also decided that the accounts of the Treasurer and Secretary should be itemized so as to show for what each amount was paid and to so appear in the published report.

The matter of running a dairy train on the Santa Fe road was discussed and approved and the Secretary was empowered to go ahead with the arrangements and carry them through to success if it was found possible to do so within the available means of the association.

Reports were read from the Secretary and Treasurer and not being complete because the business of the year and not yet

been closed, they were referred to the President to be audited by him as soon as the year's business was entered.

The Secretary was also instructed to proceed with the publishing of the annual report and to let contract for such work to the lowest bidder. There being no further business the meeting adjourned.

SECRETARY'S REPORT.

Directors, Illinois State Dairymen's Ass'n,

Gentlemen:—I hereby submit a report of the money received and paid out by the Secretary during the year of July 1st, 1906, to July 1st, 1907, and a brief statement of the work of the office.

Heretofore the association has confined its efforts to the annual convention and the sending out of reports of proceedings of that meeting, but during the year just closed, besides the convention, the association ran a dairy train over the main line of the Santa Fe from Chicago to the Mississippi River and down their Pekin branch to Morton. This train was run according to the following schedule:

SCHEDULE OF

Special train in Illinois: March 25th to 30th inclusive, Chicago to Dallas and Pekin branch, account Illinois Dairymen's Association.

	Leave Chicago	7:50 a. m.
	Arrive Millsdale	9:00 a. m.
	Leave Millsdale	10:15 a. m.
	Arrive Blodgett	10:25 a. m.
	Leave Blodgett	11:25 a. m.
March 25th.	Arrive Lorenzo	11:35 a. m.
	Leave Lorenzo	12:30 p. m.
	Arrive Coal City	12:45 p. m.
	Leave Coal City	3:00 p. m.
	Arrive Mazon	3:15 p. m.

March 26th.

Leave Mazon	8:30 a. m.
Arrive Verona	840 a. m.
Leave Verona	9:50 a. m.
Arrive Kinsman	10:00 a. m.
Leave Kinsman	11:15 a. m.
Arrive Ransom	11:25 a. m.
Leave Ransom	2:00 p. m.
Arrive Kernan	2:10 p. m.
Leave Kernan	3:25 p. m.
Arrive Ancona	4:00 p. m.
Leave Ancona	5:00 p. m.
Arrive Streator	5:15 p. m.

March 27th.

Leave Streator	8:15 a. m.
Arrive Caton	8:45 a. m.
Leave Caton	10:00 a. m.
Arrive Toluca	10:10 a. m.
Leave Toluca	12:30 p. m.
Arrive Wilburn	1:00 p. m.
Leave Wilburn	2:15 p. m.
Arrive Edelstein	3:00 p. m.
Leave Edelstein	4:00 p. m.
Arrive Princeville	4:15 p. m.

March 28th.

Leave Princeville	8:30 a. m.
Arrive Laura	8:50 a. m.
Leave Laura	10:15 a. m.
Arrive Williamsfield	10:30 a. m.
Leave Williamsfield	1:00 p. m.
Arrive Appleton	1:20 p. m.
Leave Appleton	2:20 p. m.
Arrive Surrey	3:00 p. m.
Leave Surrey	4:00 p. m.
Arrive Cameron	4:10 p. m.

March 29th.

Leave Cameron	8:40 a. m.
Arrive Ormonde	9:00 a. m.
Leave Ormonde	10:15 a. m.
Arrive Smithshire	10:45 a. m.
Leave Smithshire	12:00 m.
Arrive Stronghurst	12:20 p. m.
Leave Stronghurst	2:20 p. m.
Arrive Lomax	2:35 p. m.
Leave Lomax	3:45 p. m.
Arrive Dallas	4:00 p. m.
Leave Dallas	4:30 p. m.

	Arrive Long Point	7:00 a. m.
	Leave Long Point	9:30 a. m.
	Arrive Dana	9:40 a. m.
	Leave Dana	10:40 a. m.
	Arrive Benson	11:10 a. m.
	Leave Benson	12:10 p. m.
March 30th.	Arrive Roanoke	12:20 p. m.
	Leave Roanoke	2:30 p. m.
	Arrive Washington	3:00 p. m.
	Leave Washington	4:00 p. m.
	Arrive Morton	4:20 a. m.
	Return to Chicago after	5:30 p. m.,
	this date.	

The territory covered is new in dairying and while we found farmers generally anxious to learn about the possibilities of dairy farming, we found a great many who had very limited ideas as to the value of the industry or how it should be conducted in order to insure a profit. For example; the expression was heard a number of times, that land in that part of the state is too valuable for dairying, when in fact it is the only branch of farming that will make possible a profit on the valuation that these farmers put upon their land.

During the week the dairy train was run, the weather was exceedingly favorable for outdoor work and gave promises of an unusual early opening of Spring. On that account many farmers were in the field plowing and sowing oats and the attendance at the train meetings was not as large as would have been the case, had the weather been the usual variety for the last of March.

The dairy train consisted of an engine and baggage car, two day coaches and a sleeper. In the baggage car were shown separators and other dairy supplies.

The day coaches were used for the meetings and the sleeper was for the accommodation of speakers, officers of the association and others in charge of the train.

Stops were made at the various places and if the audience was large enough to fill both coaches, speakers were provided for each during the time the train was at the station and time was also given for the audience to inspect the dairy machinery



W. E. JANES, Hinsdale.



A. F. JANSEN, Effingham.

Elected Directors of Illinois State Dairymen's Association at Joliet Convention, January, 1907.

and supplies in the baggage car. Where there were enough children to make a separate meeting for them such was held in one of the cars.

During the week the train made thirty stops and the total attendance of farmers was in the neighborhood of 3200. This number of farmers were talked to at a very light expense. The whole cost to the association above the returns for sleeping car service paid by the representatives of the supply firms, was not more than \$200.00. Of course the expense of the train itself is not included, as the Santa Fe railroad realizing the importance of building up dairying along their line of road gave us the train free and the service of the men who operated it, the association having to pay only for the sleeping car.

We believe that the train was a splendid investment and that the foundation for future dairy growth in that section was laid and that the results will be greater in the future than they appear at the present time.

We believe that the dairy train idea should be encouraged wherever we can have the co-operation of the railroads and that similar trains should be run wherever the occasion arises.

In the matter of expense of the Secretary's office, some of the items are larger on account of the extra work of the office in arranging for the dairy train, but otherwise they are practically the same as in former years.

The chief expenses are for postage and traveling expense and in this report we have expenses of the dairy train some of which would not appear in future enterprises of that kind. For example; the banners used on the car to designate the purpose of the train, are in good order and capable of service on future trains.

In the matter of postage expense, will say that from the Secretary's office were mailed out 270 copies of the annual report to members in the state and to other places where inquiry was made for them. The postage on each was eleven cents. 550 programs and posters at two cents were mailed out and for six weeks prior to the Joliet convention, articles were mailed out

each week to from fifty to one hundred and fifty papers in the state advertising the coming meeting.

The postage item in connection with the dairy train was also quite heavy and the other items are covered by receipted bills audited by the President of the association.

The following statement shows various items received and paid out:

PAID OUT.

Stamps	\$ 69.87
Express, freight, cartage	22.30
Traveling	46.98
Telegrams and Telephones	5.39
Envelopes (reports, programs, etc.)	7.89
Banners and Repairs Dairy train	52.30
Hotel (Joliet) Expense Speakers and officers	56.50
Paid Treasurer Coolidge	462.30
Chairs in exhibit hall Joliet	4.95
J. G. Lombard	5.00
Stenographer's expense	4.65
Exhibit Hall, Sign and Cards	7.45
Labor	3.50
Exchange .....	.40
Printing, folding, etc.	19.75
Miscellaneous	2.45
	<hr/>
Total	\$771.68

RECEIVED.

Treasurer Coolidge	\$ 50.00
Francis D. Moulton & Co.	10.00
Colonial Salt Co.	10.00
Monroe Hotel (Butter)	60.00
Blanke & Hauke	10.00
Well-Richardson Co.	20.00
J. B. Ford & Co.	20.00
Diamond Crystal Salt Co.	10.00
A. H. Barber Creamery Sup. Co.	10.00

DeLaval Sep. Co.	35.00
Sharples Separator Co.	25.00
Elgin Butter Tub Co.	10.00
International Salt Co.	20.00
Creamery Pkg. Mfg. Co.	25.00
Worcester Salt Co.	10.00
D. H. Burrell & Co.	10.00
Vermont Farm Mchne. Co.	35.00
Chr. Hansen's Laboratory	10.00
E. L. Wilson	28.00
L. N. Wiggins	20.00
Empire Cream Sep. Co.	10.00
Memberships	150.00
Dairy Train	134.00
International Harvester Co.	10.00
Treasurer Coolidge	39.38
Total	\$771.68

TREASURER'S REPORT.

Galesburg, Ill., July 1, 1907.

To the Board of Directors of the Illinois Dairymen's Association I would submit the following report of the financial condition of the Association to this date.

Receipts.

To balance on hand last year	\$ 298.89
August 1, from State appropriation	1500.00
From Geo. Caven, Secretary .....y	462.30
Total receipts	\$2261.19
Approved—Lewis N. Wiggins.	

Disbursements.

Date.	No.	To Whom Paid.	Purpose.	Amount.
1906. Feb. 6	933	Otis C. Murray	Premium \$10, Butter \$5....	\$ 15.00
Oct. 24	954	W. R. Kimzey	Springfield expenses	12.10
Oct. 24	955	Henry J. Youngs	Chicago and Springfield expenses	16.08
Oct. 24	956	Geo. Caven	Salary as secretary	100.00
Oct. 24	957	Geo. Caven	Expense of mailing reports	50.00

Date.	1906.	Voucher.	To Whom Paid.	Purpose.	Amount.
Dec. 18	958		John Coolidge	Springfield expenses	7.00
Dec. 18	959		The Elgin Dairy Re- port	Programs, cards, etc.	56.25
Dec. 18	960		Lowrie & Black	Printing annual report ...	727.17
Dec. 18	961		Chicago Dairy Pro- duce	Cuts in report	26.61
1907					
Feb. 6	962		M. S. Campbell	Springfield expenses	15.95
Feb. 6	963		C. H. Weaver & Co...	Butter judge expenses	3.40
Feb. 6	964		N. P. Hull	Expense Joliet meeting....	17.25
Feb. 6	965		Chas. Foss	Expense Joliet meeting....	7.44
Feb. 6	966		H. A. Hopper	Expense Joliet meeting....	9.32
Feb. 6	967		J. M. Trueman	Expense Joliet meeting....	13.03
Feb. 6	968		Creamery Supply Co...	Butter tryers	5.38
Feb. 6	969		Chicago Produce Co...	Money advanced to Central Pass. Assn.	11.00
Feb. 6	970		Bert L. Thomas	Expense Joliet meeting....	5.50
Feb. 6	971		W. R. Kimzey	Expense Joliet meeting....	29.90
Feb. 6	972		E. Davenport.	Expense Joliet meeting....	12.81
Feb. 6	973		Carl E. Lee	Expense Joliet meeting....	10.87
Feb. 9	974		Henry Wallace	Expense Joliet meeting....	49.50
Feb. 6	975		Geo. Caven	Salary	100.00
Feb. 6	976		Whitehead & Hoag Co.	Badges for Joliet meeting.	33.35
Feb. 6	977		John Coolidge	Expense Joliet meeting....	12.50
Feb. 6	978		J. H. Palmer	Prorata \$2.20, butter \$7.50.	9.70
Feb. 6	979		Louis Neilson	Prorata \$8.80, butter \$5.00.	13.80
Feb. 7	980		Geo. W. Hoppensbeadt..	Prorata \$11.00, butter \$5.00	16.00
Feb. 7	981		A. B. Conant	Prorata \$5.50, butter \$5.00.	10.50
Feb. 7	982		Robt. Moren	Prorata	8.80
Feb. 7	983		Wm. Englebrect	Prorata	4.40
Feb. 7	984		R. N. Zimmerman ...	Prorata \$2.20, butter \$5.00.	7.20
Feb. 7	985		David Van Patten ...	Prorata	4.40
Feb. 7	986		Peter Nelson	Prorata \$6.60, butter \$7.50.	14.10
Feb. 7	988		J. L. Cooksley	Prorata \$2.20, butter \$5.00.	7.20
Feb. 7	989		Wm. J. Kane	Prorata	9.90
Feb. 7	990		C. Christensen	Prorata	8.80
Feb. 7	991		E. T. Moore	Prorata \$6.60, butter \$5.00.	11.60
Feb. 7	992		E. H. Coulson	Prorata \$2.20, butter \$5.00.	7.20
Feb. 7	993		Anton Bueler	Prorata \$11.00, butter \$5.00	16.00
Feb. 7	994		J. Scheldmiller	Prorata \$2.20, butter \$5.00.	7.20
Feb. 7	995		Alice M. Cooksley ...	Prorata	11.00
Feb. 7	996		J. G. Goeller	Prorata \$4.40, butter \$5.00.	9.40
Feb. 7.	997		Thos. Slonborg	Prorata	2.00
Feb. 7	998		J. S. Bennington	Prorata	8.00
Feb. 7	999		Chas. Foss	Prorata	8.00
Feb. 7.	1000		S. W. Miller	Prorata	2.00
Feb. 7	1001		John Coldwater	Prorata	2.00

Date.	1907. Voucher.	To Whom Paid.	Purpose.	Amount.
Feb. 7	1002	Geo. Pester	Prorata	8.00
Feb. 7	1003	Geo. S. Bristol	Prorata	9.00
Feb. 7	1004	R. B. Moll	Butter	2.50
Feb. 7.	1005	Frank Koors	Butter	5.00
Feb. 7	1006	Geo. G. Wilson	Butter	5.00
Feb. 7	1007	T. W. Marquardt	Butter	7.50
Feb. 7	1008	E. L. Wilson	Butter	5.00
Feb. 7	1009	B. M. Campbell	Prorata \$15.00, butter \$5.00	20.00
Feb. 6	1010	J. R. Biddulph	Premium on cheese	14.00
Feb. 6	1011	O. C. Gregg	Expense Joliet meeting....	40.82
Feb. 12	1012	L. N. Wiggins	Expense Joliet meeting....	46.85
Feb. 12	1013	W. J. Fraser	Expense Joliet meeting....	10.52
Feb. 20	1014	L. E. Johnson	Butter	2.75
Mch. 1	1015	C. C. Hayden	Joliet expenses ...	6.85
Mch. 1	1016	M. S. Campbell	Quincy expenses	22.28
Mch. 1	1017	Emma W. Higgin- botham	Stenographic report	75.00
Mch. 1	1018	J. P. Mason	Springfield and Joliet exp..	12.75
Mch. 1	1019	A. F. Jansen	Quincy expenses	12.64
Apr. 4	1020	S. B. Shilling	Dairy train expenses	10.57
Apr. 4	1021	W. J. Fraser	Dairy train expenses	6.24
Apr. 4	1022	H. A. Hopper	Dairy train expenses	12.73
Apr. 4	1023	N. P. Hull	Dairy train expenses	53.21
Apr. 4	1024	Elgin Dairy Report...	Dairy train adv. matter....	23.00
Apr. 4	1026	Lowrie & Black	Freight on reports	12.59
Apr. 9	1027	The Pullman Co.	Sleeper, dairy train	137.50
Apr. 9	1028	L. N. Wiggins	Dairy train expense	23.00
Apr. 9	1029	G. C. Hunter	Photos dairy train	7.00
Apr. 9	1030	Geo. W. Ingersoll	Letter heads for office....	8.75
Apr. 9	1031	G. S. Conibear	Photos dairy train	4.31
May 22	1032	Joseph Newman	Springfield expenses	18.50
May 22	1033	Geo. Caven	To balance accounts, 1906 and 1907	39.38
July 1	1034	John Coolidge	Quincy expenses, stamps, etc.	12.50
July 1		Balance on hand ...		38.84

Respectfully,

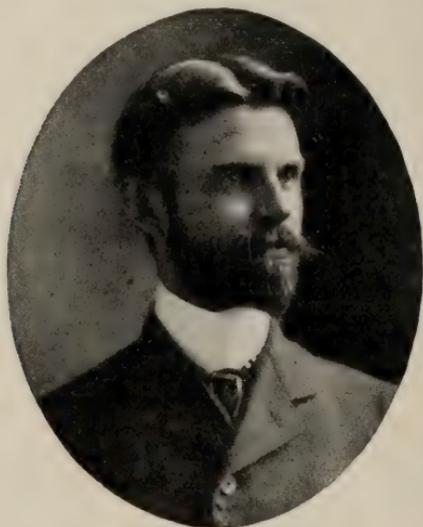
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John Coolidge, Treasurer.

Approved—Lewis N. Wiggins.

BETTER THINGS FOR THE DAIRYMAN.
—Multitude of Worthless Cows Must Go to the Butcher.
—How to Get the Good Ones That Make Big Money.
—

The actual relation of the cow and the herd to the *real* profits derived from dairy farming is little realized by the people depending upon this occupation for a living. There is no line of farming where well-directed effort will pay so large a profit. Notice I say *well directed* effort for the profits derived

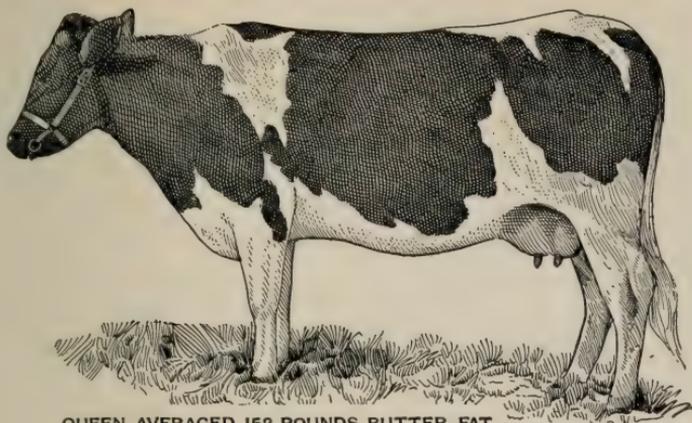


PROF. W. J. FRASER,
Chief Department Dairy Husbandry,
University of Illinois.

from dairy farming depend almost entirely upon the good judgment and common sense used. The profits on the average dairy farm in Illinois today can easily be doubled.

Discovered Only by Scales and Test.

Quite unsuspected these Queens have everywhere honey-combed dairy society. All of them are dead beats; they will



QUEEN AVERAGED 152 POUNDS BUTTER FAT.
QUEEN LACKS \$2.00 OF PAYING HER BOARD AND LODGING.

never pay for their board. The more of them a dairyman keeps, the poorer he is. The way to find out—the only sure way—is to weigh and test the milk of each cow.

WHAT ROSE HATH WROUGHT.

Fifty-Seven Weeks of Advanced Registry Record.

Twelve pounds of butter fat for a single week, is the production requirement for admission to the Holstein-Friesian ad-



ROSE AVERAGED 384 POUNDS BUTTER FAT.
ROSE RETURNS \$56.00 PER YEAR PROFIT.

vanced register. Three times in her third lactation period Rose made 17 2-3 pounds of butter fat per week. Twenty different weeks of that period her yield was more than 12 pounds per week. For five successive weeks, six months after calving, her average was 13 pounds of butter fat per week. In her fourth lactation period there were 16 weeks during each of which Rose made more than 12 pounds of butter fat; and in her fifth period, 21 weeks.

Total production for 12 years, 87, 102.3 pounds of milk—43 1-2 tons—10,248 gallons—1,281 cans of 8 gallons each—106 wagon loads of 12 cans each; allowing three rods for a team this would make a procession one mile long—6 carloads, making a good milk train.

Butter for 12 years, 4,318.36 pounds, worth at present prices (25 cents per pound), \$1,079.59.

Skim-milk for 12 years, 72,585 pounds, worth at 15 cents per 100 pounds, \$108.88.

Total receipts for 12 years (not reckoning calves nor manure), \$1,188.47, or \$99.04 per year.

Just think what the receipts of a dairyman would be whose herd consisted of 25 cows of this kind—\$2,500 per year, not counting calves and manure.

Rose was bought for \$50 when 4 years of age. She has had only ordinary treatment, no better than she would receive on a good dairy farm. She has not been pampered or fed to produce the utmost amount of milk.

Rose Is Representative.

Remarkable as is the performance of this grade cow, she is not heralded as standing apart in unapproachable splendor, but as a great leader of the thousands of money-making cows in Illinois.

Illinois has a million dairy cows. Like men, they do not all travel the same path nor reach the same destination. Whither are they going, and how far, in their service for the dairyman? Who has stopped to ask, much less to answer the question? What difference is there in their efficiency? In the profits they

leave in the owner's pocket at the close of the year? The dairyman has been in the dark as to the paths his cows take. But under the arc light of the scales and the Babcock test the parting of the ways is made plain. Half of all the cows in Illinois take the one or the other of the above paths.

Extensive investigations by the Illinois Experiment Station indicate that a fourth of all the cows in this state follow the left-hand path. That is, they produce no more than the average of 133 1-2 pounds butter fat, per year. That is the average of the lowest fourth of 554 cows in 36 Illinois herds tested a full year by this Station. This path is not the "milky way"; it lacks the upward arch, the starry brightness—and the milk.

At 23 cents a pound for butter fat these 139 cows make a return of \$30.77 to the dairyman. At \$30 per year for feed—and who would figure it less—their profit is 77 cents per cow per year! It takes one of these cows 4 1-2 days to earn one cent profit, or the fun of milking her 45 times to earn the enormous sum of 5 cents.

But the highest fourth of the 554 cows produce 301 pounds butter fat, which means an income of \$69.32 and a clear profit of \$31.32 per cow (after taking out \$38 for feed). These are the cows taking the right-hand path above. These are certainly the right cows, and the path they take leads right on to the right things for the dairyman—profit, progress, plenty, an attractive home, wider usefulness, higher education for his children, and real enjoyment of country life for all the family. And the right dairyman will take great pains to add this kind of cows to his herd.

The average cow in that right-hand path is worth as much in actual profit to the dairyman as 40 2-3 cows in the left-hand path; and 25 cows of this better sort return as much profit as 1021 cows that turn to the left.

As seen above, the poor cows naturally find their way to a poor barn, a poor home, a poorly kept farm and poor dairyman—and in the end, the dairyman will do well, after slaving hard for years, if he does not find his way "over the hills to the poor-house." If all these things are not met with on that cow path.

it will be no fault of the great bovine procession traveling that way.

Not only individual cows but large portions of herds, and even whole herds, take the wrong path at the parting of the ways. Of these 36 herds, all the cows of the poorest herd averaged a profit of but \$1.74 per cow per year. The average cow of the best herd is worth more than 24 cows of the kind that forms the poorest three herds. The writer knows three other dairy herds the milk returns of which show a profit of but 62 cents per cow for the year. While in the same neighborhood are three herds the milk of which averaged a profit of \$60.94 per cow. One cow of this kind equals 96 cows of the other three herds. And in another locality the same kind of a contrast came to the writer's attention.

A little pondering of these divergent cow paths may help the dairyman to make a good turn for himself—turn on the light of the scales and test—turn off the poor cows to the butcher—and turn all his attention to the high-producing cows that make a specialty of turning feed into milk and money. It all depends on which path the cows take—and which cows the dairyman takes.

The profitless cow is a real and living issue and a large one in dairying for bread and butter. One of the greatest and easiest steps of improvement in the dairy business today is to discover and weed out these poor cows. Isn't it time to stop guessing at these vital elements in the profit of the dairy business and to find out for sure—by weighing and testing the milk—what each individual cow is earning for the owner.

We all know there is a difference in dairy herds as well as in individual cows. But do we clearly understand that some Illinois herds do not pay for the feed given them? That other herds pay too small a margin of profit to justify the investment in money and labor? And that still other herds are making their owners big money? When we realize this it is easy to see how profit can be doubled. Do dairymen in general know that these differences rest on plain causes that may be readily understood, and that a change from the poor herd to the highly prof-

itable herd is a comparatively easy matter, within the reach of any farmer who is able to keep cows at all?

Ten years' observation of Illinois dairy herds and the individual testing of more than 800 cows in forty herds, has given the speaker positive evidence of the practical worthlessness of about one-fourth the cows in these herds and the exceedingly great efficiency and value of the best one-fourth. Both these classes of cows are common in every community. As a rule there are some of each in every herd.

No Accounts Kept.

It is equally surprising that these poor cows are not known to the owner; their demand on his charity is not suspected. It is very hard to find a dairyman who employs any means whatever of knowing the exact returns from each cow in his herd. The ordinary dairyman has no idea of how much milk, butter fat or butter each animal produces in a year, or how much it costs to feed her. The natural result with the majority of our dairy farmers is large investment of money and labor for too small returns.

Few if any herds we have tested contained no cows of lowest fourth that produce only 133 pounds fat. Nearly every herd also has some good cows producing over 300 pounds fat. Have a profitable standard and raise this each year, selling all cows that fall below this standard. This is easily done and it requires much less energy to weed out the poor cows than it does to continue to milk them.

Such records as we have discussed indicate that one-fourth of all the dairy cows in the state may be placed with Rose in the same general class of high-producers. This is made still more emphatic by the contrast of the poorest one-fourth of the same 554 cows, yielding an average of only 133½ pounds of butter fat.

The Mission of Rose.

The 12-year record of Rose and her pioneer identification with these discoveries (all made by weighing and testing the

milk of individual cows throughout the year) have given Rose a distinct mission to dairymen everywhere—a mission of far more value than the tons of milk she gave and the dollars she returned her owner. And this is her message: “In almost every dairy herd are several very good and several very poor cows, but the dairyman doesn’t know how good or how poor they are. The difference is surprising and vital to the dairy business. It is the difference between success and failure, between poverty and plenty. Find out what each cow is doing—or isn’t doing—(by weighing and testing her milk.) Keep the good cows and keep no others.”

Let the memory and record of Rose ever stand, first, for a definite knowledge of this difference in production, and second, for a settled policy of improvement of the herd. Standing for this, Rose will yet save the dairymen who are milking the million cows of Illinois 4,000 times \$1,200 every year instead of returning one owner \$1,200 in twelve years.

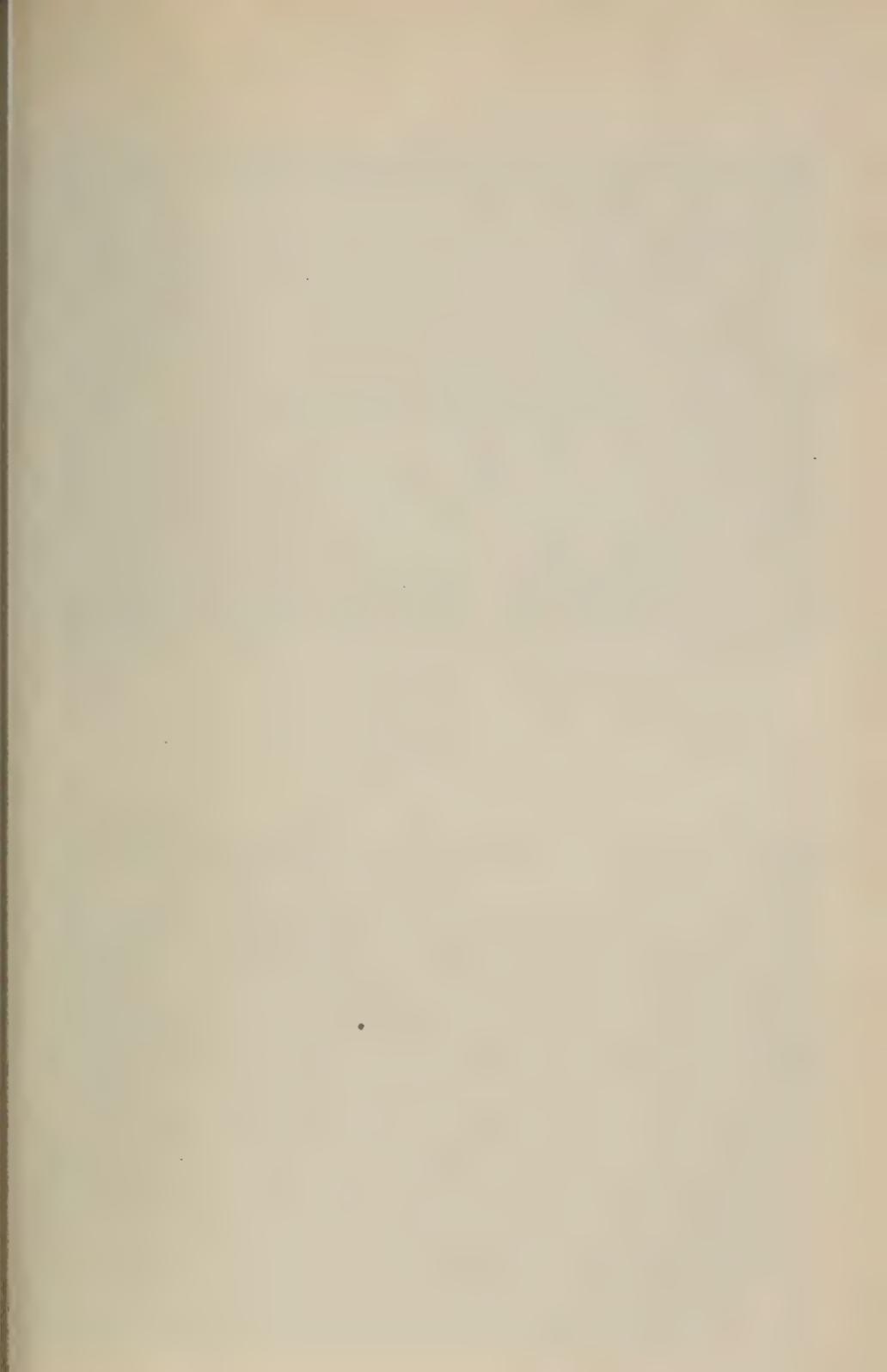
Thousands of Profitless Cows in Illinois.

Queen and No. 3 are not alone in this losing business. The speaker knows from actual testing of 800 cows in 40 different herds that there must be thousands of individual contrasts as great or greater than this in the dairy herds of Illinois.

How Does It Come That We Have So Many Poor Cows in Illinois.

A large portion of Illinois dairymen are not raising their heifer calves, but buying their cows. This means there is no provision for perpetuating the dairy herd or the best cows in it; in a few years all the good blood of the present herd will be gone. This is a ruinous practice to the dairy business.

The cow buyer has no such natural advantages for getting good cows as the dairyman has. The latter has the mother cows and knows something of their milk record; he has cheap feed and the necessary equipment; calf raising is a part of his business. It is absurd to suppose that the dairyman can buy as good cows as he can raise. A prominent dairyman of the state says of his grade herd: “The heifers we raise from our best cows

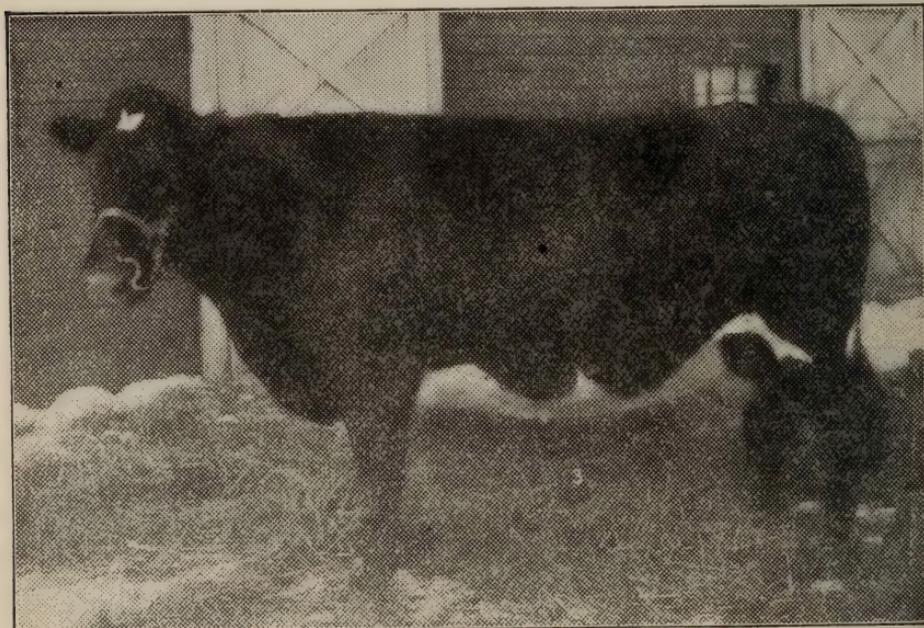




Cow No. 1.—Average record for three years, 11,390 pounds milk; 405 pounds butterfat.

From the same feed this cow produced 1.88 times as much butterfat as cow No. 3.

Returns a clear profit of \$42.60 per year.



Cow No. 3.—Average record for three years, 3,830 pounds of milk, 138 pounds butterfat.

Lacked \$2.86 per year of earning her board.

Fifty-two as poor as she found in eighteen Illinois dairy herds.

are better milk producers with their first calves than are the average mature cows we can buy." Several of our most progressive dairymen have said practically the same thing, which means at maturity that two home-bred cows are equal to three that are bought.

If breeding means anything anywhere it means that the cow's quality of large milk production is likely to be transmitted to her daughter. There is no other animal from which such an absolute and complete record of performance can be secured as from the dairy cow. Shall the value of these records to her progeny be thrown away by not saving the good heifer calves?

Nobody else has so many natural advantages as the dairyman for raising good heifers, and nobody else has the dairyman's interest in it, or is likely to succeed so well at it. Any other principal method of replenishing the herd is sheer wastefulness of great natural advantages.

Absolutely Proven.

Every man who has had extended experience or observation in this matter will agree that the pure-bred dairy sire from high-producing dams, and which is also a good individual, is of peculiar value and great economy in building up the herd. The records of dairy breeding have proved it conclusively a thousand times over. No man who studies the facts can doubt it. The evidence is to be seen in the heifers of every such sire, and in their contrast with heifers lacking such parentage.

The great difference between the good and the poor cow cannot be estimated. The study of these 10 years reveals this fact. I cannot close without referring again to the great contrast between the good and poor cows and what this really means to the dairyman's pocketbook and the life of his whole family.

Why Dairying Frequently Doesn't Pay.

Americans don't take to the idea of chains and slavery, but many an Illinois dairyman has unconsciously drifted into the condition of the man in the picture. He is not chained to a fellow prisoner or to a post, but to a common (altogether too common) brute—to a worthless wilful cow.

He don't know where he is going; he simply follows the cow. That's how he got tied up to this creature; he didn't know what he was doing, nor what the cow was doing—or rather what she wasn't doing. In fact, there's been altogether too little looking and doing in this man's business. The dairyman has blindly followed without figuring; he has worked hard with his hands but little with his lead pencil, and the dollars have come his way very reluctantly. And as for the cow the only thing she has done right well is—the dairyman; she is “doing” him beautifully. If the dairyman ever gets hold of that big key there'll be “something doing” in that dairy! He will soon hand over his end of the chain to the butcher.

The cow is not worried. She is not disposed to look on the dark side of life as long as she can go where she pleases and get a living without earning it. Thus far she has found no trouble in pulling her owner along without his asking any questions, and she now feels sure that her milk record will never be inquired into. She doesn't know about the key within his reach.

That chain has never galled her shoulder, but she has plenty of gall for all that. She has been satisfied to make 133 pounds of butter fat in a year and to return to her owner a clear profit of 77 cents in 365 days. If the dairyman had 474 cows of this kind he could make from them just one dollar a day! With that he could keep soul and body together.

But do not mistake this cow for a rare specimen of an almost extinct family. On the contrary she is very common and popular on all our prairies. She is a cow of consequence and not to be sneezed at and dismissed from mind. She is, in fact, a leader; she leads that dairyman (and a great many others) where she will, while she grazes contentedly. She also has a following of one-fourth the million cows in Illinois—250,000 of them have learned bold assurance in using the dairyman's feed and barn and time and capital for a cent and a half a week per head. This cow is right now doing a great stroke of business in Illinois dairying. The only stroke that can ever get ahead of her is the stroke of the butcher's mallet on her head.

It may be said to the credit of this cow that she is not a vicious animal. The dairyman has nothing to fear from her horns or her feet. She is a well-behaved creature, familiar to every farmer, and usually there is nothing suspicious about her manner. But when it comes to remorseless stealing of the bread from the mouths of the dairyman's family, her tribe may well be classed with the great business sharks that prey upon the people. She has kept the dairymen of this state out of fully five millions of dollars the past year without the slightest shame or nervousness. And yet the dairyman follows this cow as though he had never known freedom from such an encumbrance.

The dairyman who says that dairying don't pay is ten to one boarding several cows of that kind in his herd.

The dairyman is not exactly easy in his mind. That chain is heavy and tight, but he has carried it so long he thinks that burdens belong with dairying, or he lays the blame to ill luck or a poor price for milk; or perchance he says he cannot afford to keep good cows, forgetting that he could less afford to keep poor or worthless ones.

But see, the hands of science and the most successful dairy experience have provided him a key to the situation. As soon as ever he sees it—O, that he might see!—he will make use of the scales and Babcock test and find out what every cow on the place is doing for him—or against him. Armed with that knowledge, he will never follow that pious old fraud of a spend-thrift cow again.

The cow for this dairyman stands behind him. She has learned the knack of turning feed into milk and butter fat. She represents the average production of the best fourth of the dairy cows in Illinois, (300 pounds of butter fat per year), and the dairyman should get better acquainted with her. She is a better cow than he thought. In fact, he has not thought enough about this cow or known how many such are in his herd. He cannot know without using the key—weighing and testing the milk of each cow for the year. He would have a vastly easier time of it if he were tied to this cow, and to this cow alone. And as sure as he uses the scales and test and comes to know each cow's

production, he, like all other dairymen who have tried it, will gradually change his herd to this kind of high producers. And that will inevitably lead to more profit in his business—to better education for his family, to a more comfortable home, and to the conveniences and privileges that go with real prosperity.

The faults and failings of the worthless cow have cancelled or concealed the profits of the good cow, just as human idlers are a tax upon their fellows. The good cow has to do the work for both. Not knowing the production of either, the dairyman has overestimated the poor and underestimated the good. One cow of the good kind, producing 300 pounds of butter fat per year, is actually worth to the dairyman more than forty cows of the other kind. When the dairyman knows the good cows in his herd—knows how good they are—he will be just as anxious to tie to them as they are willing and faithful to serve him.

When will the dairyman start the rebellion (and the test), throw off his fetters, and fill his barn with the kind of cows that are glad to earn him good money and make possible a better way of living for his whole family?

WILBER J. FRASER,
Chief in Dairy Husbandry.

University of Illinois.



SELECTION AND IMPROVEMENT OF DAIRY CATTLE.

An Address by Supt. O. C. Gregg, of Lynd, Minn.

We get the foundation of the knowledge needed in the selection of dairy stock by noting how the dairy qualities of cattle



O. C. GREGG, Lynd, Minn.
Supt. of State Farmers' Institutes.

are first developed. The work begins by exciting the udder to unnatural activity by stripping it continuously of all the milk secreted. Such stripping or "milking dry" is a call on nature for more milk, which leads to a call for more blood (from which the milk is produced), thence more food to produce that needed blood.

This order, persistently followed, leads to the formation on the part of nature of an animal that eats largely—digests and

assimilates well (requiring an excellent constitution), and expends additional force in elaborating the milk from the large quantity of blood produced from the abundance of food consumed.

We can make a condensed summary statement in these words: *The cow eats largely, digests amply, milks abundantly.* Again we can state that "*the dairy cow represents a high type of a great eater, with strong digestion and great milk production.*" Nature will then in wisdom, provide strong jaws for eating, great paunch for food, great udder for milk and what is of greater importance still, *a vigorous nerve organization to drive digestive capacity and milk secretion.* With such a review of the forces brought into action in this matter of dairy development, we will now describe in detail the true type of dairy cow and note the laws governing its growth.

Vitality.

This part should be very carefully guarded.

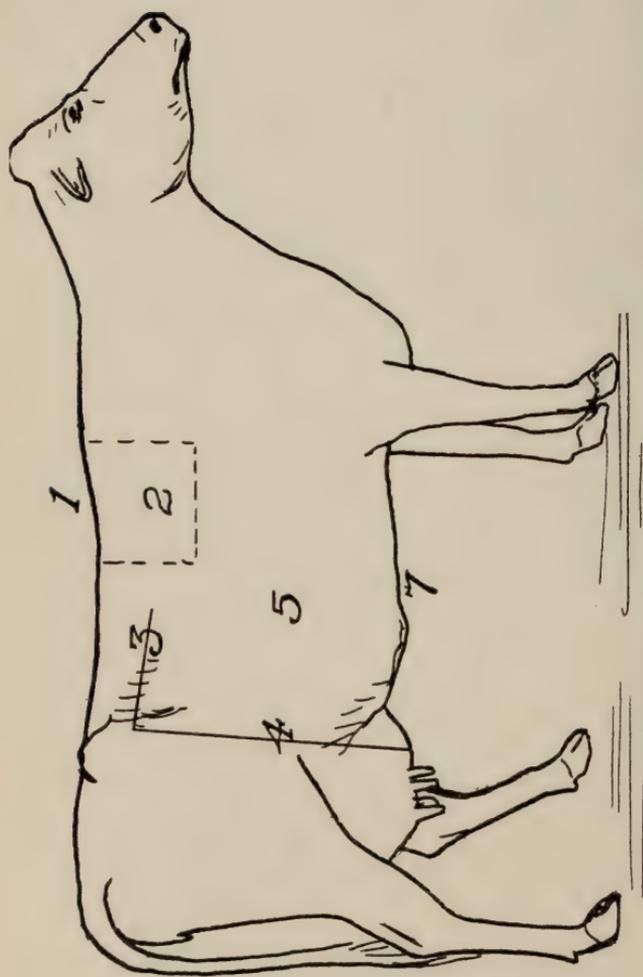
Physicians state that the dread disease, consumption, follows in the track of the cow.

Low vitality tends to poor and diseased blood and from it we obtain the diseased milk of death. We do not attempt to examine as a medical expert, but not the following indications of the strong constitution that we want.

1: Let the umbilical attachment be large. This is a good indication that the mother of the cow nourished the foetus well.

2: Let there be a great depth through the heart and lung region. This place is below the space marked 2 in the outline. This should be well rounded out. As you stand before the cow the forelegs will stand well apart. The reason for this amplitude here is manifest.

3: Let the junction of spine and skull be broad. A strong attachment here is evidence of a large vertebra, which is ever present in the dairy family with a vigorous nerve development. This animal will ever scale low in the bone and muscular system, but must be strong in the nerve system. A strong nerve system is very good evidence of good constitution.



a good outline for a dairy cow.

4: Let the hair be oily or well nourished, and the skin mellow or pliable. These conditions are hard to describe, but are readily recognized by experience.

These conditions mean good circulation and nutrition.

Nerve Force.

The eyes should be large and full, with a quiet look. The secretion of milk is part of the passion of procreation. The udder is supplied with a net work of nerves. The continued milk giving continually excites these many nerves to action which, in turn, excite the nerve organization to greater activity. The brain is the power house of this system, and the full eye means great nerve power. We might call the eye the nerve gauge.

2: The backbone, which is the casing of the spinal cord, should be large for reasons given under head No. 3, of previous sub-head.

3: The forehead should be broad and dished. The breadth indicates brain capacity, and the dishing of the frontal bone is caused by the eye socket being enlarged to meet the demands of the enlargement of the eye before referred to.

Digestion.

1: The mouth should be large. This breadth of muzzle is an indication of great intestinal development.

2: The spinal processes at the point numbered 1, should be prominent, giving a fin-like appearance. This is caused by the weight of the great paunch pulling at the ribs so that they hang less obliquely than in native stock, and as each rib is attached to a single section of vertebra of the backbone, the change of the rib from the oblique to the more perpendicular position throws each spinal process up into greater prominence.

Anyone taking the skeleton of the ox and pulling the ribs toward the front legs, will at once notice this corresponding change in these projections of the vertebrae.

This indicates then that the animal came from a line of great eaters.

3: The spacing from the hip bone to the rib, as shown by line 3, should be wide. First, for the reason above given; for if the ribs are brought down and toward the front legs they are also brought away from the hind quarters. Secondly, the paunch so unusually developed by the eating capacity of the cow, compels the breathing to be performed more in the fore part of the body. This largeness of paunch throws these ribs, at this point, out of use and as a consequence nature eliminates, or takes out, the ribs in course of time. May we not safely say that the floating rib is one that is in process of elimination and will be dropped? Here then, we have another registry of nature that the animal is a great consumer.

4: The depth from hip bone downward, as shown by line 4, should be long. This indicates that the digestive process in this animal is very closely allied with milk secretion. If this line is short, the animal might eat largely, but expend its force so obtained in running or roaming about, but not in producing milk.

The connection between food, blood and milk is here strong and unbroken. This is a very important point.

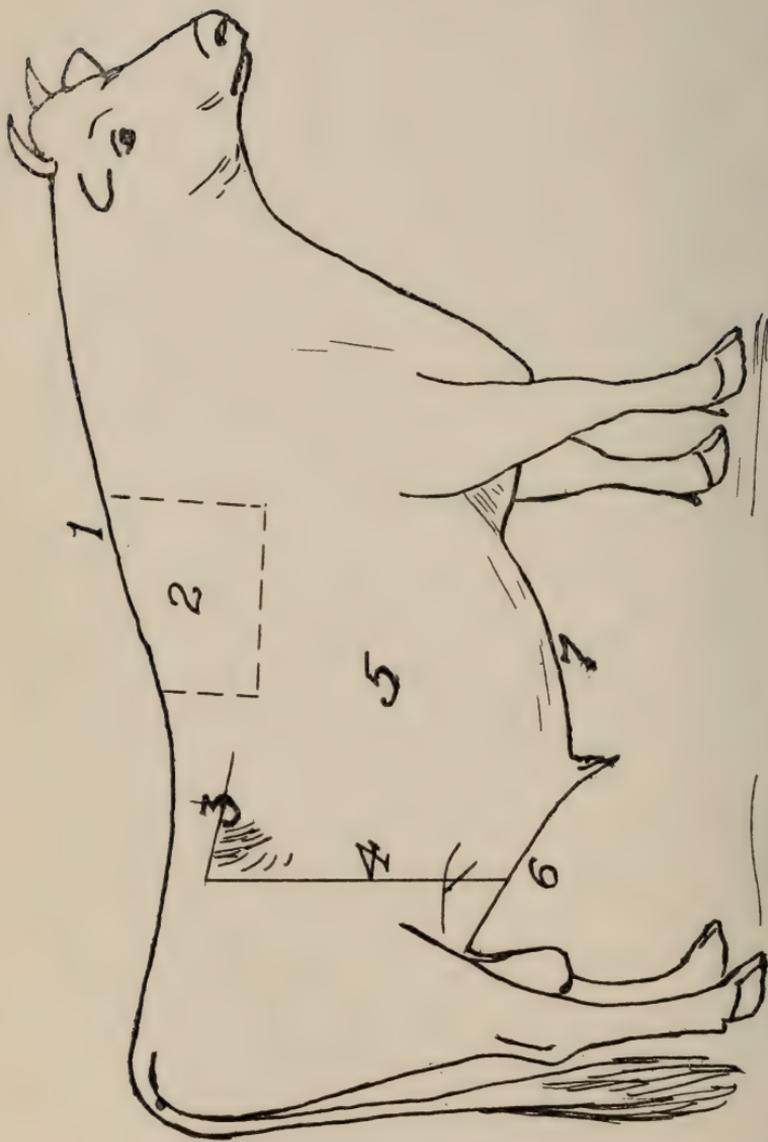
Anatomy and physiology will unite with experience in testifying that a poor connection here will result in a poor cow.

Milk Secretion.

1: Udder capacity is the first thing to be noticed. The fore udder is readily seen by the eye. The rear udder extends upward to that point between the thighs where the skin ceases to be more ample than on other parts of the body. The hind quarters will be scant, or "cat hammed," as usually phrased. This is caused by the depletion of the muscular system at the udder, and gives the ample space needed for the complete udder development.

2: The udder should be fine haired, as the continual flow of blood for generations in great quantities has produced animal heat in that part to the point of fining or expelling the hair.

3: The udder should have a glandular quality. This is best known by veins showing just beneath the skin. This is



a good outline for a dairy cow

evidence that blood is crowding the udder space to the exclusion of mere fleshy tissue.

4: The milk veins will develop with the years and treatment of the cow, by the same law that action will develop any member; but the holes through the abdominal wall, as shown in the figure marked 7, will ever be present at all ages. There should be on each side one single one and larger at maturity, and from that to two or more. The extension of these entrances toward the front legs are in proportion to the strength of line dairy breeding. Sometimes these entrances are made, in part, under the fore leg.

The reason for these indications is, that the large amount of blood from the digestion and the udder returning to the heart in its circulation, requires ample entrance room. So the holes are increased in size and number and the extension of the veins before entrance is to give more room for the veins without the abdominal walls so as to adapt themselves to the various attitudes of the body and be free from the weight of the heavily food-burdened viscera.

5: The teats should be of good size and well placed. This indicates good, strong, well developed quarters in the udder.

6: The space numbered 2 in the outline should have a decided pitch downward, as opposed to its being rounded in beef cattle, where it is referred to as the "crops." This may be called the form of poverty of the rib. All flesh formers in quadrupeds are rounded at this point. This space so formed is the best indication that the animal will be a continuous milker (unless spoiled by bad handling), for it will not rob the udder for flesh or fat forming.

Incidental Indication.

1: The horns should be fine at the base. This is largely owing to the depletion of the fore part of the body by the corresponding development of the rear.

2: The withers, as well as the brisket and the neck, should be thin for the same reason above given.

3: The legs and tail will be fine, because they are little used by cattle so carefully stabled and to whom food is brought by attendants. The fineness of the hand of the professional man as compared with the laboring man's hand, is a case in point.

4: The hips should be broad and the pelvic arch high. Both of these points are evidently the outgrowth of the continued development of the procreative system. Here we have ample room for the young and easy delivery of the same. Most, if not all, of these various points have been more or less understood as applied to the cow, but the fatal error has been made in not tracing the same laws in the conformation of the sire.

The Dairy Sire More Than Half the Herd.

We now take an outline of a noted dairy sire and upon examination you will find the same laws of form for purpose, written in his body.

Vitality.

Note it in umbilical attachment, heart and lung room, breadth between the fore legs, junction of spine and skull, with hair and skin of good quality. See under this head, as in case of the cow, before given.

Nerve Force.

Here again we have the full eye, the large back bone, the length of tail, and the broad and dished forehead.

Digestion.

The great mothers have again put their mark on their son, by giving a broad muzzle, prominent spinal processes, the wide spacing of the rib, as at 3, great depth, as at 4.

Milk Secretion.

Strange as it may appear to some, the mother markings are carried to a still greater extent than that already noted. We now must give more careful detail. He will also be "cat hammed," and udder development will be easily traced by the fullness of the skin at the point numbered 6, extending the whole length and breadth of the rear under part of the body, which

will be easily taken up in folds by the hand. He will also be fine haired, for reasons given before. The milk veins will be perceptible, and particularly the entrances as at 7, through the abdominal wall.

Sometimes two holes will appear on a side, but that is rare. The entrance near the fore part of the body is also worthy of note. Here is one of the best places to gauge the strength of dairy line breeding. The embryo teats should be well placed; this is of more importance than their size.

Last, but vitally important, the space numbered 2, should be well pitched, as in the case of the cow. You may lay it down as a rule that roundness here and meating well down to the hocks is ruin, in advance, in dairy breeding. Such a sire will beget heifers that are short in the milking period and tending to put on flesh and lacking in udder capacity.

Incidental Indications.

Will be the same as noted in the case of the cow, save that the neck will be muscular, as essential to the fighting qualities inherent in his sex. So briefly outlined, are the outward signs of that inward grace of dairy prepotency in the bull that the dairy world needs today. Many men who knew cows of quality when they saw them, have never once recognized dairy qualities in the sire, and have bred good cows to pure bred but worthless "pretty" bulls, and have ruined their herds. Such instances are continually being brought to our notice. We develop cows with ample feed and care, and then destroy the gain, so far as it would affect their heifers, by the use of bad bulls, registered though they be. A bull that has not enough dairy quality within himself to mark his own form with, is certainly a poor bull to use to transmit that quality to others.

The reader will readily understand that the indications, outlined in this article, are the results of generations of dairy conditions. Nature adapts herself to those conditions by selecting this best form that we have tried to outline. She will persistently push this form to our notice. It remains with men who have "eyes that see" to recognize these signs of desired quality

and breed form to form and by such line dairy breeding overcome by heredity the tendency to revert to the original type which we do not want, and which we can no longer afford to feed and keep.

In the matter of quality of milk we have not written but now add, as all sufficient, let the milk test be used. This is the only safe guide in that matter. So, in addition to this matter of selecting by type, we must breed from a line of producers of good quality of milk, as shown by test.

The Ancestors of a Sire Are Great Factors.

Bulls selected from a line of performers on both sides of his parentage and that unbroken by one or more that were pedigreed non-performers, are safe bulls to use for the improvement of dairy stock. Such bulls, however, will show the dairy form.

A good dam and a good grand dam go a good ways to establish quality in a bull. quality for money asked. We have bought pedigrees and breeds long enough. Now we want an animal that is worth something, with the pedigree and breed thrown in.



Illinois Dairy and Food Laws

In Force July 1, 1907

An Act to prevent fraud in the sale of dairy products, their imitation or substitutes, to prohibit and prevent the manufacture and sale of unhealthful, adulterated or misbranded food, liquors or dairy products, to provide for the appointment of a State Food Commissioner and his assistants, to define their powers and duties and to repeal all acts relating to the production, manufacture and sale of dairy and food products and liquors in conflict herewith.

Section 1. Be it enacted by the People of the State of Illinois, represented in the General Assembly:

Provision for appointment of a State Food Commissioner and the establishment of a State Food Department. That the Governor shall appoint a commissioner, who shall be known as the State Food Commissioner, who shall be a citizen of the State of Illinois, and who shall hold his office for the term of four years and until his successor is appointed and qualified, and who shall receive a salary of thirty hundred dollars per annum and his necessary expenses incurred by him in the discharge of his official duties, and who shall be charged with the enforcement of all laws that now exist or that hereafter may be enacted in this State regarding the production, manufacture, sale and labeling of food herein defined, and to prosecute or cause to be prosecuted any person, firm or corporation, or agent thereof, engaged in the manufacture or sale of any article manufactured or sold in violation of the provisions of any such law or laws. The

Governor shall also appoint from time to time, as required, a Food Standard Commission, for the purpose of determining and adopting standards of quality, purity or strength, for food products, for the State of Illinois, to consist of three members, one of whom shall be the State Food Commissioner or his representative, who shall serve without extra pay; one of whom shall be a representative of the Illinois Food Manufacturing Industries and one of whom shall be an expert food chemist of known reputation, all to be citizens of the State of Illinois, who shall receive fifteen dollars (\$15.00) per day for a period not exceeding thirty (30) days in one year and necessary expenses incurred during the time employed in the discharge of their duties: *Provided*, that said Food Standard Commission, in determining and adopting a standard of quality, purity or strength, of milk or cream, shall fix such standard as may be determined solely by the examination and test of milk or cream and the can or receptacle in which it is placed.

The said commissioner is hereby authorized to appoint, with the advice and consent of the Governor, one assistant commissioner, who shall be a practical dairyman, whose salary shall be \$2,000 per annum and expenses incurred in official duties. One chief chemist, who shall be known as State Analyst, whose salary shall be \$2,500 and expenses incurred in the discharge of official duties. One attorney, whose salary shall be \$1,800 per annum and expenses incurred in the discharge of official duties. One chief clerk, whose salary shall be \$1,800 per annum and expenses in discharge of official duties. Said commissioner shall also have authority to appoint five analytical chemists, whose salary shall be \$1,200 per annum each; twelve inspectors, whose salary shall be \$1,200 per annum and the necessary expenses incurred in the performance of their duties. Three (3) stenographers at \$900 and one assistant clerk at \$900 each.

The said commissioner shall make annual reports to the Governor not later than the 15th of January, of his work and proceedings, and shall report in detail the number of inspectors he has appointed and employed, with their expenses and disbursements and the amount of salary paid the same, and he may

from time to time issue bulletins of information, when in his judgment the interests of the State would be promoted thereby.

The said commissioner shall maintain an office and laboratory, where the business of said department may be conducted. This section shall not affect the term of office of the present commissioner, and he shall be regarded as having been appointed under the provisions of this Act.

Sec. 2. *Power of Commissioner and Inspectors Making Inspection.*) The State Food Commissioner, and such inspectors and agents as shall be duly authorized for the purpose, when and as often as they may deem it necessary for the purpose of determining whether any manufactured food complies with the law, shall examine the raw materials used in the manufacture of food products and determine whether any filthy, decomposed or putrid substance is used in their preparation. They may also examine all premises, carriages or carts where food is manufactured, transported, stored or served to patrons, for the purpose only of ascertaining their sanitary condition and examining and taking samples of the raw materials and finished products found therein; but nothing in this act shall be construed as permitting such officers to inquire into, or examine methods or processes of manufacture, or requiring or compelling proprietors or manufacturers, or packers of proprietary or other food products, to disclose trade rights or secret processes, or methods of manufacture. Said commissioner, inspectors and agents shall have power and authority to open any package, can or vessel, containing or supposed to contain, any article manufactured, sold or exposed for sale, or held in possession with intent to sell, in violation of the provisions of this Act, or laws that now exist, or that may hereafter be enacted in this State, and may inspect the contents thereof, and may take samples therefrom for analysis. The employes of railroads, express companies or common carriers shall render to them all the assistance in their power, when so requested, in tracing, finding or disclosing the presence of any article prohibited by law, and in securing samples thereof as hereinafter provided for.

Sec. 3. *Refusal to Assist Inspector a Misdemeanor.*) Any

refusal or neglect on the part of such employes of railroads, express companies or other common carriers, to render such friendly aid, or to furnish such samples for analysis, as provided for in section 2 of this Act, shall be deemed a misdemeanor, and shall be punished as hereinafter provided.

Sec. 4. The person taking such sample as provided for in section 2 of this Act, shall in the case of bulk or broken package goods divide the same into two equal parts, as nearly as may be, and in the case of sealed and unbroken packages he shall select two of said packages, which two said packages shall constitute the sample taken and, properly to indentify the same, he shall, in the presence of the person from whom the same is taken, mark or seal each half or part of such sample with a paper seal or otherwise, and shall write his name thereon and number each part of said sample with the same number and also write thereon the name of the said dealer in whose place of business the sample is found, and the person from whom said sample is taken shall also write his own name thereon, and at the same time the person taking said sample shall give notice to such person from whom said sample is taken that said sample was obtained for the purpose of examination by the State Food Commissioner. One part of said sample shall be taken by the person so procuring the same to the State Analyst or other competent person appointed for the purpose of making examinations or analyses of samples so taken, and the person taking such sample shall tender to the person from whom it is taken the value of that part thereof so retained by the person taking said sample; the other part of said sample shall be delivered to the person from whom said sample is taken. If the person from whom said sample is taken has recourse upon the manufacturer or guarantor, either by operation of law or under contract for any failure of the part of said sample to comply with the provisions of this Act, then said person from whom said sample is taken shall retain for the period of ninety days that part of said sample so delivered to him in order that said manufacturer or guarantor may have the same examined or analyzed if he so desires.

Provided, that the person procuring said sample may se-

curely pack and box that part thereof retained by him and send the same to the State Analyst, or other competent person appointed hereunder for the purpose of making examinations or analyses of samples, and his testimony that he did procure the sample and that he sealed and numbered the same as herein provided, and that he wrote his name thereon and that he packed and boxed said part thereof and sent the same to the State Analyst, or other competent person appointed hereunder to analyze such sample, and the testimony of the person to whom said package or box is addressed that he received the same in apparent good order, that said sample was sealed, and that the number thereof and name of the sender, as herein provided for, was on said sample, and that the seal at the time the same was received was unbroken, shall be *prima facie* evidence that the sample so received is the sample that was sent, and that the contents thereof are the same and in the same condition as at the time the person so procuring said sample parted with the possession thereof, and the testimony of said two witnesses as above shall be sufficient to make such *prima facie* proof.

Sec. 5. *Manufacturing Adulterated or Misbranded Food Misdemeanor.*) It shall be unlawful for any person to manufacture for sale within the State of Illinois any article of food or drink which is adulterated or misbranded within the meaning of this Act, and any person who shall violate any of the provisions of this section shall be guilty of a misdemeanor and on conviction thereof shall be punished according to the provisions of this Act.

Provided, that no article of food shall be deemed misbranded or adulterated within the provisions of this Act when intended for export to any foreign country or purchaser, and prepared or packed according to the specifications or directions of the foreign country to which said article is intended to be shipped; but if said article shall be in fact sold or offered for sale for domestic use or consumption, then this proviso shall not except said article from the operation of any of the other provisions of this Act.

Sec. 6. *Possession Misbranded or Adulterated Articles*

Provided.) The having in possession of any article of food or drink which is misbranded or adulterated with intent to sell the same, is hereby prohibited; and whoever shall have in his possession with the intent to sell, sell or offer for sale any article which is adulterated or misbranded within the meaning of this Act, shall be guilty of a misdemeanor, and on conviction thereof shall be punished as hereinafter provided. Proof that any person, firm or corporation has or had possession of any article which is adulterated or misbranded shall be *prima facie* evidence that the possession thereof is in violation of this section.

Sec. 7. *Term Food Defined.*) The term "food," as used herein, shall include all articles used for food, drink, confectionery or condiment by man or other animals, whether simple, mixed or compound, and any substance used as a constituent in the manufacture thereof.

Sec. 8. *Defines Adulteration.* That for the purpose of this Act an article shall be deemed to be adulterated—

In case of confectionery:

First—If it contains terra alba, barytes, talc, chrome yellow, paraffin, mineral fillers or poisonous substances, or poisonous color or flavor.

Second—If it contains any ingredient deleterious or detrimental to health, or any vinous, malt or spiritous liquor or compound, or narcotic drug.

In case of food:

First—If any substance has been mixed or packed with it so as to reduce or lower or injuriously affect its quality, strength or purity.

Second—If any substance has been substituted wholly or in part for the article.

Third—If any valuable constituent of the article has been wholly or in part abstracted: *Provided*, that in the manufacture of skim or separated cheese the whole or part of the butter fats in the milk may be abstracted.

Fourth—If it be mixed, colored, powdered, coated, polished or stained in any manner whereby damage or inferiority is con-

sealed, or it is made to appear better or of greater value than it really is.

Fifth—If it contains any added poisonous or other added deleterious ingredient which may render such article injurious to health: *Provided*, that when in the preparation of food products for shipment they are preserved by an external application, applied in such a manner that the preservative is necessarily removed mechanically, or by maceration in water, or otherwise, and directions for the removal of said preservatives shall be printed on the covering of the package, the provisions of this Act shall be construed as applying only when such products are ready for consumption; and formaldehyde, hydrofluoric acid, boric acid, salicylic acid and all compounds and derivatives thereof are hereby declared unwholesome and injurious.

Sixth—If it consists in whole or in part of a filthy, decomposed or putrid, infected, tainted or rotten animal or vegetable substance or article, or any portion of an animal unfit for food, whether manufactured or not, or if it is the product of a diseased animal, or one that has died otherwise than by slaughter.

Sec. 9. *Misbranded Defined.*) The term "misbranded," as used herein, shall apply to all articles of food or drink, or articles which enter into the composition of food or drink, the packages or label of which shall bear any statement, design or device regarding such article, or the ingredients or substance contained therein which shall be false or misleading in any particular; and to any such products which are falsely branded as to manufacturer, packer or dealer who sells the same, or as to the state, territory or country in which it is manufactured or produced. That for the purpose of this Act an article shall be deemed misbranded—

In case of food:

First—If it be an imitation of or offered for sale under the distinctive name of another article.

Second—If it be labeled or branded so as to deceive or mislead the purchaser, or purports to be a foreign product when not so, or if the contents of the package as originally put up shall have been removed in whole or in part and other contents shall

have been placed in such package, or if it shall fail to bear a statement on the label of the quantity or proportion of any morphine, opium, cocaine, heroin, alpha or beta eucaine, chloroform, cannabis indica, chloral hydrate or acetanilid, or any derivative or preparation of any such substances contained therein.

Third—If in any package form and the contents are stated in terms of weight or measure, they are not correctly and plainly stated on the outside of the package.

Fourth—If it be a manufactured article of food or food sold in package form, and is not distinctly labeled, marked or branded with the true name of the article, and with either the name of the manufacturer and place of manufacture or the name and address of the packer or dealer who sells the same.

Fifth—If the package containing it or its label shall bear any statement, design or device regarding the ingredients of the substance contained therein, which statement, design or device shall be false or misleading in any particular: *Provided*, that an article of food which does not contain any added poisonous or deleterious ingredients shall not be deemed to be adulterated or misbranded in following cases:

First—In case of mixtures or compounds which may be now, or from time to time hereafter known as articles of food under their own distinctive names, and not an imitation of or offered for sale under the distinctive name of another article, if the name be accompanied on the same label or brand with a statement of the place where the article has been manufactured or produced.

Second—In case of articles labeled, branded or tagged so as to plainly indicate that they are compounds, imitations or blends, and the word "compound," "imitation" or "blend," as the case may be, is plainly stated on the package in which it is offered for sale: *Provided*, that the term "blend," as used herein, shall be construed to mean a mixture of like substances, not excluding harmless coloring or flavoring ingredients used for the purpose of coloring and flavoring only; and as applied to alcoholic beverages, only those distilled spirits shall be regarded as "like substances" which are distilled from the fermented

mash of grain and are of the same alcoholic strength: *And, provided, further,* that nothing in this Act shall be construed as requiring or compelling proprietors or manufacturers of proprietary foods, which contain no unwholesome added ingredients, to disclose their trade formulas, except in so far as the provisions of this Act may require to secure freedom from adulteration or misbranding.

Third—In the case of mixtures of corn syrup (glucose) or corn sugar (dextrose) or corn sugar syrup, with cane or beet sugar (sucrose) or cane or beet sugar syrup, in food, if the maximum percentage of corn syrup (glucose), or corn sugar (dextrose) or corn sugar syrup, in such article of food be plainly stated on the label.

Sec. 10. *Confiscation and Condemnation of Misbranded or Adulterated Foods.*) Any article of food or drink or liquor that is adulterated or misbranded within the meaning of this Act, and is being sold or offered for sale within the State of Illinois, shall be liable to be proceeded against in any circuit court, or the Superior Court of Cook county, or the municipal court of any city, or before any justice of the peace within whose jurisdiction the same may be found, and seized for confiscation by process of law or condemnation. And if such article is condemned as being adulterated or misbranded, or of a poisonous or deleterious character within the meaning of this Act, the same shall be disposed of by destruction or sale, as the said court may direct, and the proceeds thereof, if sold, less the legal costs and charges, shall be paid into the treasury of the State of Illinois and credited to the fund of the State Food Commission, to be used in the enforcement of the State food laws, but such goods shall in no instance be sold contrary to the provisions of this Act: *Provided, however,* that upon the payment of the costs of such libel proceedings and the execution and the delivery of a good and sufficient bond to the effect that such articles shall not be sold or otherwise disposed of contrary to the provisions of this Act, the court may, by order, direct that such articles be delivered to the owner thereof. Either party may demand trial by jury upon any issue of fact joined in any such case, and all such proceed-

ings shall be at the suit of and in the name of the People of the State of Illinois.

Sec. 11. *Vinegar to Be Branded.*) All vinegar made by fermentation and oxidation without the intervention of distillation, shall be branded with the name of the fruit or substance from which the same is made. All vinegar made wholly or in part from distilled liquor shall be branded "distilled vinegar," and shall not be colored in imitation of cider vinegar. All vinegar shall be made wholly from the fruit or grain from which it purports to be or is represented to be made, shall contain no foreign substance, and shall contain not less than four per cent, by weight, of absolute acetic acid.

Sec. 12. *Extracts to Be Labeled.*) Extracts made of more than one principle shall be labeled in a conspicuous manner with the name of each principle, or else with the name of the inferior or adulterant; and in all cases when an extract is labeled with two or more names, such names must be in a conspicuous place on said label, and in no instance shall such mixture be called imitation, artificial or compound, and the name of one of the articles used shall not be given greater prominence than another: *Provided*, that all extracts which cannot be made from the fruit, berry, bean or other part of the plant, and must necessarily be made artificially, as raspberry, strawberry, etc., shall be labeled "imitation," in letters similar in size and immediately preceding the name of the article: *Provided, further*, that prepared cocoanut, containing nothing other than cocoanut, sugar and glycerine, shall be labeled as prepared cocoanut, and when so made need not be labeled "compound" or "mixture."

Sec. 13. *Baking Powder—How Labeled.*) No person by himself, his servant or his agent, or as the servant of any other person, shall, *first*, make or manufacture baking powder or any other mixture or compound intended for use as baking powder; *second*, or sell, exchange, deliver or offer for sale or exchange such baking powder or any mixture or compound intended for use as baking powder, unless the same shall contain not less than ten per cent available carbon dioxide and unless the common names of all the ingredients be printed on the label.

Sec. 14. *Adulterated Spirituous, Malt or Vinous Liquors Prohibited.*) No person shall, within this State, by himself, his servant or agent, or as a servant or agent of any other person or corporation, manufacture, brew, distill, have or offer for sale, or sell any spirituous or fermented or malt liquor, containing any drug, substance or ingredient not healthful or not normally existing in said spirituous, fermented or malt liquor, or which may be deleterious or detrimental to health when such liquors are used as a beverage, and the following drugs, substances or ingredients shall be deemed to be not healthful and shall be deemed to be deleterious or detrimental to health when contained in such liquors, to-wit: Cocculus indicus, copperas, opium, cayenne pepper, picric acid, Indian hemp, strychnine, arsenic, tobacco, darnel seed, extract of logwood, salts of zinc, copper or lead, alum, methyl alcohol and its derivatives and any extracts or compound of any of the above drugs, substances or ingredients, and any person violating any of the provisions of this section shall be deemed guilty of a misdemeanor.

Sec. 15. *Mutilating Label Prohibited.*) Whoever shall deface, change, erase or remove any mark, label or brand provided for this Act with intent to mislead, deceive or to violate any of the provisions of this Act, shall be held liable to the penalties of this Act.

Sec. 16. *Sale of Unclean or Unwholesome Milk for Consumption and Unsanitary Containers Prohibited.*) No person, firm or corporation shall offer for sale, or sell to any person, firm or corporation, creamery or cheese factory, any unclean, unhealthful, unwholesome or adulterated milk or cream, or any milk or cream which has not been well cooled or to which water or any foreign substance has been added, or milk or cream which has been handled or transported in unclean or unsanitary vessels or containers: *Provided*, that nothing in this section shall be construed to prevent the sale of skim milk to factories engaged in the manufacture of skim milk products, nor the sale of skim milk under the provisions of section 19 of this Act.

Sec. 17. *Persons Receiving Milk to Wash Cans.*) Any person, firm or corporation who receives from any other person,

firm or corporation, any milk or cream in cans, bottles or vessels which have been transported over any railroad or boat line, where such can, bottles or vessels are to be returned, shall cause the said cans, bottles or vessels to be emptied before the said milk or cream contained therein shall become sour, and shall cause said cans, bottles or vessels to be immediately washed and thoroughly cleansed and aired.

Sec. 18. *Not to Manufacture Food from Impure or Unclean Milk or Cream.*) No person, firm or corporation shall manufacture from unclean, impure, unhealthful or unwholesome milk, or from cream from the same, any article of food.

Sec. 19. *Sale of Skim Milk—Cans—How Labeled.*) No person, firm or corporation shall sell, or expose for sale, or have in his possession with intent to sell, in any store or place of business, or on any wagon or other vehicle, used in transporting milk or milk commonly called "skim milk" without first attaching to the can, vessel or other package containing said milk, a tag with the words "skim milk" printed on both sides of said tag in large letters, each letter being at least three-fourths of an inch high and one-half inch wide. Said tag shall be attached to the top or side of said can, vessel or package where it can be easily seen.

Sec. 20. *Instruments for Measuring Milk and Cream Standards.*) The State standard milk measure or pipettes shall have for milk a capacity of seventeen and six-tenths cubic centimeters, and the State standard test tube or bottles for milk shall have a capacity of two cubic centimeters of mercury at a temperature of sixty degrees Fahrenheit between "zero" and ten on the graduated scale marked on the necks thereof. For cream eighteen grams shall be used, and the standard test tubes or bottles for cream shall have a capacity of six cubic centimeters of mercury at a temperature of sixty degrees Fahrenheit between "zero" and thirty on the graduated scale marked on the necks thereof, and it is hereby made a misdemeanor to use any other measure, pipette, test tube or bottle to determine the per cent of butter fat where milk or cream is purchased by, or furnished to creameries or cheese factories, and where the value of

said milk is determined by the per cent of butter fat contained in the same. Any manufacturer, merchant, dealer, or agent in this State who shall offer for sale or sell cream or milk pipette or measure, test tube or bottle which is not correctly marked or graduated, as herein provided, shall be guilty of a misdemeanor and upon conviction thereof shall be punished as provided in this Act.

Sec. 21. *Underreading Babcock Test Prohibited.*) It shall be unlawful for the owner, manager, agent or any employe of a creamery or cheese factory to manipulate or underread the Babcock test, or any other contrivance used for determining the quality or value of milk, or to falsify the record thereof, or to pay for such milk on the basis of any measurement except the true measurement, as thereby determined.

Sec. 22. *Sale of Preservatives Prohibited.*) No person, firm or corporation shall manufacture for sale, advertise, offer or expose for sale, or sell, any mixture or compound intended for use as a preservative or other adulterant of milk, cream, butter or cheese, nor shall be manufacture for sale, advertise, offer or expose for sale, or sell, any unwholesome or injurious preservative of any food: *Provided, however,* that this section shall not apply to pure salt added to butter and cheese.

Sec. 23. *Vehicles to be Marked.*) Any person, firm or corporation, who shall in any of the cities, incorporated towns or villages of this State which contains a population of 5,000 or over, engage in or carry on a retail business in the sale or exchange of, or any retail traffic in milk or cream, shall have each and every carriage or vehicle from which the same is vended, conspicuously marked with the name of such vendor on both sides of such carriage or vehicle.

Sec. 24. *Illegal Lard.*) No person shall, within this State, manufacture for sale, have in his possession with intent to sell, offer or expose for sale, or sell, as lard, any substance not the legitimate and exclusive product of the fat of the hog.

Sec. 25. *Lard Substitute.*) No person shall manufacture for sale within this State, or have in his possession with intent to sell, offer or expose for sale, or sell, as lard, or as a substitute

for lard, or as an imitation of lard, any mixture or compound which is designed to take the place of lard and which is made from animal or vegetable oils or fats other than the fat of the hog, or any mixture or combination with any animal or vegetable oils or fats, unless the tierce, barrel, tub, pail or package containing the same shall be distinctly and legibly branded or labeled with the name of the person, firm or corporation making the same, together with the location of the manufactory and the words "lard substitute" or "adulterated lard" or "compound," "imitation" or "blend," as the case may be, or unless the same shall be sold under its own distinctive name, as provided for in section 9 of this Act.

Sec. 26. *Persons Selling Imitation or Substitute for Lard to Inform Purchaser.*) It shall be unlawful to sell or offer for sale any "lard substitute" or "adulterated lard" or "compound," "imitation" or "blend," as herein defined, without informing the purchaser thereof, or the person or persons to whom the same is offered for sale, that the substitute sold or offered for sale is "lard substitute" or "adulterated lard" or "compound," "imitation" or "blend," as the case may be.

Sec. 27. *Sale of Process Butter not Branded Prohibited.*) No person, firm or corporation, agent or employe, shall manufacture for sale, sell, offer or expose for sale, in this State, any butter that is produced by taking original packing stock butter, or other butter, or both, and melting same so that the butter fat can be drawn off or extracted, then mixing the said butter fat with skimmed milk, or milk, or cream, or other milk product, and rechurning or reworking the said mixture, or that produced by any process that is commonly known as boiled, process or renovated butter, unless the same is branded or marked, as provided in section 28 of this Act.

Sec. 28. *Process Butter—How Branded.*) No person, firm, corporation, agent or employe, shall sell, offer or expose for sale, or deliver to a purchaser, any boiled, process or renovated butter, as defined in section 27 of this Act, unless the words "Renovated Butter" shall be plainly branded with gothic or bold face letters at least three-fourths of an inch in length

on the top and sides of each tub, or box, or pail, or other kind of case or package, or on the wrapper of prints or rolls or bulk packages in which it is put up. If such butter is exposed for sale uncovered, or not in a case or package, a placard containing the label so printed shall be attached to the mass of butter in such a manner as to be easily seen and read by the purchaser. The branding or marking of all packages shall be in the English language, and in a conspicuous place so as to be easily seen and read by the purchaser.

Sec. 29. *Illegal Foods to be Seized.*) Whenever the commissioner or his agents shall have ground for suspicion that any article of food, found in possession of any person, firm or corporation, is adulterated or misbranded within the meaning of this Act, he may seize such article of food and make an inventory thereof, and shall leave a copy of such inventory with the party holding such suspected goods, and tag the same "suspected;" and he shall notify in writing the person, firm or corporation in whose possession it may be found, not to offer the same for sale or sell or otherwise dispose of the same until further notice in writing from the commissioner. Whereupon the commissioner shall forthwith cause a sample of said article of food to be examined or analyzed, and if the same shall be found to be adulterated or misbranded within the meaning of this Act, the commissioner shall proceed with a hearing and subsequent proceedings as provided in this Act. If, however, such examination or analysis shall show that such article of food complies with the provisions of this Act, the person, firm or corporation in whose possession such article of food is found shall forthwith be notified in writing that said seizure is released, and authority given to dispose of such article of food. Such seizure may be had without a warrant and said commissioner, and all inspectors and agents appointed pursuant to law, are hereby given full power and authority of "policemen." Any court having jurisdiction, upon receiving proof of probable cause for believing in the concealment of any food or dairy products or substitutes therefor, or imitation thereof, kept for sale or for a purpose, or had in possession or under control, contrary to the provisions

of this Act, or other laws which now exist or may be hereafter enacted, shall issue a search warrant and cause a search to be made in any place therefor and to that end may cause any building, enclosure, wagon or car to be entered, and any apartment, chest, box, locker, tub, jar, crate, basket or package to be broken open and the contents thereof examined.

Sec. 30. *Search Warrants to be Issued for Illegal Food.*) All warrants issued pursuant to section 29 hereof shall be directed to the sheriff, bailiff or some constable of the county where such food or dairy products may be supposed to be concealed, commanding such officer to search the house or place where such food or dairy product, or substitute thereof, or imitation thereof, for which he is required to search, is believed to be concealed, which place and the property to be searched for, shall be designated in the warrant, and to bring such food or dairy product or substitute therefor or imitation thereof, when found, and the person in whose possession the same is found, before the magistrate who issued the warrant, or before some other court or magistrate having jurisdiction of the case to be proceeded against as hereinbefore provided for in section 10 of this Act.

Sec. 31. *State's Attorney to Assist.*) It shall be the duty of the State's Attorney in any county of this State when called upon by the commissioner, or any of his assistants to render any legal assistance in his power to execute the law and to prosecute cases arising under the provisions of this Act: *Provided*, That no person shall be prosecuted under the provisions of this Act for selling or offering for sale any article of food or drugs as defined herein, when same is found to be adulterated or misbranded within the meaning of this Act, in the original unbroken package in which it was received by said person when he can establish a guaranty signed by the wholesaler, jobber, manufacturer or other party residing in this State, from whom he purchased such article, to the effect that the same is not adulterated or misbranded in the original unbroken package in which said article was received by said dealer, within the meaning of this Act, designating it. Said guaranty to afford protection, shall contain the name and address of the party or parties mak-

ing the sale of such article to such dealer, and in such case said party or parties shall be amenable to the prosecutions, fines and other penalties as provided for in this Act: *Provided*, That no such guaranty shall operate as a defense to prosecutions for the violation of this Act. *First*. If the dealer shall continue to sell after notice by the State Food Commissioner that such article is adulterated or misbranded within the meaning of this Act. *Second*. If the dealer shall fail to preserve for the manufacturer or guarantor and deliver to him upon demand the sample left with him by the commissioner or his agent.

Sec. 32. *State Board of Health to Furnish Samples.*) The State Board of Health may submit to the commissioner or any of his assistants samples of food or drink for examination or analysis, and shall receive special reports showing the results of such examination or analysis.

Sec. 33. *State Analysts Shall not Furnish Certificate of Purity.*) It shall be unlawful for the State Analyst or any assistant State Analyst to furnish to any individual, firm or corporation any certificate as to the purity or excellence of any article manufactured or sold by them to be used as food or in the preparation of food.

Sec. 34. *Using Shift or Device.*) The use of any shift or device to evade any of the provisions of this Act shall be deemed a violation of such provision and punishable as herein provided.

Sec. 35. *Master's Liability, Etc.*) Whoever shall, by himself or another, either as principal, clerk or servant, directly or indirectly, violate any of the provisions of this Act, shall be guilty of a misdemeanor and punished as herein provided.

Sec. 36. *Penalties, License Fees and Proceeds Paid to State Treasurer.* All fines, penalties, and all proceeds collected from goods confiscated and sold under the provisions of this Act and other laws relating to dairy and food products, and all license fees collected hereunder, shall be paid into the State Treasury.

Sec. 37. *Label—Size of Type.*) The principal label on any package of food, as defined by this Act, shall be printed

plainly and legibly in English with or without the foreign label in the language of the country where the product is produced or manufactured and the size of type, if not otherwise described in this Act, shall be not smaller than EIGHT-POINT (BREVIER) CAPS: *Provided*, That in case the size of the package will not permit the use of eight-point cap type, the size of the type may be reduced proportionately.

Sec. 38. *Food Commissioner to Make Rules and Regulations.*) The State Food Commissioner shall make rules and regulations for carrying out the provisions of this Act, and shall have power to make rules and regulations for the analyzing and reporting the results thereof, of articles submitted for analysis by the State Board of Health, and regulating the analyzing and reporting thereon of samples taken under any law or laws of the United States by any person hereunder, or furnished by any officer or employe charged with the enforcement of the laws of the United States relative to the manufacture, sale or transportation of adulterated, misbranded, poisonous or deleterious foods, dairy products or articles manufactured from dairy products or liquors.

Sec. 39. *Standard of Purity and Strength.*) In the enforcement of this Act, and in the construction thereof, the following named articles of food stuffs, when offered for sale or exposed for sale, or sold, shall conform to the analytical requirements set opposite each respectively.

Milk shall contain not less than three (3) per cent of milk fat and not less than eight and one-half (8.5) per cent of solids, not fat.

Condensed Milk and Evaporated Milk shall contain not less than twenty-eight (28) per cent of milk solids and one hundred (100) per cent of such milk solids shall contain not less than twenty-seven and five-tenths (27.5) per cent of milk fat.

Cream shall contain not less than eighteen (18) per cent of milk fat.

Maple Sugar shall contain not less than sixty-five one-hundredths (0.65) per cent of maple ash in the water-free substance.

Honey is laevo-rotatory, containing not more than twenty-five (25) per cent of water, not more than twenty-five hundredths

(0.25) per cent of ash and not more than eight (8) per cent of sucrose.

Cloves shall contain not more than five (5) per cent of clove stems, not less than ten (10) per cent of volatile ether extract, not less than twelve (12) per cent of quercitannic acid, not more than eight (8) per cent of total ash, not more than five-tenths (0.5) per cent of ash insoluble in hydrochloric acid, and not more than ten (10) per cent of crude fiber.

Black Pepper shall contain not less than six (6) per cent of non-volatile ether extract, not less than twenty-five (25) per cent of pepper starch, not more than seven (7) per cent of total ash, not more than two (2) per cent of ash insoluble in hydrochloric acid, and not more than fifteen (15) per cent of crude fiber.

Lemon Extract shall contain not less than five (5) per cent of oil of lemon by volume.

Orange Extract shall contain not less than five (5) per cent of oil of orange by volume.

Vanilla Extract shall contain in one hundred (100) cubic centimeters the soluble matters from not less than ten (10) grams of vanilla bean.

Olive Oil has a refractive index (25 degrees C.) not less than one and forty-six hundred and sixty ten thousandths (1.4660) and not exceeding one and forty-six hundred and eighty ten-thousandths (1.4680); and an iodine number not less than seventy-nine (79) and not exceeding ninety (90).

All Vinegars shall contain four (4) grams of acetic acid in one hundred (100) cubic centimeters (20 degrees C.)

Cider Vinegar shall contain not less than one and six-tenths (1.6) grams of apple solids, and not less than twenty-five hundredths (0.25) grams of apple ash in one hundred (100) cubic centimeters (20 degrees C.)

Wine Vinegar shall contain not less than one (1) gram of grape solids and not less than thirteen-hundredths (0.13) gram of grape ash in one hundred cubic centimeters (20 degrees C.)

Malt Vinegar shall contain in one hundred (100) cubic centimeters (20 degrees C.) not less than two (2) grams of solids and not less than two-tenths (0.2) gram of ash.

In the enforcement of this Act and the construction thereof all articles of food not defined in this Act, when offered for sale or exposed for sale, or sold, shall conform to the definition and analytical requirements of the standard adopted and promulgated from time to time by the State Food Standard Commission: *Provided*, such standards for any article of food or drink, or for any substance used or intended to be used in food or drink shall be deemed *prima facie* evidence of the proper standard of quality, purity and strength of any such article or substance, but shall only be deemed such *prima facie* evidence in the trial of cases brought in the proper courts to enforce the provisions of this Act.

Provided, That nothing in this section shall be construed to prevent the sale of any wholesome food product which varies from such standards, if such article of food be labeled so as to clearly indicate such variation.

Sec. 40. *Preliminary Hearing by the Commissioner.*) When it appears from the examination or analysis that the provisions of this Act have been violated, the Food Commissioner shall cause notice of such fact, together with a copy of the findings, to be given to the party or parties from whom the sample was obtained; and to the party, if any, whose name appears upon the label as manufacturer, packer, wholesaler, retailer, or other dealer, by registered mail. The receipt of the post office department for such registered notice shall be received as *prima facie* evidence that such notice has been given. The party, or parties, so notified, shall be given an opportunity to be heard under such rules and regulations as may be prescribed as aforesaid. Notices shall specify the date, hour and place of the hearing. The hearing shall be private, and the parties interested therein may appear in person or by attorney. If, after such hearing, the commissioners shall believe this Act has been violated, he shall cause the party, or parties, whom he believes to be guilty, to be prosecuted forthwith, under the provisions of this Act. No action or prosecution shall be instituted against any person for a violation

of the provisions of this Act, unless the same shall have been commenced within ninety days from the taking of said sample.

Sec. 41. *Penalty.*) Any person convicted of violating any of the provisions of the foregoing act shall, for the first offense, be punished by a fine in any sum not less than fifteen (15) dollars, and not more than one hundred (100) dollars, or by imprisonment in the county jail not exceeding thirty days, or by both such fine and imprisonment, in the discretion of the Court, and for the second and each subsequent offense by a fine of not less than twenty-five (25) dollars and not more than two hundred (200) dollars, or by imprisonment in the county jail not exceeding one year, or both, in the discretion of the Court; or the fine above may be sued for and recovered before any justice of the peace or any other court of competent jurisdiction in the county where the offense shall have been committed, at the instance of the State Food Commissioner or any other person in the name of the People of the State of Illinois as plaintiff and shall be recovered in an action of debt.

Sec. 42. *Judgment—Issuing Capias.*) When the rendition of the judgment imposes a fine as provided in any of the sections of this Act, it shall be the duty of the Justice of the Peace or other court rendering such judgment also to render a judgment for costs and such Justice of the Peace or other court shall forthwith issue a capias or warrant of commitment against the body of the defendant, commanding that unless the said fine and costs be forthwith paid the defendant shall be committed to the jail of the county and the constable or other officer, to whose hands said capias or warrant shall come, shall in default of such payment, arrest the defendant and commit him to the jail of the county, there to remain as provided in Section 171 of "An Act to revise the law in relation to criminal jurisprudence," in force July 1, 1885, unless such fine and costs shall sooner be paid.

Sec. 43. *Repeal.*) All acts and parts of acts inconsistent with this act are hereby repealed: *Provided*, That nothing in this act contained shall be construed as repealing the act entitled, "An Act to regulate the manufacture and sale of substitutes for

butter," approved June 14, 1897, in force July 1, 1897, or any part thereof.

Approved May 14, 1907.

In force July 1, 1907.

Food and Dairy Law.

An Act to regulate the manufacture and sale of substitutes for butter.

Section 1. *Be it enacted by the People of the State of Illinois, represented in the General Assembly:* That for the purpose of this Act, every article, substitute or compound or any other than (that) which is produced from pure milk or cream therefrom, made in the semblance of butter and designed to be used as a substitute for butter made from pure milk or its cream, is hereby declared to be imitation butter: *Provided*, that the use of salt and harmless coloring matter for coloring the product of pure milk or cream shall not be construed to render such product an imitation.

Sec. 2. No person shall coat, powder or color with annato or any coloring matter whatever, any substance designed as a substitute for butter, whereby such substitute or product so colored or compounded shall be made to resemble butter, the product of the dairy.

No person shall combine any animal fat or vegetable oil or other substance with butter, or combine therewith, or with animal fat or vegetable oil, or combination of the two, or with either one, any other substance or substances, for the purpose or with the effect of imparting thereto a yellow color or any shade of yellow so that such substitute shall resemble yellow or any shade of genuine yellow butter, nor introduce any such coloring matter or such substance or substances into any of the articles of which the same is composed.

Provided, Nothing in this act shall be construed to prohibit the use of salt, rennet and harmless coloring matter for coloring the product of pure milk or cream from the same.

No person shall, by himself, his agents, or employes produce or manufacture any substance in imitation or semblance of nat-

ural butter, nor sell, nor keep for sale, nor offer for sale, any imitation butter, made or manufactured, compounded or produced in violation of this section, whether such imitation butter shall be made or produced in this State or elsewhere.

This section shall not be construed to prohibit the manufacture and sale, under the regulations hereinafter provided, of substances designed to be used as a substitute for butter and not manufactured or colored as herein provided.

Sec. 3. Every person who lawfully manufactures any substance designed to be used as a substitute for butter, shall mark by branding, stamping or stenciling upon the top or side of each box, tub, firkin or other package in which such article shall be kept, and in which it shall be removed from the place where it is produced, in clear and durable manner in the English language, the word "oleomargarine," or the word "butterine," or the words "substitute for butter," or the words "imitation butter," in printed letters in plain Roman type, each of which shall not be less than three-quarters of an inch in length.

Sec. 4. It shall be unlawful to sell or offer for sale any imitation butter without informing the purchaser thereof, or the person or persons to whom the same is offered for sale, that the substance sold or offered for sale is imitation butter.

Sec. 5. No person, by himself or others, shall ship, consign or forward by any common carrier, whether public or private, any substance designed to be used as a substitute for butter unless it shall be marked or branded on each tub, box, firkin, jar or other package containing the same, as provided in this Act, and unless it be consigned by the carriers and received for by its true name: *Provided*, that this Act shall not apply to any goods in transit between foreign states across the State of Illinois.

Sec. 6. No person shall have in his possession or under his control any substance designed to be used as a substitute for butter, unless the tub, firkin, jar, box or other package containing the same be clearly and durably marked as provided in this Act: *Provided*, that this section shall not be deemed to apply to persons who have the same in their possession for the

actual consumption of themselves (or) their families. Every person who shall have possession or control of any imitation butter for the purpose of selling the same which is not marked as required by the provisions of this Act, shall be presumed to have known during the time of such possession or control the true character and name, as fixed by this Act, of such product.

Sec. 7. Whoever shall have possession or control of any imitation butter or any substance designed to be used as a substitute for butter, contrary to the provisions of this Act, for the purpose of selling the same, or offering the same for sale, shall be held to have possession of such property with intent to use it in violation of this Act.

Sec. 8. No action shall be maintained on account of any sale or contract made in violation of, or with intent to violate, this Act, by or through any person who was knowingly a party to such wrongful sale or contract.

Sec. 9. Whoever shall deface, erase or remove any mark provided by this Act, with intent to mislead, deceive, or to violate any of the provisions of this Act, shall be guilty of a misdemeanor.

Sec. 10. Whoever shall violate any of the provisions of this Act, shall be punished by a fine of not less than \$50 nor more than \$200, or by imprisonment in the county jail not to exceed 60 days for each offense, or by both fine and imprisonment, in the discretion of the court, or the fine alone may be sued for and recovered before any Justice of the Peace in the county where the offense shall be committed, at the instance of any person in the name of the People of the State of Illinois as plaintiff.

Sec. 11. It is hereby made the duty of the State's Attorney of each county in this State to prosecute all violations of this Act upon complaint of any person, and there shall be taxed as his fees in the case the sum of ten dollars (\$10), which shall be taxed as costs in the case.

Approved June 14, 1897, in force July 1, 1897.

ALFRED H. JONES, *Commissioner*.

H. E. SCHUKNECHT, *Assistant Commissioner*.

T. J. BRYAN, PH.D., *State Analyst*.

Membership List for 1907

A

Alexander, A. B., Effingham.	Austin, C. E., Effingham.
Alexander, C. B., Chicago (Star Union Line).	Austin, E., Effingham.
Adams, Chas. J., Loda.	Austin, F. G., Effingham.
Adams, H. O., Effingham.	Austin, W. W., Effingham.
Ardrey, R. G., Oakdale.	Auten, A. O., Jerseyville.
Austin, Calvin, Effingham.	Aulenburk, Henry, Effingham.

B

Bagley, F. R., Chicago, (Francis D. Moulton & Co.)	Blood, F. J., Chicago (Wells, Richardson & Co.)
Baird, F. W., Custer Park.	Bloomfield, R. A., Mt. Sterling.
Baldwin, Geo. H., Mendon.	Bloyer, George, Harper.
Baldwin, R. C., Redpath.	Bloyer, Otto, Elkhorn Grove.
Bargfeld, Lawrence, Effingham.	Bluff Springs Creamery Co., Thomson.
Barnes, C. A., 313 S. Clinton St., Chicago.	Boehmer, H., Barrington.
Barnhart, Chas., Elwood.	Bragg, C. T., Franklin.
Bartholomew, C. L., Cedarville.	Brewer, Dr. D., Fairbury.
Barton, Fannie, Block road, Joliet.	Brinker, F. H., Winneshiek.
Baumgartner, F., Joliet.	Bristol, G. S., Plainfield, R. R. 6.
Beatty, Frank, Galena.	Brooks, J. S., Urbana.
Becker, W. J., Farina.	Buchanan, G. L., Robinson, R. F. D. 5.
Benthien, H. H., Sandwich.	Bueler, Anton, Bemes.
Benton, D. C., Kaneville.	Buelter, Henry, Batavia.
Biddulph, J. R., Providence.	Burton, G. F., Mt. Carroll.
Bigler, A. W., Sigel.	Burton, H. R., Edgewood.
Blanke, R. L., St. Louis, Mo., (Blanke & Hauk.)	Busbane, Jno., New Lenox.

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| Campbell, A. B., Oregon. | Cobb, E. N., Monmouth. |
| Campbell, M. S., Genoa. | Coldwater, Jno., Elwood. |
| Carbaugh, Wm. T., Lanark, R. R. 1. | Collyer, W. D., Chicago. |
| Carpenter, K. B., Thomson. | Conant, A. B., Vernon. |
| Carr, F. A., Aurora. | Cook, Clarence, Beecher. |
| Carter, M. W., Jacksonville. | Cooksley, Alice M., East Troy, Wis. |
| Cassens, Geo., Alhambra. | Cooksley, J. L., East Troy, Wis. |
| Causey, J. S., Mulberry Grove. | Cooley, Fred A., Yorktown. |
| Caven, George, Chicago. | Coolidge, C. P., Winnebago. |
| Christ, John, Washington. | Coolidge, J. H., Galesburg. |
| Christensen, C. M. | Crissey, N. O., Avon. |
| Clegg, J. F., Chicago (Merrill & Eldredge.) | Crosier, Eli I., Utica. |
| Clinger, J. V., Stewardson. | Culter, Geo. A., Belvidere. |
| | Cutler, F., Lockport. |

D

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| Dalbert, A., Richard. | Dickinson, F. J., Woodbine. |
| Darik, Jas., Edgewood. | Diehl, Jno. H., Effingham. |
| Davenport, Prof. E., Urbana. | Dorsey, L. S., Moro. |
| Davis, S. E., Elgin. | Dowling, Robt. J., Ontarioville. |
| Davis, Wm. F., Quincy. | Doyle, M., Elwood. |
| Dayton, Hutchinson. | Duell, H. R., Sandwich. |
| Defrees, Tallie, Greenville. | Dummemuth, Chas., Olney. |
| DeLano, H. W., Sugar Grove. | Dust, H. W., Effingham, R. F. D. No. 4. |
| DeLaval Separator Co., Chicago. | |
| Dewey, F. E., Capron. | |

E

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| Eastman, H., Shabbona. | Engbring, W. H., Effingham. |
| Eaton, R., Elwood. | Erf, Prof. Oscar, Manhattan, Kan. |
| Ehlers, Jno., Altamont. | |

F

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| Fellhoelter, Jos., Effingham, R. F. D. 4. | Francis, F., New Lenox. |
| Flanders, T. P., Big Rock. | Francisco, M., Wauconda. |
| Flint Bros., Joliet. | Frankenstein, H. C., Effingham. |
| Ford, J. B. & Co., Wyandotte, Mich. | Fraser, Prof. W. J., Urbana. |
| Forsher, Thos., Leland Hotel, Springfield. | Fredricks, Andrew, Elgin (DeLaval Separator Co.) |
| Foss, Chas., Cedarville. | Frein, H. P., Smithton. |
| Foster, J. C., Sparta. | Freund, S. H., Johnsburgh. |
| | Fryer, Wm., Winslow. |

G

- Gibbons, T. H., Elgin.
 Giesecking, W. G., Altamont.
 Gilkerson, G. T., Marengo.
 Gillespie, A. D., Watson.
 Gillett, W. J., Rosendale, Wis.
 Glover, A. J., Ft. Atchison, Wis.
 Godfrey, A., Lockport.
 Goeller, J. G., Tower Hill.
 Goldstein, H., Effingham.
 Gordon, M. D., Wyandotte, Mich.
 (J. B. Ford Co.)
 Grant, E., Farina.
 Gravenhorst, A., Effingham.
 Gravenhorst, J. W., Effingham.
 Green, G. M., Mt. Olive.
 Green, W. J., Welton.
 Green, Wm. M., Lockport.
 Greene, L. P., 7617 Union Ave., Chicago (The Sharples Separator Co.)
 Greene, S. F., 7617 Union Ave., Chicago (Miller Pasteurizing Machine Co.)
 Greenwood, H., Joliet.
 Greenwood, Ivan J., Bristol.
 Grossman, J. H., Martinville.
 Grout, A. P., Winchester.
 Gullickson, Martin, Frankfort Station.
 Gurler, G. H., DeKalb.
 Gurler, H. B., DeKalb.
 Gurler, H. B., DeKalb.

H

- Haddleton, W. J., Hinsdale.
 Hadley, E., Joliet.
 Haecker, Prof. A. L., Lincoln, Neb.
 Haecker, Prof. T. L., St. Anthony Park, Minn.
 Haeger, D. C., Dundee.
 Haley, C. F., Marley.
 Hall, C., R. R. No. 1, Cantrill.
 Hall, J. L., Cantrill.
 Hartman, W. T., Naperville.
 Harvey, T. H., Effingham.
 Harvey, W. R., Clare.
 Hatch, Fred L., Spring Grove.
 Hauk, R. B., St. Louis, Mo.
 Hayden, C. C., Urbana.
 Heath, G. W., Mason, R. F. D. 1.
 Hendlemeyer, Jos., Effingham.
 Henry, R. J., Millersburg.
 Herkenheim, P. J., Malta.
 Herman, Jno., Raymond.
 Heth, G. W., Mason, R. F. D. 1.
 Hicks, J. E., Chadwick.
 Hicks, J. E., Chadwick.
 Hicks, J. E., Thompson.
 Holland, O. E., Warren.
 Hopkins, Geo. C., Oregon.
 Hoppensteadt, Geo. W., Goodenow.
 Hopper, H. A., Lafayette, Ind.
 Hopson, J. J., Vail City.
 Horsing, S. S., Stillman Valley.
 Hostetter, A. B., Springfield.
 Hostetter, W. R., Mt. Carroll.
 Hovey, E. L., Capron.
 Hunt, Geo. A., Hebron.
 Hunt, James R., Ottawa.
 Hutchinson, D., Elwood.

I

- Irish, H. B., Farina.

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| Janes, W. E., Hinsdale. | Johnson, Lewis, Stewardson. |
| Jennings, A. A., Chicago (Star Union Lines.) | Johnson, R., Oblong. |
| Jensen, A. F., Effingham, R. F. D. 4. | Joliet Pure Ice Co., Joliet. |
| Jensen, S. M., Orangeville. | Jones, A. H., State Food Commissioner, Chicago. |
| Johnson, Ernest, Hebron. | Jorgensen, F. A., Urbana. |
| Johnson, Lars, Stewardson. | |

K

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| Kane, Wm. J., Morrison, R. F. D. 4. | Koeke, Jno. B., Effingham. |
| Kendall, George, Mt. Carroll. | Koester, Toney J., Effingham. |
| Kent, A. H., Mulberry Grove. | Koester, W. J., Effingham. |
| Kilbourne, C. S., Aurora. | Kolb, John, Elizabeth. |
| Kimzey, W. R., Du Quoin. | Koors, Frank, Fairfield. |
| Kirkpatrick, J. R., Oakdale. | Knigge, L. H., McHenry. |
| Kleckner, H. S., Orangeville. | Kuobolock, Geo., Marion. |

L

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| Lally, W. A., Chicago (New York Despatch Transportation Co.) | Litchardt, Herman, Schaumberg. |
| Leass, S. L., Sullivan. | Lloyd, W. B., Kinmundy. |
| Lee, Carl E., Urbana. | Lohmen, Wm. C., Sorento, R. R. 2. |
| Letts, Geo. D., Frankfort Station. | Long, J. H., Effingham. |
| Lewis, C. A., Joliet. | Long, M., Woodstock. |
| Lied, John M., Edgewood. | Loy, J. H., Effingham. |
| Liell John M., Edgewood. | Lowitz, Chas. C., Wyandotte, Mich. (J. B. Ford Co.) |
| Lindley, Hon. C. J., Greenville. | Ludwig, Mat., Lockport. |

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| Macey, V. D., Mooresville. | Maule, A., Shirland. |
| Mallory, Grant, Freeport. | Maurer, W. H., Rock Grove. |
| Mann, F. J., Gilman. | McCarnaghie, A. R., Capron. |
| Mann, W. E., Pecatonica. | McCredie, Wm., Elgin. |
| Mantz, L. P., Watson. | McFarland, Frank, Big Rock. |
| Marksman, Jno., Effingham. | McKinon, J. C., Amboy. |
| Marquardt, T. W., Lombard. | McLaughlin, T. L., Chicago. |
| Martin, A. W., Altamont. | McNish, F. J., Chicago (Creamery Package Mfg. Co.) |
| Mason, J. L., Elgin. | Metzger, F. L., Millstadt. |
| Mason, J. P., Elgin. | |

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| Meyer, Adolph, Greenville. | Montgomery, A. R., Capron. |
| Michener, E. P., Chicago (Briggs House.) | Moore, W. S., Chicago. |
| Miller, Geo., Metropolis. | Moren, Robt., Freeport. |
| Miller, R. M., Metropolis. | Morris, Geo. O., Greenville. |
| Miller, S. W., Plainfield. | Morris, Jos., Washington. |
| Mils, Col. Chas., Springfield. | Muller, F. J., Forreston. |
| Mingle, John, Toledo. | Murphy, P. A., 317 Jefferson St., Joliet. |
| Mitchell, C. E., Effingham. | Murray, Otis C., Johnsburg. |
| Moles, F. R., Chicago. | Musselman, S. L., Brookville. |
| Moll, A. D., Mascoutah. | Myers, O., Elwood. |

N

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| Nelson, L., Camp Point. | Newman, John, Elgin. |
| Nelson, Peter, Creston. | Newman, Joseph, Elgin. |
| Newberry, J. W., Sigel. | Noel, E. C., Elwood. |

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| Olson, Chas., Kirkland. | Overbeck, Jno., Effingham. |
| Osgood, H. B., Chicago (Creamery Package Mfg. Co.) | |

P

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| Palmer, F. R., Pearl City. | Pennington, J. S., Plainfield. |
| Palmer, H. M., MacLean. | Pester, Geo., Manhattan. |
| Palmer, H. W., MacLean. | Pfingston, H. W. F., Schaumberg. |
| Palmer, J. A., Effingham. | Phillips, Edw., Griggsville. |
| Parker, R. H., Effingham. | Phillips, Louis, Germantown. |
| Parks, A. A., Joliet. | Pierce, Harry, Savanna. |
| Patterson, J. P., Plainfield. | Powell, J. W., Peoria (Merchants' Despatch Transportation Co.) |
| Patterson, Jno. W., Plainfield. | Powell, S. |
| Patton, R. A., Hanna City. | |
| Peak, S. W., Winchester. | |

R

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| Ramsey, S. B., Effingham. | Riegel, John O., Highland. |
| Rawson, Frank E., Alden. | Robbins, Wm., Manhattan. |
| Rayner, J. W., Elgin. | Roby, Wm., Fairfield. |
| Redpath, R. G., Baldwin. | Roessler, Theodore, Shelbyville. |
| Relf, E., Elwood. | Rowley, Walter, Lockport. |
| Rice, H. B., Lewiston. | Rynders, C. W., Waverly. |

S

- Sanmann, J. F., Havana.
 Sanmann, W. H., Havana.
 Savage, F., Marley.
 Scharth, John, Mascoutah.
 Schildmiller, Jno., Thomson.
 Schlattman, Fred, St. Libory.
 Schlosser, G., 9149 Erie Ave., Chicago.
 Schoen, H. M., Edgewood.
 Schuknecht, H. E., La Grange (Asst. State Food Commissioner.)
 Schumaker, B., Mason.
 Schumaker, J., Altamont.
 Schumaker, John, Eldermont.
 Schwartz, Ed., Damascus.
 Scotey, W. H., Greenup.
 Scott, J. E., Scales Mound.
 Seaman, J., Greenville.
 Shepard, W. P., Chicago (Empire Cream Separator Co.)
 Shilling, S. B., Mason City, Ia.
 Shook, V. A., Freeport.
 Short, E., Joliet.
 Simonson, Geo., Renard.
 Slegal, Jesse W., Effingham.
 Sloggett, John, Hinckley.
 Slouborg, Thos., Savanna.
 Smith, Andrew, Washington.
 Smith, C., Effingham.
 Smith, D. C., Lake Zurich.
 Smith, S. F., Columbus.
 Snow, W. D., Bloomington.
 Soltwedel, H. Y., Effingham.
 Spanger, E. E., Big Rock.
 Spanger, W. G., Plainfield.
 Speed, Chas. V., Baileyville.
 Spencer, C. V., Chicago (Santa Fe Railroad.)
 Spies, L. A., St. Jacob.
 Sprague, C. N., Joliet.
 Sprague, F., Lockport.
 Springsteen, P. J., Beecher, R. F. D. 3.
 Staples, W. S., Hoopole.
 Starman, Benj., Effingham.
 Stilson, E. L., Manhattan.
 Stocker, J. J., Greenville.
 Storer, Wm., Chicago.
 Storm, C., Lockport.
 Storms, H., New Lenox.
 Stowell, J. E., Chicago.
 Strain, Jas. A., Greenville.
 Straw, T. H., Shannon.
 Sudendorf, C., Clinton (Wells, Richardson & Co.)
 Sumner, J. B., Effingham.
 Sur, J. W., Effingham.
 Sweeney, Frank, Chicago (C. H. Weaver & Co.)

T

- Tatten, Geo. E., Garden Prairie.
 Terpening, J. D., New Lenox.
 Terry, D. M., Earlville.
 Thompkins, H. S., Union.
 Thompson, Frank B., Greenwood.
 Thornton, Chas. H., Argyle.
 Thurston, Henry F., 355 Dearborn St., Chicago.
 Tindall, W. K., Malta.
 Truman, J. M., Urbana.

U

- Ulmer, Jno. T., Effingham.
 Upton, E. N., Effingham

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| Van Kuren, S. J., Belvidere
(National Creamery Supply Co.) | Van Patten, David, Plainfield.
Van Volking, F. P., Danville |
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| Wachtel, Wm., Effingham, R. F. D.
No. 1. | Williams, C. H., Chicago (Colonial
Salt Co.) |
| Walker, H. E., Kirkwood. | Willinghoff, E. J., Chicago. |
| Walker, Dr. J. H., Effingham. | Willson, D. W., Elgin. |
| Wall, J. A., Joliet. | Willson, W. C., Elgin. |
| Walsh, F. M., Ft. Atkinson, Wis. | Wilson, Chas. G., Martinsville. |
| Walton, Edw. B., Arma. | Wilson, E. L., Manhattan. |
| Walton, E. W., Anna. | Wilson, L. D., Greenwood. |
| Waspi, J. S., Spring Grove. | Winter, A. C., Waterman. |
| Weaver, Vernon A., Greenville. | Wise, Geo., Greenville. |
| Webb, Wm., Lockport. | Wise, G. W., Effingham. |
| Weber, A. J. C., Joliet. | Wiser, G. L., Martinsville. |
| Weber Dairy Co., Joliet. | Wood, D. E., Elgin. |
| Webster, E. H., Washington, D. C.
(Chief Dairy Division.) | Wood, R. L., Woodhull. |
| Weddige, F., Big Rock. | Woodard, C. H., Big Rock. |
| Welsh, S. T., Lake Creek. | Woodburg, A. E., Danville. . . |
| Wentworth, E. M., Davenport, Ia.
(Star Union Lines.) | Woolverton, D. C., 154 Lake St.,
Chicago. |
| Wiggins, L. N., Springfield. | Worman, A. J., Effingham. |
| Wilkening, W. C., Schaumburg. | Worman, C. A., Ludopton. |
| | Wright, F. W., Joslin. |
| | Wright, S. N., Elgin. |
| | Wyman, B. F., Sycamore. |

Y

- Youngs, H. J., Stillman Valley.

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| Zeller, A., Highland. | Zimmerman, R. N., Xenia. |
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HANDLING OF CREAM ON THE FARM.

By C. E. Lee, Dairy School, University of Illinois.

There is a growing demand for instruction regarding the handling of cream on the farm. This indicates that the farmers have an interest in the production of good butter and realize that it is a valuable concentrated food product. They are beginning to learn that the butter that grades extra is not made from cream produced under unsanitary conditions, and that when the rich, sweet flavor of cream has been destroyed by carelessness and neglect before it leaves the farm, it can never be restored by any means in their own or the butter maker's power. There are a few dairymen who care very little about the condition of their cream as long as it can be disposed of. They do not realize that by carelessness they are doing an irreparable injustice to their more painstaking neighbors. For there are a number of cream producers who are doing their best but their instruction and their material for work are limited.

Since the use of the hand separator has become so universal, the product of the creameries that had to change from the handling of whole milk to the handling of cream, does not meet with its former favor. The same man may be operating the creamery and applying more skill than formerly and yet the butter may be below its previous standard. What is the reason for it? How can we improve this condition?

The outline as to how the work should be done is given with a view of aiding the farmer—that he may have a specific outline. If the conditions of some are such that this cannot be followed exactly, they should aim to come as near to it as possible.

Care of Utensils.

All the utensils used in handling the milk and cream should be made of the best grade of tin. Never use wooden or galvanized pails.

See that all joints in the pails, cans, and strainers are well made and filled with solder.

Do not put cream in an old can that has the tin partly worn off. The can may rust and this has a deteriorating effect upon milk or cream and imparts a peculiar metallic flavor. Utensils that come in contact with milk or cream can best be cleaned by first rinsing with cold water and then washing with a brush and hot water. Some believe that a washing powder should be added to the wash water. This should not be done unless you have a powder that is free from grease. Soap should never be used. In buying washing powder get a brand that is guaranteed to be free from grease or get ordinary sal soda and use it sparingly. After washing the utensils with hot water, rinse thoroughly with boiling water and place them where they can come in contact with the direct rays of the sun. In washing the ordinary five, eight, or ten-gallon milk cans, be sure that the inside of the shoulder of the can has been rubbed with the brush. This is really the hardest portion of the can to wash. It is hard to get at and the splashing of a partly filled cream can may be baked on by coming in contact with hot water.

Utensils scalded with boiling water and left in contact with the water long enough to be thoroughly heated do not need to be dried with a cloth. Simply place them where they will drain and be exposed to the sun. Vessels used about the dairy should not be used for any other purpose.

Obtaining the cream from the milk is a very simple problem. The old method of putting milk in shallow pans in a cool place, or deep cans in a tank of cold water, are still in use. But the farmer does not obtain all the cream by these methods. A number of farmers are using what they call a water separator for creaming the milk. This is nothing but a fraud—a piece of apparatus deceiving to the users. The same results could be obtained with the ordinary cans used in the deep-setting system by filling them one-third to one-half full of water and pouring in enough milk to fill the cans, and removing the cream in the usual way. By this so-called hydraulic or water separator, the farmer loses from one-fifth to one-fourth of the butter fat.

This may not seem like much loss, but if all the facts concerning this method of creaming were known, it would be used much less than it is. Butter fat is lost, thin cream is obtained, which is often contaminated with all the impurities of the water. The cream may have a watery flavor which leaves its effect on the butter.

The most satisfactory method of obtaining cream from milk on the farm, is by the use of a standard make of hand separator. The cost of the machine may seem high, but when the amount of butter fat is compared with the butter fat obtained from the same milk by other methods, the farmer can easily figure how long it will take before he can make the cost of the machine.

"What separator shall we buy?" is a question that we are often asked. There are several makes of hand separators on the market. The principle upon which they do their work is practically the same. But there is a difference in the efficiency and durability of them. If the farmer has a preference for a certain make and is satisfied that it will do good work, that is the separator for him to buy. But the man who has no preference, who simply wants a good machine, should not accept one that has not been thoroughly tested.

If the separator is put in and operated, capacity tested, and the skim milk tested for butter fat by the agent or salesman, be sure the following is adhered to: The handle of the separator must not be turned faster than the number of turns indicated on the handle or stated in the book of instruction. There are machines that will not do close skimming at regulation speed, but will do very efficient work at a greatly increased speed. Increased speed means greater wearing of the running parts and more work. See that the capacity is what it is claimed to be and that everything about the separator is well constructed of good material.

General Instructions for the Care and Handling of the Hand Separator.

Set the machine perfectly level on a solid floor. To be sure that no dirt or grit has found its way into the gearing, clean all parts thoroughly before using. All the parts that come in

contact with the milk should be thoroughly scalded. Oil separator each time it is used. Use only the best grade of oil. Once a month remove all gearing guards and examine to see if everything is working properly. There should be no indications that some parts are gradually wearing down. If at this time it is deemed advisable to thoroughly clean all bearings and gearing parts, kerosene applied and wiped off and replaced with oil will materially aid the lasting effects of the separator.

If by accident some milk should get into any portion of the separator, clean it out, as it will soon clog the gearings and give an offensive odor to the room.

Look occasionally to see if the separator is standing level. Do not think that the separator is a difficult piece of machinery and that it is hard to take care of. It is not. Use your judgment and follow the directions given in the book of instructions, pertaining to your make of machine.

Clean the separator each time after using. Do not think that cleaning once a day is sufficient. It may mean poor skimming and abnormal loss of butter fat. The cleaning is best done immediately after it has been used. Take it apart; rinse well with cold water, then wash all parts of the bowl and tinware in warm water, using the brushes that belong to the separator. Never use a dish cloth or soap of any kind, but rather use small quantities of sal soda or washing powder that is free from grease. After all parts are thoroughly washed, rinse in boiling water and place where they will be exposed to the sun. Even the brushes used in washing should be scalded and placed in the sun. During the night leave all parts in the supply can. Do not put together. It is best to skim the milk immediately after milking or while the milk is still warm. Most separators do their best work when the milk has a temperature of from 85 to 95 degrees F.

See that all parts are supplied with oil and the machine operated at full speed and at full capacity. If turned by hand, see that the speed is uniform and evenly applied. By this I mean do not simply push when the handle goes down and pull when it starts up. This is hard on the separator. It is good

policy to run a quart of warm water through the bowl prior to turning on the milk supply and just after the separating is completed. Increase the speed while flushing the bowl. The common practice is to stop turning and then pour in the warm water. Allow the bowl to come to a standstill of its own accord unless there is a brake attached.

The relative amount of cream to be obtained from the amount of milk skimmed will depend upon the breed of cows producing the milk, the season of the year, and whether the cows are fresh or advanced in period of lactation. Some farmers say, "Why does my cream vary with the season?" One reason is because the milk does not test the same during the whole year. Other conditions being the same, the richest milk is produced on dry feed and when the cow is nearly dry.

It is good policy to skim a cream that will test from 30 to 40, or in other words, in skimming ten gallons of milk, one or one and one-third gallons of cream should be obtained. It is not the amount of cream that counts but the amount of butter fat. If the cream is sold to a creamery where the sampling of the cream for testing is done by means of a cream scale instead of a pipette, you will get what belongs to you, whether the cream be thick or thin.

Cream testing between 30 and 40 means more skim milk at home. The cream will keep better and there will be less cream to care for and transport. If a man has churned a certain amount of cream at home and sent an equal amount of the same cream to the creamery, the number of pounds of butter obtained will be a trifle more than the butter fat figured from the test of the cream at the creamery, simply because the test determines the amount of butter fat, and as a rule, 6 to 6 $\frac{1}{4}$ pounds of butter fat will make 7 pounds of butter.

When a separator is set to skim a 40 per cent cream, it does not mean that every can of cream obtained will test 40 per cent. For the per cent of fat in the cream is affected by the variation in the speed of the machine, temperature of the milk, amount of

milk going in to the bowl, the amount of water used in flushing out the bowl and, as written above, variation in the test of milk.

Care of Cream.

1. As soon as the cream is separated from the milk, it should be cooled to at least 60 degrees F., but 50 would be better. While the cream is cooling, it should be stirred occasionally and should not be covered tightly until cold. Never mix a warm lot of cream with the cold cream, but cool each, skimming before mixing with the cream already on hand and stir thoroughly.

2. Deliver the cream to the creamery at least three or four times a week in summer and two or three times per week in winter. Do not think because the cream is sweet it is all right and need not be delivered. Bitter flavors may be developing, that may not be noticed until the butter is made.

3. It may not be necessary to speak of how the cream should be delivered at the creamery. The best cream is usually received when the farmer delivers it himself, and when each farmer's cream is delivered at the creamery or shipping station in separate cans. During transportation the cans should be protected with a cover—a wet blanket in summer and a dry one in winter. If the cream is gathered by a cream hauler and your cream is mixed with your neighbor's, see that the cream is thoroughly stirred before a small sample is taken out for testing.

4. It seems that a number of farmers would deliver a better grade of cream if they had a suitable place for keeping it until it is delivered. No one should attempt to keep the cream in the cellar or in a large tank of water where the daily pumping isn't sufficient to keep down the temperature of the water. If a suitable place cannot be built in a well-constructed milk house, the following arrangement answers the purpose quite well.

5. Caring for the cream at the proper time in any of the ways given below will show very little souring at the end of two days.

6. Make a small water-tight box of two-inch material and of sufficient size to hold all the cream cans necessary in handling the cream. This box should have a tight-fitting cover. It is a

good plan to divide the box into sections by means of rods, then if one can is left in the tank of water, it will remain upright and in place. The best place for this tank is in the milk house. It may be placed between the well pump and the stock watering tank. In that case another box or a small house should be built over it for protection. All the water pumped for the stock should flow through this tank, entering at the top and discharging near the bottom. This will force all the old water out first. The overflow pipe should have one-half inch larger diameter than the inlet in order that the water may be freely carried off. The water in the tank should be of sufficient depth to immerse the cans within two inches of the top.

Another place that would be suitable for holding cream could be built inside the watering tank, or an ordinary kerosene barrel may answer the purpose. Burn out the oil; bore holes for the water inlet and outlet between the second and third hoops for the water inlet and outlet between the second and third hoops from the top. Make connections same as for the box. Be sure the inlet water pipe is extended nearly to the bottom. It is a good plan to bore one-inch holes between the first and second hoops from the top. By placing rods through these holes, the cans will not float when partly filled. Shelter this barrel the same as you would the box. Remember to change the water in the box or barrel often enough to have it reasonably cold so that the cream may be kept nearly the same temperature as the water from the well.

RIPENING THE CREAM FOR MAKING BUTTER ON THE FARM.

By C. C. Lee, Dairy School, University of Illinois.

The difficulties and problems involved in the handling of cream for making butter are so numerous and complex, it is little wonder that there is a lack of uniformity in the product. The trouble may be due to some of the following causes: Improper handling of the milk before the cream is removed, using the

dairy utensils, such as pails, strainers and cans, for other purposes and not cleaning them thoroughly before they are again used as receptacles for milk or cream, allowing the cream to stand in a warm, ill-ventilated room where it becomes tainted and acquires an off-flavor or becomes too sour. Let us suppose that everyone that has handled milk has learned that cleanliness is one of the things that must not be overlooked; that everything that comes in contact with the milk up to the time the cream is removed has been of a nature to produce a very fine grade of cream.

It is out of the question to make the best grade of butter out of cream that has an off-flavor or is in any way tainted. Do not think because you have a small amount of cream it is not necessary to churn more than once a week. Aim to churn twice per week. On a number of farms where butter is made, they churn Tuesday and Friday, and market the butter on Saturday. It is not essential to follow this rule, but in order to secure a uniform grade of butter it is necessary to churn at least every third or fourth day.

Every farm should have a place suitable for holding the cream until it is churned and no place will answer this purpose better than in a well-constructed milk house. As a rule the common practice of keeping the milk and cream in cellars is not conducive to best results, for the cream will absorb the odors of the room. The ordinary stock watering tank is frequently resorted to for keeping the cream, but often the tank is so large that a sufficient amount of water is not pumped in every day to keep the temperature down. A description of a suitable place for keeping the cream is given in circular No. 1.

While the cream is held during the collecting period it should be kept at about 52. Each new lot of cream should be cooled to that temperature before it is mixed with the cream that has previously been saved. For if the warm cream is mixed with the cold cream the temperature of the cold cream will be raised and the bulk of cream will have to be cooled a few degrees. When cold cream is warmed slightly it will sour sooner. The following suggestion has been tried and found to work well:

For holding the cream have a regular can fitted with a cover through which the handle of the stirrer may project. The second can should be smaller, but of sufficient size to hold all the cream of one skimming. Cool the cream in this can before pouring it into the larger can. It is a good plan to leave the cream in this can until the following milking time, but the cooling should commence as soon as the separating is done in order to check the souring. Stir the cream occasionally while it is cooling. When a sufficient amount of cream has been collected for a churning, or twenty-four hours before the time set for churning, the cream can should be removed from the place where it has been kept cold and placed where the cream will warm to from 60 to 65 degrees, in summer, and 70 to 75 degrees in winter. Add the starter, using from one to two and a half gallons for every ten gallons of cream. In case the cream has not been kept cold enough to remain sweet, it will not be necessary to warm it up for souring. After the starter is added the cream should be thoroughly stirred every hour until it has taken on a sufficient amount of acid for churning. This can be determined by an acid test or by the general appearance. It should be smooth and glossy with a clean acid taste and aroma. Under favorable conditions, starting with sweet cream, this development of acid is brought about in from six to eight hours. The cream should then be cooled to churning temperature and held for at least two hours in winter and from four to six hours in summer. Otherwise, the butter will come soft and mushy with a corresponding increased loss in the buttermilk.

A number of people have used the following method of handling the cream: At the beginning of the collecting period or when the first amount of cream is placed in the cream can, a small amount of starter is added to it, usually one-fourth of the amount of cream; in this case the development of acid is going on slowly during the time the cream is collected. No fresh cream should be added to the cream can later than twelve hours before it is churned. The above method works well if the cream is kept cold enough to control the amount of acid developed.

At times during the collecting period, even when cream

is kept at a temperature of 50 degrees, a bitter flavor will develop. This may be due to a bitter flavor in the milk caused by the cows eating certain foods, or by certain bacteria getting into the milk. In either case it will cause considerable trouble. To a certain extent this can be destroyed by pasteurization. Another fact worth considering is that pasteurized cream will keep sweet for a longer period even if it is kept at a higher temperature. The objection made to pasteurizing cream on the farm is that it adds to the labor involved. While this is true, it is going to improve the butter and it is time well spent. Pasteurization on the farm may be made simple and effective, especially when the dairy is fitted up with a small boiler for supplying steam. To pasteurize, place the can containing the cream from the evening and morning's milking in a tank of hot water and hold at a temperature of from 160 to 170 for twenty or thirty minutes, then cool. Stir the cream occasionally while it is heating and cooling.

The writer has known cases where there was difficulty in getting butter from cream. This was due to a viscous condition of the cream, caused by using milk from cows that were nearly dry. By pasteurization this difficulty was removed.

If the cream has been pasteurized a starter must be used to produce the proper acidity and flavor of the cream before churning. The value of starters in making butter should not be underestimated. No matter whether butter is made on the farm or in the well equipped creamery. It is true that butter can be made from sweet cream, but as a rule it will lack the flavor that butter produced from ripened cream will have. Nearly all of the butter made at the present time is from cream that has been ripened, or, in other words, sour cream. The souring of cream is best brought about when it is under control and the only way to have it so is by the use of a well-made starter. Cream or milk will sour if allowed to stand for a certain time. The length of time depends upon how cleanly it has been produced. If the cream is left to sour of its own accord, the undesirable bacteria or those which produce an off-flavor will develop along side of the desirable ones and chances are that they will get control

of the vat of cream. To be sure that these little bacteria that sour the cream will not be out numbered, add a starter. This is simply a certain amount of sour milk, having a mildly clean acid flavor.

To make the starter, whole milk or skim milk can be used. The latter is preferred because the top of the starter must be thrown away. Take a certain amount of either, the amount depending on the amount of cream to be churned (1 to 2½ gallons of starter to every 10 gallons of cream.) Place this milk in a covered vessel where it can be kept at a temperature of 70 degrees or even 85 if it is desired that it should sour in a shorter period. At 70 degrees, as a rule, it takes from 18 to 24 hours for it to become thick. When the starter is sour, it is ready to be added to the cream, but first remove an inch of the top and throw it away. If what remains has a smooth glossy appearance with a clean milk acid taste and aroma it indicates a good starter. Stir this well and add to the cream. It is sometimes impossible to obtain a good starter from the mixed milk of the herd. This is especially true in the fall or when a number of the cows are going dry. In that case better results can be obtained by using a commercial starter or by selecting several samples of milk in perfectly clean quart jars and allowing the milk to sour. Select the one that shows the most solid curd and the cleanest flavor for your starter. Mix this with the desired amount of selected whole milk taken from a cow that is giving the most milk or from one that was recently fresh. Allow this to stand at a favorable temperature for a short time or until it is sour enough to use in the cream.

As has already been stated, use from one to two and a half gallons of starter to ten gallons of cream. If the cream for churning has been obtained by setting the milk in shallow pans or in the ordinary shot gun or cooley cans, the cream is usually thinner than the cream obtained by the use of the hand-separator, and not more than one gallon of starter can be used to ten gallons of cream. Best results can be obtained by churning cream that contains enough butter fat to produce in the neighborhood

of $2\frac{1}{2}$ pounds butter per gallon of cream after the starter is added, or 28 per cent cream.

As stated elsewhere in this circular, the amount of acid can be determined by an acid test, or, when the cream has taken on a glossy appearance and has developed a mild acid flavor it is ready to be cooled for churning. It might be said that there is a great deal of butter made today where the amount of acid developed in the cream is governed by the judgment of the maker who thinks the acid test is not necessary. Our best butter-makers, whether in the creamery or dairy, do not rely upon their own taste and judgment, but use either the Mann's or Farrington acid test. It is essential that they do so as the proper kind of ripening of cream is going to show itself in the butter made. A lack of acid will produce a mild piece of butter and too high an acid will produce high acid butter with a sour curdy flavor. The manipulation of the acid test is simple and does not require much time. Place five of the Farrington Alkaline Tablets (which are handled by any dairy supply house) in five ounces of water and allow them to dissolve before using. Make the test by taking a certain measure full of cream. (It may be a regular milk testing pipette or any small measure.) Pour it in a white cup and using the same measure add as many measures full of the prepared solution as will produce a light pink shade. When the cream is ready to be churned there should be five times as much of the solution as cream. If one of cream and four of the solution leave the mixture pink the cream should be allowed to stand a little longer before cooling, but if it took between four and five, begin to cool. When the cream is to stand at churning temperature over night, cool when one measure of cream and four of the solution shows the pink shade.

LICENSED COMMERCIAL FERTILIZERS AND FEEDING STUFFS.

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This bulletin is published in accordance with Wisconsin statutes of 1898, sec. 1494d, and gives the results of analyses of the commercial fertilizers licensed for sale in this state during the current calendar year. Under Chap. 377, laws of 1901, commercial concentrated feeding stuffs have also been licensed for sale in the state during the present year, and a list of feed-stuffs for which licenses have been taken out by the manufacturers or agents up to April 1, 1907, are given in the second part of this bulletin. Samples of concentrated feeding stuffs sold by feed dealers in different parts of the state have been collected during the past three months by authorized agents of the Station; these examples are now being subjected to chemical analysis and microscopic examination in our laboratory, and the results obtained, with the analyses of other samples of feeding stuffs, collected during the year, will be given in the regular feed bulletin published toward the end of the year.

A—Licensed Commercial Fertilizers.

The general subject of commercial fertilizers has been frequently discussed in earlier publications of our Station, and the explanations there given as to the main principles governing the application of fertilizers, will doubtless be of service to those who are not already familiar with this subject. It has been thought well to repeat in this place some brief explanatory remarks concerning certain technical terms met with in statements of fertilizer analyses, and to say a few words about the fertilizing elements on which we have to depend for maintaining or restoring the fertility of our land.

The main fertilizing ingredients which it may be necessary to supply in growing crops under the conditions present in this state are nitrogen, phosphoric acid, potash and lime.

Nitrogen may be present in fertilizers in three different forms, as *nitrate*, *ammonia*, or *organic compounds*. The first two forms of nitrogen are of immediate value to crops, since they are easily soluble and may be readily assimilated by plants. Organic nitrogen is the form of nitrogen found in fertilizers of vegetable or animal origin. Some of these, like leather or woolen scraps, hoofs, horn shavings, etc., possess very little value as fertilizers, being insoluble and but slowly decomposed in the soil. The fertilizer laws of many states do not recognize nitrogen contained in materials of this kind as of any value. *Available nitrogen* means nitrogen supplied in nitrates, ammonia salts, or organic compounds of easily decomposable character, like dried blood, tankage, cotton seed meal, etc. The determinations of soluble nitrogen in the licensed mixed fertilizers sampled and analyzed by us during the past season, will give valuable information as to the amounts of directly available nitrogen present in the different licensed brands of fertilizers.

The main nitrogenous fertilizers used in this state are nitrate of soda, tankage, and dried blood. The first mentioned fertilizer is mostly used by market gardeners and florists, and is of great value in stimulating the growth of plants by furnishing immediately available plant food; the other materials mentioned are also valuable fertilizers, but are slower in their action; they make up the bulk of the nitrogenous components of nearly all the commercial fertilizers on our market. Nitrogen is the most costly ingredient of artificial fertilizers. Certain kinds of plants, like the clovers, alfalfa, vetches and other species of the legume family, through the agency of microscopic organisms, are able to transform the free nitrogen of the air to organic nitrogenous compounds, which may be used for the nutrition of farm animals and thus indirectly, and indeed directly, contribute to the supply of nitrogenous plant food in the soil. The farmer adopting a system of crop rotation in which clover or other crops of the legume family are included, may often avoid a cash outlay for nitrogenous fertilizers, and need only see to it that the supply of potash and phosphoric acid in his soil is not unduly reduced through continuous cropping.

Phosphoric acid is found in different forms in the commercial fertilizers offered for sale in the state, viz, in combinations with calcium, magnesium, iron, or aluminum; some of these compounds are soluble and others insoluble. We distinguish in fertilizer analyses between *soluble*, *reverted*, and *total phosphoric acid*. Mono-calcium phosphate (containing *soluble* phosphoric acid) is soluble in water; di-calcium phosphate (containing *reverted* phosphoric acid) is insoluble in water, but soluble in a strong warm solution of ammonium citrate, while the tri-calcium phosphate (containing *insoluble* phosphoric acid) is not appreciably soluble in either of these liquids. The phosphoric acid contained in raw bone, bone meal, or rock phosphate is in the form of tri-calcium phosphate. When applied to the soil in a fine-ground condition, it is gradually dissolved by the soil moisture and the juices of the plant roots and thus rendered available to plants. Coarse-ground bone, on the other hand, is but slowly decomposed in the soil and therefore of but little value for crop production the first season. Super-phosphates contain both water-soluble and citrate-soluble phosphoric acid. Broadly speaking, both of these kinds of phosphoric acid are of about equal value to plants. The phosphoric acid in basic slag (odorless phosphate) is largely soluble in ammonium-citrate solution. *Available phosphoric acid* means the sum of water-soluble and reverted phosphoric acid, and represents the phosphoric acid of immediate value to plants. The results of the analyses are calculated on a basis of the content of phosphoric anhydrid (P_2O_5).

Potash is readily soluble in water in the compounds used as potassic fertilizers in our state. Potash is obtained in wood ashes, largely in the form of carbonate, or in various imported potash salts, like crude kainit (containing 12-13 per cent potash), potassium muriate, sulfate, silicate, etc. Since muriates (chlorids) have an injurious effect on the quality of certain crops, notably tobacco and potatoes, the use of potash salts free from muriate is in some cases desirable or even essential. The results of the analyses are figured on a basis of the content of potassium oxid (K_2O).

Lime fertilizers are not, generally speaking, of the importance to the agriculture of our state as they are under the conditions prevailing in some Eastern states and in the old world. It is possible, however, that the soil in some sections of our state may be benefited by applications of lime (see p. 11).

Lime is applied either as land plaster (sulfate), marl or ground limestone (carbonate), as slaked lime (hydrate and carbonate).

The methods of analysis followed in the chemical work of our Station are those adopted by the Association of Official Agricultural Chemists; the methods are revised from year to year at the annual conventions of this Association.

Suggestions as to the Purchase and Use of Commercial Fertilizers.

The farmers of our state have not found it necessary as yet to purchase large quantities of commercial fertilizers, as must be done by eastern and southern farmers, and by a wise system of farming they will never, generally speaking, have to pay out so much money for fertilizers in the future as is being done each year in the older states. The diagram on the title page of this bulletin shows the average annual expenditures for commercial fertilizers per farm for the United States and for three different states, according to the last census; it will be seen that the farmers of Wisconsin pay out only \$2.00 for artificial fertilizers per year and per farm, against \$20.00 for the state of New York, \$26.00 for Georgia, and \$10.00 for the whole Union. The farmers in the eastern and southern states are paying a heavy penalty for the methods of agriculture previously followed in those states, and the conditions now prevailing there in this respect furnish a warning example to our farmers to so husband the resources of their land that they will not reduce its fertility by faulty methods of agriculture, and render it necessary for their children and grandchildren to depend on artificial fertilizers for maintaining the productiveness of the land. This can be easily avoided by keeping live stock and taking good care of the barnyard manure, and by adopting systems of crop rotation which will prevent the exhaustion of

soil fertility or the reduction of the supply of any single fertilizing ingredient in the soil so that profitable crops cannot be grown thereon except by special fertilization.

Fortunately, stock raising and dairying husbandry are most important branches of agriculture in our state, and large quantities of concentrated feeding stuffs are annually purchased by Wisconsin farmers; these feeds are valuable as food materials, and at the same time enrich the manure produced by farm animals, so that if this is properly cared for, the quantities of fertilizing ingredients thus secured will, as a rule, enable the farmer, to a large extent at least, to maintain the fertility of his land.

Where systems of continuous grain raising or culture of special crops are followed, however, and where farmyard manure cannot be obtained in sufficient quantities, commercial fertilizers will prove excellent substitutes. In case of special crops, like tobacco, garden truck, potatoes, sugar beets, etc., calling for more or less one-sided fertilization, such fertilizers will be found of superior value, as they will supply the fertilizing ingredients in exactly the proportions required and, if desired, in an immediately available form. Commercial fertilizers are preferred for barnyard manure by many city people for lawns on account of convenience of application or for aesthetic reasons.

It is impossible to give definite directions as to the kinds and quantities of fertilizers required for different crops, because soils differ greatly in their contents of valuable fertilizing materials and we have no direct or infallible rule by which the amounts of available plant food in the soil can be determined. A rapid growth of foliage and a deep green color of the same give evidence of an ample supply of nitrogen in the soil; if the foliage seems watery and the growth of the plants is more or less rank, there is most likely a need of phosphoric acid, and probably of lime. If the plants make a rather stunted growth, under conditions of normal supply of water, and mature early, there is too much phosphoric acid in the soil to go with the other essential fertilizing elements present, and nitrogen and perhaps potash will be apt to materially improve the crops har-

vested. Potash fertilizers are, generally speaking, especially beneficial in case of leafy plants, like tobacco, cabbages, beets, clover, potatoes, etc.; but in addition to potash these plants call for fair supplies of the other essential fertilizing ingredients.

The following table will give a somewhat definite idea as to the amounts of fertilizing ingredients removed from the land by various crops commonly grown in our state:

Table I.—Fertility Removed by Various Crops.

Kind of Crop.	Assumed yield. per acre.	Removed per acre, pounds.		
		Nitrogen.	Phosphoric Acid.	Potash.
Corn (grain and stalks).....	60 bu.	84	32	34
Wheat (grain and straw)....	30 bu.	62	20	26
Oats (grain and straw).....	60 bu.	60	22	50
Clover hay	2 tons.	82	18	88
Timothy hay	2 tons.	50	20	60
Tobacco (leaves only).....	1,600 lbs.	70	8	91
Sugar beets, topped	15 tons.	42	8	65
Cabbage	15 tons.	100	35	135
Peas	15 bu.	108	33	52
Potatoes	200 bu.	33	20	62

The low prices which the ordinary farm crops command do not, as a rule, warrant the expenditure of much money for commercial fertilizers for these crops under present conditions; but this is not, as a rule, the case with special crops like tobacco, sugar beets, potatoes, garden truck, etc. The figures given in the table suggest the quantities and kinds of fertilizing elements that should be supplied in growing these crops; somewhat larger quantities of the different fertilizing elements than those removed by the crop should generally be furnished the fertilizers applied, to allow for unavoidable losses in fertilizing ingredients through drainage, through inversion into an unavailable form, or because the plant roots may not reach all of the fertilizer applied.

With the increasing importance of *tobacco* culture in this state, the proper fertilization of land planted to this crop becomes more important; tobacco growers will no doubt find it to their advantage to supplement dressings of farmyard manure

with commercial fertilizers, rich in potash and phosphoric acid, so that all the manure on the farm need not be put on the small piece of tobacco land, as is now often the case. It will be noted from the figures presented in the table that tobacco draws heavily on potash and nitrogen, and these ingredients must therefore be supplied in ample quantities. (See Twenty-Third Annual Report of this Station, p. 203-4, for further information as to tobacco fertilizers.)

Another crop which will be likely to repay the cost of commercial fertilizers is *sugar beets*. This crop, like tobacco and most other leafy plants, is especially exhaustive of the nitrogen and potash in the soil, unless the leaves and tops are returned to the land; liberal applications of the two fertilizing ingredients given, with a fair supply of phosphoric acid, will be apt to increase the tonnage of the beets and improve their quality, as has been repeatedly shown by direct fertilizer trials at this and other experiment stations. (Experiments with fertilizers for sugar beets were conducted on different types of soils by our station in 1906; see Bul. No. 150, also Bul. No. 123 published in 1905). If the tops and beet pulp are fed to cattle or sheep and the manure is carefully preserved and put on the land, the loss in fertility incident to sugar beet culture will be small, and it can be further reduced by applications of filter-press cake which is now generally wasted at beet sugar factories.

Of the other special crops mentioned, *cabbages* and *peas* also require liberal fertilization with nitrogenous and potassic fertilizers and should, in addition, receive a moderate allowance of phosphoric acid, while *potatoes*, a crop much less exhaustive than either of those just mentioned, are benefited by a general proportion of potash.

Since the fertilizer requirements of different types of Wisconsin soils have not as yet been systematically studied, we cannot say definitely which system of fertilization will produce the best results for our different kinds of soils. The following general hints as to the fertilizer requirements of soils of different character are, however, borne out by our present knowledge of the subject: Soils whose fertility has been great-

ly reduced through long continued cropping and which will be greatly benefited by applications of farmyard manure, should receive a general fertilizer containing all three valuable fertilizer ingredients, nitrogen, phosphoric acid, and potash. Sandy and light soils are especially benefited by applications of potash and nitrogen, and will also in general respond to phosphoric acid fertilization, while our clay and loam soils do not often need much potash, but are apt to be low in phosphoric acid. Humus and marshy soils, like all low-lying moist soils, are rich in organic matter and in nitrogen, and require, as a rule, phosphoric acid and potash, and sometimes lime. Potash fertilizers have been found very beneficial in growing corn on black marsh soils. The soils in the southeastern and eastern parts of our state do not appear to need lime fertilizers, but it is possible that the light sandy and clayey soils in the central and northwestern counties of the state and the clay soils in the southwestern counties will be benefited by applications of lime fertilizers, like slaked lime, land plaster, marl, etc.

No definite rule can be laid down with regard to the quantities of commercial fertilizers to be applied, as the amounts necessary to produce good crops will vary with the character and the state of fertility of the soil, the kind of crop to be grown, and other conditions. For ordinary farm crops 500 pounds per acre may be considered a heavy application; applications of half a ton or more will only give economical returns in the case of special crops grown under an intensive system of farming. Farmers who expect to use commercial fertilizers on their land are advised to make applications on a small area at first, say at the rate of 200 pounds per acre, or at different rates per acre, so that they may gain some experience as to the best methods of applying the fertilizers and as to the profitability of the applications on their land, before they spend much money for these. The poorer the soils on which artificial fertilizers are used, the better returns may, in general, be expected. Lime may be applied at the rate of 1,000 pounds per acre on light soils, and double this amount on heavy soils, in the sections of the state where this constituent is likely to pro-

duce an increase in production. (See Bul. No. 150 of this Station).

Valuation of Fertilizers.

The cost of commercial fertilizers in the market is governed by law of supply and demand, as is that of all other commodities. Raw materials and chemicals containing one or two fertilizing ingredients furnish data for the calculation of the average cost of these ingredients in commercial fertilizers. Since the prices of the different fertilizing materials vary somewhat from time to time according to the condition of the market, the calculations must be revised at intervals. The average retail prices of raw materials and chemicals in the large eastern fertilizer markets for the six months preceding March each year are calculated by a number of eastern experiment stations, and the cost of the different fertilizing ingredients which commercial fertilizers on the market contain, is obtained on the basis of these figures; these values correspond approximately to the prices of fertilizing materials in our main fertilizer markets, and may be used for the purpose of comparing the value of the various commercial fertilizers offered for sale in this state.

The trade values of fertilizing ingredients in raw materials and chemicals adopted for the present year are given in the following schedule:

	Cents per lb.
NITROGEN—	
in nitrate salts	18.3
in ammonia salts	17.5
ORGANIC NITROGEN—	
in dry and fine-ground fish, meat and blood, and in high-grade mixed fertilizers	20.5
in fine bone and tankage	20.5
in coarse bone and tankage	15
PHOSPHORIC ACID—	
soluble in water	5
soluble in ammonium-citrate solution	4.5
in dry fine-ground fish, bone and tankage.....	4
in coarse fish, bone and tankage	3
in cottonseed meal, linseed meal, castor pomace, and wood ashes	4
insoluble (in ammonium-citrate solution) in mixed fertilizers	2

POTASH—

as high-grade sulfate, and in forms free from muriate....	5
as muriate	4¼

In order to obtain the valuation price of 100 lbs. of a fertilizer, the percentages of valuable fertilizing components are multiplied in each case by the price given in the preceding schedule; to this actual cost of the fertilizing ingredients contained in the fertilizer should be added the cost of placing the fertilizer on the market; this cost will vary considerably according to local and other conditions; the Pennsylvania Department of Agriculture estimates the expense as follows:

Mixing	\$1.00 per ton
Bagging	\$1.00 per ton.
Agent's commission.....	20 per cent of retail cash value of ingredients
Freight	\$2.00 per ton

The approximate values of the various fertilizers licensed for sale in our state may be ascertained by this method of calculation, and the purchaser will thus be able to form an opinion whether or not a fair price is asked for a certain fertilizer.

It must be remembered, however, that the valuation placed on the various fertilizers by this method is a *Commercial* and not an *Agricultural* one. It shows the average retail cash price of the different fertilizing ingredients plus the cost of placing the fertilizer on the market; the agricultural value of a fertilizer will depend on a number of conditions beyond the control of the seller, such as the need of the soil of the particular fertilizing ingredient or ingredients in question; the judgment used in applying the same, as to methods, time, and quantities applied; the conditions of the weather, etc.; the agricultural value of a fertilizer, in other words, will vary according to the season and according to the intelligent application of the fertilizer; one farmer may derive full benefit from the use of a fertilizer, while to another it may be almost money thrown away. It is therefore evident that only a commercial valuation of fertilizers is ever possible; this will enable persons to compare the different fertilizers offered for sale, and will assist them in deciding which are the most economical ones for their special purpose.

Analyses of Licensed Commercial Fertilizers in Wisconsin during 1907.

The manufacturers mentioned below have taken out licenses for the sale of the following twenty-two brands of fertilizers in this state during the current year, in accordance with Wisconsin statutes of 1898, sec. 1494c.

Table II.—Licensed Commercial Fertilizers, 1907.

No.	Name of Brand.	Manufacturer or agent.	Guarantee, per cent.			
			Nitro- gen. Pr ct.	Avail- able. Pr ct.	Phosphoric acid. Pr ct.	Pot- ash. Pr ct.
1	Swift's Superphosphate.	Swift & Co., Chicago..	1.64	8.0	12.0	2.0
2	Swift's Onion, Potato and Tobacco	Swift & Co., Chicago..	1.64	8.0	11.0	7.0
3	Swift's Pure Bone Meal.	Swift & Co., Chicago..	2.50	....	25.0	....
4	Swift's Truck Grower..	Swift & Co., Chicago..	.82	8.0	10.0	4.0
5	Swift's Sugar Beet Grower	Swift & Co., Chicago..	2.50	8.0	11.0	5.0
6	Swift's Special Phos- phate and Potash	Swift & Co., Chicago..	....	10.0	11.0	2.0
7	Swift's Pure Ammonia- ted Bone and Potash.	Swift & Co., Chicago..	4.75	....	16.0	3.0
8	Homestead, a Bone Black Fertilizer	Michigan Carbon Works, Detroit, Mich.	2.06	8.0	9.0	1.5
9	Red Line Phosphate with Potash	Michigan Carbon Works, Detroit, Mich.	....	10.0	11.0	2.0
10	Homestead High Grade Garden and Vegetable Fertilizer	Michigan Carbon Works, Detroit, Mich.	2.06	8.0	9.0	6.0
11	Blatchford's Plant Grow- er and Land Renovator.	John W. Barwell, Waukegan, Ill.	5.00	5.25	10.5	6.0
12	Star Phosphate	The Armour Fertilizer Works, Chicago .....	....	14.0	16.0	....
13	All Soluble	The Armour Fertilizer Works, Chicago	2.88	8.0	10.0	4.0
14	Phosphate and Potash.	The Armour Fertilizer Works, Chicago ....	....	10.0	12.0	2.0
15	Bone, Blood and Potash.	The Armour Fertilizer Works, Chicago	4.11	8.0	10.0	7.0

16	Currie's Complete Garden and Lawn Fertilizer	Currie Bros. Co., Milwaukee	5.13	3.28	12.07	7.88
17	Darling's Western Brand	Darling & Co., Chicago.	.41	7.0	9.0	.5
18	Darling's Chicago Brand	Darling & Co., Chicago.	1.65	8.0	10.0	2.0
19	Darling's Farmer's Favorite Brand	Darling & Co., Chicago.	2.47	8.0	10.0	4.0
20	Darling's Vegetable and Lawn Fertilizer	Darling & Co., Chicago.	3.3	8.0	9.0	7.0
21	Swift's Garden City Phosphate	Swift & Co., Chicago..	....	14.0	15.0	....
22	Swift's High Grade Special Phosphate and Potash	Swift & Co., Chicago..	....	10.0	11.0	4.0

The Station analyses of the brands given are shown in the following tables. According to the state fertilizer law, each manufacturer "shall affix to every package of fertilizer sold a statement of the following fertilizing constituents, namely: The percentage of nitrogen in an available form, of potash soluble in water, and of available phosphoric acid, soluble and reverted, as well as total phosphoric acid." The guaranteed composition of the licensed fertilizers is given in the table in connection with the results of our analyses of the samples furnished by the manufacturers in compliance with the law. A small number of samples of various licensed brands were collected by representatives of the Station during the past year and have been analyzed in our laboratory, with results as shown in the second half of the table. (Table III B.)

These samples were collected in the stores of the following dealers or were forwarded for analysis by the buyers, as stated: No. 32, Wisconsin Sugar Co., Menomonee Falls; Nos. 35 and 41, Geo. Warren Co., Warrens; Nos. 36, 37, and 39, D. P. Wigley, Racine; Nos. 38 and 40, J. A. Denniston, Janesville; Nos. 42, 44, and 45, Peterson & Burroughs, Racine; No. 43, J. D. Thrasher, Green Lake; No. 46, W. C. Davis, Walworth; No. 47, C. H. Jackson, Oconomowoc; No. 48, M. A. Rasmussen, Somers; Nos. 50 and 51, David Lawton, Racine; No. 52, D. M. Barlass, Janesville; and No. 53, Currie Bros., Milwaukee.

Table III.—Analyses of Licensed Commercial Fertilizers, 1907.
A.—Manufacturers' Samples.

Station No.	NAME OF BRAND	NITROGEN						PHOSPHORIC ACID						POTASH					
		Moisture		Guaranteed		Found		Soluble		Reverted		Available		Total		Guaranteed		Found	
		Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.	Prct.
1	Swift's Superphosphate	11.28	1.64	2.24	1.13	5.98	4.09	8.0	10.07	12.0	12.82	2.0	2.05	7.0	8.20	2.0	2.05	7.0	8.20
2	Swift's Onion, Potato and Tobacco	6.48	1.64	1.50	.15	5.56	3.96	8.0	9.52	11.0	12.56	7.0	8.20	11.0	12.56	7.0	8.20	11.0	12.56
3	Swift's Pure Bone Meal	4.18	2.50	2.62	...	...	...	...	...	25.0	27.50	...	...	25.0	27.50	...	...	25.0	27.50
4	Swift's Truck Grower	1.37	.82	2.08	.22	4.73	6.20	8.0	10.93	10.0	11.51	4.0	3.94	10.0	11.51	4.0	3.94	10.0	11.51
5	Swift's Sugar Beet Grower	1.44	2.50	2.41	.95	3.20	5.37	8.0	8.57	11.0	11.26	5.0	8.44	11.0	11.26	5.0	8.44	11.0	11.26
6	Swift's Special Phosphate & Potash	.79	...	...	...	5.12	7.29	10.0	12.41	11.0	12.79	2.0	2.38	11.0	12.79	2.0	2.38	11.0	12.79
7	Swift's Pure Ammoniated Bone and Potash	3.43	4.75	4.80	1.60	2.37	8.68	...	11.05	16.0	16.68	3.0	3.08	16.0	16.68	3.0	3.08	16.0	16.68
8	Homestead, a Bone Black Fertilizer	11.28	2.06	2.27	.17	5.83	2.32	8.0	8.15	9.0	13.11	1.5	3.89	9.0	13.11	1.5	3.89	9.0	13.11
9	Red Line Phosphate with Potash	8.27	...	...	...	5.27	5.97	10.0	11.24	11.0	13.59	2.0	2.75	11.0	13.59	2.0	2.75	11.0	13.59
10	Homestead High Grade Garden and Vegetable Fertilizer	11.66	2.06	2.20	.48	7.16	3.43	8.0	10.62	9.0	11.64	6.0	6.58	9.0	11.64	6.0	6.58	9.0	11.64
11	Blatchford's Plant Grower and Land Renovator	2.65	5.0	4.73	3.97	.64	4.74	5.25	5.38	10.5	9.60	6.0	4.76	10.5	9.60	6.0	4.76	10.5	9.60

12 Star Phosphate	1.31	...	...	11.36	3.07	14.0	14.43	16.0	17.73	...	...
13 All Soluble	4.63	2.88	2.71	.34	4.10	4.90	8.0	9.00	10.0	11.53	4.0 4.25
14 Phosphate and Potash	8.73	...	...	...	5.88	4.87	10.0	10.75	12.0	12.03	2.0 1.87
15 Bone, Blood and Potash	4.53	4.11	6.45	2.21	6.14	3.97	8.0	10.11	10.0	12.92	7.0 7.26
16 Currie's Complete Garden and Lawn Fertilizer	2.00	5.13	5.13	3.05	.50	2.78	3.28	3.28	12.07	12.70	7.88 7.88
17 Darling's Western Brand	8.02	.41	.59	...	5.37	2.67	7.0	8.04	9.0	9.52	.50 .42
18 Darling's Chicago Brand	5.77	1.65	1.85	.47	6.60	2.20	8.0	8.80	10.0	10.82	2.0 2.47
19 Darling's Farmers' Favorite Brand....	4.31	2.47	2.78	.11	4.17	4.97	8.0	9.14	10.0	12.38	4.0 5.07
20 Darling's Vegetable and Lawn Fertilizer	6.74	3.3	3.49	1.22	5.06	3.12	8.0	8.18	9.0	11.64	7.0 7.88
21 Swift's Garden City Phosphate.....	6.35	...	...	...	12.92	5.42	14.0	18.34	15.0	19.06	...
22 Swift's High Grade Special Phos- phate and Potash*.....	...	...	...	...	...	10.0	...	11.0	...	...	4.0 ...

* Sample not received in time to include analysis thereof in this bulletin.

Table III.—Analyses of Licensed Commercial Fertilizers, 1907—Continued.
B.—Samples collected by Station.

Station No.	NAME OF BRAND	NITROGEN				PHOSPHORIC ACID				POTASH			
		Moisture	Guaranteed	Found	Soluble	Reverted	Available		Total		Guaranteed	Found	
							Prct.	Prct.	Prct.	Prct.			Prct.
32	Swift's	3.58	5.75	5.02	1.58	.51	8.45	7.0	8.86	...	16.12	6.0	3.71
35	Swift's Ammoniated Bone and Potash	3.22	4.75	4.43	1.79	3.84	8.50	...	12.34	16.0	16.43	3.0	4.96
36	Swift's Pure Bone Meal	6.45	2.50	2.80	...	...	...	...	...	25.0	27.30	...	...
37	Swift's Phosphate and Potash	5.95	...	...	...	11.13	1.60	10.0	12.73	11.0	13.88	2.0	2.10
38	Swift's Pure Superphosphate	4.81	1.64	1.90	.75	3.38	5.38	8.0	8.76	12.0	10.86	2.0	2.03
39	Swift's Truck Grower	8.13	.82	.88	...	7.06	2.98	8.0	10.04	10.0	11.88	4.0	4.21
40	Swift's Truck Grower	5.48	.82	.58	...	4.96	4.38	8.0	9.34	10.0	10.54	4.0	3.59
41	Swift's Onion, Potato and Tobacco	4.59	1.64	2.18	.78	1.69	6.44	8.0	8.13	11.0	12.41	7.0	7.49
42	Armour's Phosphate and Potash	5.83	...	...	...	6.63	3.91	10.0	10.54	12.0	13.69	2.0	2.38
43	Armour's All Soluble Fertilizer	4.09	3.0	3.16	.26	6.09	5.27	8.0	11.36	10.0	12.92	4.0	4.31
44	Armour's All Soluble Fertilizer	5.59	2.88	3.07	.35	7.68	3.60	8.0	11.28	10.0	14.33	4.0	4.12
45	Armour's Ammoniated Bone with Potash	2.86	2.47	2.82	.25	3.66	4.48	6.0	8.14	8.0	11.39	2.0	2.06
46	Darling's Vegetable and Lawn	5.23	3.30	3.29	.78	4.96	5.53	8.0	10.49	9.0	11.77	7.0	7.29
48	Darling's Favorite Brand	5.46	2.47	2.15	.53	5.71	4.65	8.0	10.36	10.0	12.92	4.0	4.17
50	Red Line Phosphate and Potash	9.34	...	...	...	3.94	7.19	10.0	11.13	11.0	12.54	2.0	2.79
51	Homestead Garden and Vegetable Fertilizer	10.04	2.00	2.22	.83	5.99	3.43	8.0	9.42	9.0	11.77	6.0	6.82
52	Homestead, a Bone Black Fertilizer	10.28	2.06	2.38	.67	4.40	4.91	8.0	9.31	9.0	11.77	1.50	2.27
53	Currie's Garden and Lawn Fertilizer	7.30	5.13	3.28	.81	.15	10.29	3.28	10.44	12.07	13.82	7.88	7.41

The mechanical analysis of the sample of bone meal included among the licensed brands of fertilizers gave the following results, the portion passing through a sieve of one-fiftieth inch mesh being designated as *fine-ground*, and that remaining on such a sieve as *coarse*.

Table IV.—Mechanical Analysis of Bone Meal, 1907.

Station No.	Brand.	Fine-	Coarse
		Ground. Per ct.	Per ct.
9	Swift's Bone Meal	66	34

Fertilizer Inspection.

It is impossible to tell from the appearance or the smell of a commercial fertilizer whether it contains a large amount of valuable fertilizing ingredients or only a very small amount. There is therefore a strong temptation for irresponsible parties to make and sell inferior or even worthless goods as standard fertilizing articles; so much so, that it has been found necessary in all states where the fertilizer business has grown to be of any importance, that the state should in some way supervise their sale. Laws regulating the sale of commercial fertilizers are at present in force in nearly every state in the Union. The Wisconsin fertilizer law which was passed by the legislature of 1895 is given in full in the following pages. According to the provisions of the law, all commercial fertilizers sold in this state at a cost exceeding \$10.00 per ton must be licensed for sale. They must be sold on a guarantee of their contents of valuable fertilizing ingredients, and the director of the experiment station, on whom is laid the duty of enforcing the law, is authorized, in person or by deputy, to take samples of all commercial fertilizers sold in this state which come within the scope of the law. In case of licensed fertilizers it may thus be ascertained whether these come up to the guaranteed composition, and when it is found that parties are selling fertilizers without complying with the provisions of the law, they may be brought before the proper legal authorities and convicted according to section 1494d of Wisconsin statutes of 1898. This

section imposes a fine of \$100.00 for the first offense and \$200.00 for each subsequent offense.

It is hoped that all dealers in commercial fertilizers in the state will comply with the law in all particulars, and that they, as well as purchasers of such fertilizers, will assist in the enforcement of the law by giving notice of violations of the same that may come to their knowledge. A strict compliance with the law is for the best interests of all honest dealers and consumers alike. Only firms that live up to the requirements of the law and have taken out licenses for the sale of their brands of fertilizers should be patronized; the law does not offer purchasers any protection against dealers in other states who sell inferior or fraudulent goods.

B.—Licensed Concentrated Feeding Stuffs.

The following eighty-six brands of concentrated commercial feeding stuffs have been licensed for sale in this state for the calendar year ending December 31, 1907. The guarantees of the manufacturers as to contents of valuable ingredients in the brands are given in all cases:

Table V.—Licensed Commercial Feeding Stuffs, 1907.

No.	Name of Brand.	Manufacturer or agent.	Guarantee.	
			Pro- tein	Fat Per ct.
Oil Meals.				
1	Ground Linseed Cake	Wm. Goodrich & Co., Milwaukee	32.0	5.0
2	Ground Oil Cake	Minn. Linseed Oil Co., Minneapolis	34.0	5.0
3	Ground Oil Cake	Northern Linseed Oil Co., Minneapolis	32.0	6.0
4	Ground Linseed Cake	American Linseed Co., Minneapolis	32.0	5.0
5	O. P. Ground Oil Cake	Red Wing Linseed Mills, Red Wing, Minn.	32.0	6.0
6	Midland Brand O. P. Ground Linseed Cake	Midland Linseed Co., Minneapolis	30.0	5.5
7	Pure Old Process Oil Meal	Archer-Daniels Linseed Co., Minneapolis	33.0	6.0
Gluten Feeds, Corn Feeds, etc.				
8	Continental Gluten Feed	Continental Cereal Co., Peoria	33.0*	14.0*
9	Ajax Flakes	Chapin & Co., Milwaukee	30.0	12.0
10	Buffalo Gluten Feed	Corn Products Mfg. Co., Chicago	24.0	2.5
11	Cedar Rapids Gluten Feed	Douglas & Co., Cedar Rapids, Iowa	24.0	4.0
12	Eagle Hominy Feed	John B. A. Kern & Sons, Milwaukee	10.75	7.5
13	"Success" Hominy Feed	Deutsch & Sickert Co., Milwaukee	11.0	7.0
14	Standard Hominy Feed	Robt. Krull Com. Co., Milwaukee	11.9	8.0
15	Yellow Hominy Feed	E. S. Woodworth & Co., Minneapolis	11.19	8.26
Mixed Corn and Oat Feeds.				
16	Blue Cross Corn & Oats Feed	E. P. Doty, Janesville, Wis.	7.0	3.0
17	Schumacher Stock Feed	The Quaker Oats Co., Chicago	11.0	4.0
18	Victor Feed or "C" Feed	The Quaker Oats Co., Chicago	7.5	3.0
19	Quaker Dairy Feed	The Quaker Oats Co., Chicago	12.0	3.0
20	Vim Feed, or "X" Feed	The Quaker Oats Co., Chicago	5.5	2.0

Table V.—Licensed Commercial Feeding Stuffs, 1907—Continued.

No.	Name of Brand.	Manufacturer or agent.	Guarantee.	
			Pro- tein.	Fat Per ct.
21	Excelsior Chop Feed	The Great Western Cereal Co., Chicago	8.0	3.5
22	Royal Oat Feed	The Great Western Cereal Co., Chicago	6.6	2.5
23	Hominy Mixed Feed	Peter Schmitz & Son, Milwau- kee	9.05	5.66
24	Imperial Corn and Oat Feed.	Deutsch & Sickert Co., Mil- waukee	8.0	4.0
25	Yellow OO Feed	E. S. Woodworth & Co., Min- neapolis	9.39	5.02
Miscellaneous Dairy Feeds.				
26	Blatchford's Calf Meal	J. W. Barwell, Waukegan, Ill.	25.0	5.0
27	Blatchford's Sugar & Flax- seed	J. W. Barwell, Waukegan, Ill.	27.0	10.0
28	National Calf Food	National Food Co., Fond du Lac, Wis.	17.25	5.0
29	Dr. Wasem's XXXX Calf Meal	Cuba City Remedy Co., Cuba City, Wis.	36.0	15.0
30	Martin's Calf Feed	John C. Martin & Co., Min- eral Point, Wis.	26.0	10.0
31	Hammond Dairy Feed	Western Grain Products Co., Milwaukee	17.0	3.0
32	Mueller's Molasses Grains...	E. P. Mueller, Milwaukee	1.0	1.**
33	Superior Quality Dried Brew- ers' Grains	John Gund Brewing Co., La Crosse	25.0	7.0
34	Dried Grains	Pabst Brewing Co., Milwaukee	28.24	7.33
35	Schlitz Dried Grains	M. G. Rankin & Co., Milwau- kee	28.0	7.0
36	Malt Sprouts	Horlick's Malted Milk Co., Ra- cine	25.0	1.0
37	Malt Sprouts	Borchert Malting Co., Milwau- kee	26.75	.86
38	Malt Sprouts	C. & J. Michel Brg. Co., La Crosse	27.0	.7
*On dry basis. ** 25 per ct. sugar.				
39	Malt Sprouts	Fauerbach Brg. Co., Madison.	28.5	.7
40	Malt Sprouts	Fred Miller Brg. Co., Milwau- kee	25.98	1.46

Table V.—Licensed Commercial Feeding Stuffs, 1907—Continued.

No.	Name of Brand.	Manufacturer or agent.	Guarantee.	
			Pro-	tein. Fat
41	Malt Sprouts	The Storck Brg. Co., Schleisingerville, Wis.	22.0	1.0
42	Malt Sprouts	John Walter & Co., Eau Claire, Wis.	26.0	1.3
43	Malt Sprouts	Wisconsin Malt and Grain Co., Appleton, Wis.	26.5	.7
44	Malt Sprouts	A. G. Laubenstein, Hartford, Wis.	25.0	.75
45	Malt Sprouts	The Kurth Co., Columbus, Wis.	24.0	.6
46	Malt Sprouts	American Malting Co., Milwaukee	23.0	1.25
47	Malt Sprouts	Portz Bros., Hartford, Wis.	25.0	.75
48	Malt Sprouts	Pabst Brg. Co., Milwaukee	30.39	1.7
49	Malt Sprouts	Konrad Bros. & Werner, Hartford, Wis.	26.5	.6
50	Malt Sprouts	Henry Rahr Sons' Co., Green Bay, Wis.	30.0	.6
51	Malt Sprouts	Rubicon Malting & Gr. Co., Rubicon, Wis.	27.0	.85
52	Malt Sprouts	Froedtert Bros. Gr. & Malting Co., Milwaukee	27.5	1.80
53	Malt Sprouts	The Konrad Schreier Co., Sheboygan, Wis.	25.5	1.0
54	Malt Sprouts	Rudolf Heger, Jefferson, Wis.	27.5	1.8.
55	Malt Sprouts	The Oskosh Brg. Co., Oshkosh, Wis.	27.0	1.7
Animal and Poultry Foods.				
56	Developing Food	Cypher's Incubator Co., Buffalo, N. Y.	10.0	3.72
57	Globe Scratch Feed	The Albert Dickinson Co., Chicago	10.5	3.0
58	Crescent Chick Feed	The Albert Dickinson Co., Chicago	10.5	3.0
59	Sun Chick Starter	The Albert Dickinson Co., Chicago	10.5	3.0
60	Queen Poultry Mash	The Albert Dickinson Co., Chicago	11.0	4.0
61	King Pigeon Feed	The Albert Dickinson Co., Chicago	10.5	3.0
62	Jewel Chick Feed	International Stock Food Co., Minneapolis	12.25	2.7

Table V.—Licensed Commercial Feeding Stuffs, 1907—Continued.

No.	Name of Brand.	Manufacturer or agent.	Guarantee. Pro- tein. Fat Per ct.
63	Old Gold Poultry Food	L. L. Olds Seed Co., Clinton, Wis.	10.5 3.0
64	Old Gold Chick Food	L. L. Olds Seed Co., Clinton, Wis.	10.5 3.0
65	Beef Scraps	The Armour Fertilizer Works, Chicago	55.0 12.0
66	Meat Meal	The Armour Fertilizer Works, Chicago	50.0 10.0
67	Poultry Bone	The Armour Fertilizer Works, Chicago	24.0 .5
68	Blood Meal	The Armour Fertilizer Works, Chicago	85.0 .2
69	Blatchford's Fill the Basket Poultry Meats	J. W. Barwell, Waukegan, Ill.	33.0 10.0
70	Sterling Hen Feed	Northrup, King & Co., Minne- apolis	11.67 3.42
71	Sterling Chick Feed	Northrup, King & Co., Minne- apolis	12.25 2.7
72	F. P. C. Chick Manna	E. P. Cassel, Lansdale, Pa.; Wernich Seed Co., Agents Milwaukee	12.0 4.0
73	Wernich's Magis Chick Feed.	Wernich Seed Co., Milwaukee	12.0 5.4
74	Swift's Digester Tankage	Swift & Co., Chicago	60.0 8.0*
75	Swift's Blood Meal	Swift & Co., Chicago	87.0
76	Swift's Beef Scraps	Swift & Co., Chicago	60.0 10.6
77	Swift's Poultry Bone	Swift & Co., Chicago	25.0 **
78	Extra Quality Quick Meal Chick Feed	Steinmesh & Co., St. Louis; Kuelsler Bros., Milwaukee, Agents	12.6 3.1
79	Purina Mill Feed—Chick	Ralston Purina Co., St. Louis.	11.0 3.6
80	Scratching Food	Cypher's Incubator Co., Buffalo N. Y.	11.05 3.0
81	Chick Food	Cypher's Incubator Co., Buffalo, N. Y.	10.54 3.4
82	Laying Food	Cypher's Incubator Co., Buffalo, N. Y.	12.89 3.8
83	Forcing Food	Cypher's Incubator Co., Buffalo N. Y.	12.89 3.8
84	Good Luck Chick Food	Good Luck Mills, St. Louis.	9.0 3.0
85	Feed-Well Chick Food	Illinois Feed Mills, St. Louis.	9.0 3.0
86	Chamberlain's Perfect Chick Food	Wernich Seed Co., Milwaukee	10.69 3.06

* per cent phosphates.

** 55 per cent phosphates.

Suggestions as to the Purchase of Concentrated Feeding Stuffs.

The guarantees of the manufacturers as to the contents of protein and fat in the licensed feeds will be found in the preceding list; by comparing the guarantees with the prices at which the feeds are sold, a fairly accurate idea as to the relative value of the different feeding stuffs to the farmer may be obtained. Guarantees of the protein and fat contents of feeding stuffs are required by the law because these components are of the highest value to feeders and the quantities in which they are found in different feeds can be readily and accurately determined by chemical analysis. This is not the case with some other components of feeding stuffs that are also of great importance in the nutrition of farm animals, notably starch and sugar. We are, however, generally speaking, justified in considering protein the most important component of concentrated feeding stuffs; *first*, because the crops grown on the farm are likely to be rather deficient in this component and this must therefore be supplied in order to supplement the farm crops in the feeding of live stock, and *second*, because the substances spoken of collectively as *protein* or *albuminoids* are of vital importance to the animals and cannot be entirely replaced by other food components; they are the only constituents of cattle foods that furnish the material required to produce flesh, milk, eggs, wool, and similar substances, and a certain minimum of them is absolutely necessary to sustain the vital processes of the animal and to replace the unavoidable wastes of the body occurring through the exercise of vital functions, through secretions, involuntary and voluntary motions, etc.

Under otherwise similar conditions, the richer a food is in protein the more valuable it is, therefore, to the farmer, if the food is of such a character that it can be fed successfully to the animals kept. The farmer cannot, as a rule, afford to buy a food very low in protein and high in carbohydrates, as he can generally produce such foods at a lower cost than they can be bought for elsewhere. It should be remembered in this connection that the guarantees given by the manufacturers are for

the total contents of protein and fat in the feeding stuffs and not for *digestible* components; and that the amount of woody fiber (*crude fiber or fiber*) which a feeding stuff contains, will determine to a large extent what proportion of the protein as well as other food materials found therein the animal can digest; the more crude fiber a feeding stuff contains, the greater proportion of the valuable food components will be consumed in the work of digestion. Refuse-feeds containing large amounts of hulls of chaff are therefore less valuable than would be supposed from their protein contents alone.

It is doubtful whether it will ordinarily pay a farmer to buy concentrated feeds containing less than seven or eight per cent of protein; aside from the low protein content and the large per cent of crude fiber which such feeds generally contain, the group of components known as *nitrogen-free extract* (starch, sugar, pentosans, gums, etc.) in these feeds is of inferior value compared with the nitrogen-free extract of the cereals, *e. g.*, which is largely made up of the first two kinds of substances mentioned. The nitrogen-free extract of hominy feed and many of the poultry foods, like that of the cereals, consist mainly of starch, and that of molasses feeds is made up of sugar to a large extent; as these feeds are moreover relatively low in crude fiber, they possess a greater feeding value compared with refuse feeds which consist largely of the hulls and chaff of grains, than would appear from a statement of their protein and fat contents alone.

The samples of mixed feeds collected by our feed inspectors during the present year under the state feeding stuff law are analyzed for their contents of crude fiber, in addition to those of protein and fat; the results of the analyses are reported to manufacturers and dealers as completed, and will be given in full in the next annual feed bulletin. This will also contain a more detailed discussion of the composition of feeding stuffs and of the value of different kinds of concentrated feeds offered for sale in our state. Copies of our bulletin No. 142 giving the results of all analyses of samples of concentrated feeding stuffs collected during 1906, with general information as to

the composition of food materials, may be had upon application by all residents of the state so long as the supply on hand lasts.

Feeding Stuff Inspection.

The law governing the sale and inspection of concentrated feeding stuffs in this state is given on pages 29—32 of this bulletin. Feeding stuffs of the kinds given in section 1 of the law are included under its provisions, viz, oil meals of all kinds, gluten meals and gluten feeds, starch refuse feeds, brewery and distillery refuse feeds, mixed feeds of all kinds, unless they are mixtures of the pure grains, whole or ground together, in which case they are exempt (see sec. 1.)

All licensed goods must be sold under a guarantee of their contents of protein and fat; if sold in bags, the name of the feed and the number of net pounds thereof in the bag, the name and address of the manufacturer, and the guaranteed percentages of protein and fat must be plainly shown *on each bag*; if sold in bulk, a printed statement giving similar information must be furnished with each car or other amount sold, and *a certified copy of this statement shall be supplied to the purchaser upon request.*

Registration blanks for licensing brands of concentrated feeding stuffs under our state law will be furnished upon application; the annual license fee for each separate brand of feeding stuff is twenty-five dollars. Analysis samples containing about two pounds of each feeding stuff are required, in accordance with sec. 3 of the law.

Retail dealers should be careful in handling goods that come under the provisions of the law, to see to it that these are licensed for sale in this state during the present year and that the packages in which they are sold are marked in accordance with the law, as described above. Both dealers and purchasers of feeds can materially aid in the enforcement of the law by giving notice of any violation of the same that may come to their attention.

The lists of licensed fertilizers and feeding stuffs given in the preceding are complete up to the time when this bulletin

went to press (April 2, 1907): licenses will doubtless be taken out for additional brands during the remaining months of the year. Inquiries in regard to licensed brands of feeding stuffs or commercial fertilizers, and other phases of the subject of feed or fertilizer inspection will receive prompt attention.

THE WISCONSIN FERTILIZER LAW.

(Sections 1494c, 1494d and 1494e, Wisconsin Statutes of 1898.)

Section 1494c. Every person who shall, in this state, sell or expose for sale any commercial fertilizer or any material used for fertilizing purposes, the price of which exceeds ten dollars per ton, shall affix to every package of such fertilizer or material in a conspicuous place on the outside thereof, a plainly printed statement clearly and truly certifying the number of net pounds therein, name or trade-mark under which the article is sold, name of the manufacturer or shipper, place of manufacture, place of business of the manufacturer and of the following fertilizing constituents, namely: The percentage of nitrogen in an available form, of potash soluble in water and of available phosphoric acid, soluble and reverted, as well as total phosphoric acid. Every such person shall also file with the director of the agricultural experiment station of the University of Wisconsin, in the month of December in each year, a certified copy of such statement for every such fertilizer or material bearing a distinguishing brand or trade-mark and which he sells or exposes for sale, which copy shall, when required by such director, be accompanied by a sealed glass jar or bottle, containing at least one pound of such fertilizer or material, and an affidavit that such sample corresponds, within reasonable limits, to the fertilizer or material which it represents in the percentage of the aforesaid constituents, which affidavit shall apply to the remaining portion of the then calendar year. Additional brands of such fer-

tilizer or material may be offered for sale during the year, provided samples and affidavits are so filed at least one month before they are offered, in which case an analysis fee of double the usual amount must be paid. A deposit of the sample of fertilizer shall be required by said director unless the person selling or offering for sale a fertilizer or material within this section shall certify that its composition for the succeeding year is to be the same as given in the last previously certified statement, in which case the furnishing of a sample shall be at the discretion of said director.

Section 1494*d*. Said director shall analyze or cause to be analyzed all such samples and publish the results of such analysis in a bulletin or report on or before the first day of the next succeeding April. Every manufacturer, importer, agent or seller of any such fertilizer or material shall pay annually to said director for each brand thereof sold within the state the sum of twenty-five dollars, and upon doing so and complying with the other provisions of law shall receive from him a certificate of such compliance which shall be a license for the sale of each brand thereof within the state for the calendar year for which such fee is paid. All moneys received by said director pursuant to this section shall be paid into the treasury of said station. Any person who shall sell or expose for sale any commercial fertilizer or material used for fertilizing purposes which is within the provisions of the preceding section without complying with the foregoing provisions or which contains a substantially smaller percentage of fertilizing constituents than are indicated by the printed statement thereon shall be punished by a fine of one hundred dollars for the first offense and two hundred dollars for each subsequent offense.

Section 1494*e*. Said director shall annually analyze or cause to be analyzed at least one sample of every fertilizer or material used for fertilizing purposes sold or exposed for sale under the two preceding sections and enforce their provisions by prosecuting or causing the prosecution of every per-

son who shall violate them. He may in person or by deputy, on tendering the value thereof, take a sample, not exceeding two pounds, for said analysis from any lot or package of fertilizer or any material used for fertilizing purposes which may be in the possession of any manufacturer, importer, agent or dealer in this state; said sample shall be drawn in the presence of the person from whom taken or his representatives, be taken from a parcel or number of packages which shall not be less than ten per centum of the whole lot sampled, be thoroughly mixed and divided into two equal samples, placed in glass vessels and carefully sealed and a label placed on each, stating the name or brand of the fertilizer or material sampled, the name of the party from whose stock the sample was drawn, the time and place of such taking; said label shall be signed by the director or his deputy and such person or his representative at the drawing and sealing of said samples; one of said duplicate samples shall be retained by the director and the other by the party whose stock was sampled; the sample retained by the director shall be for comparison with the certified statement named in section 1494c. The result of the analysis of the sample or samples so procured shall be reported to the person requesting the analysis and be published in a report or bulletin to be issued within a reasonable time.

THE WISCONSIN FEEDING STUFF LAW.

(Chapter 377, Laws of 1901; Chapter 148, Laws of 1905.)

Section 1. The term "Concentrated Commercial Feeding Stuffs," as used in this act shall include linseed meals, cotton seed meals, pea meals, cocoanut meals, oils meals of all kinds, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, sucrene feeds, hominy feeds, cerealine feeds, distillers' grains, dried brewers' grains, malt sprouts, rice meals, oat feeds, corn and oat feeds, dried blood, tankage, ground beef or

fish scraps, mixed feeds of all kinds, also condimental stock foods, patented and proprietary stock foods claimed to possess nutritive as well as medicinal properties, and all other materials intended for feeding to domestic animals; but shall not include hays and straws, the whole seeds nor the unmixed meals made directly from the entire grains of wheat, rye, barley, oats, Indian corn, buckwheat, sorghum, broom corn, millet and flax seed. Neither shall it include wet brewers' grains, nor wheat, rye and buckwheat brans or middlings not mixed with other substances, but sold separately, as distinct articles of commerce, nor pure grains ground together.

Section 2. Every manufacturer, company or person who shall sell, offer or expose for sale or for distribution in this state any concentrated commercial feeding stuff, used for feeding farm live stock, shall furnish with each car or other amount shipped in bulk and shall affix to every package of such feeding stuff in a conspicuous place on the outside thereof a plainly printed statement clearly and truly certifying the number of net pounds in the car or package sold or offered for sale, the name or trade mark under which the article is sold, the name of the manufacturer or shipper, the place of manufacture, the place of business and the percentages it contains of crude protein, allowing one percentum of nitrogen to equal six and one-fourth percentum of protein and of crude fat, both constituents to be determined by the methods prescribed by the director of the Wisconsin agricultural experiment station. Whenever any feeding stuff is sold at retail in bulk or in packages belonging to the purchaser, the agent or dealer, upon request of the purchaser shall furnish to him a certified copy of the statement named in this section.

Section 3. Before any manufacturer, company or person shall sell, offer or expose for sale in this state any concentrated commercial feeding stuffs, he or they shall for each and every feeding stuff bearing a distinguishing name or trade mark, file annually during the month of December with the director of the Wisconsin agricultural experiment station a cer-

tified copy of the statement specified in the preceding section, said certified copy to be accompanied, when the director shall so request, by a sealed glass jar or bottle, containing at least one pound of the feeding stuff to be sold or offered for sale, and the company or person furnishing the said sample shall also submit a satisfactory affidavit that said sample corresponds within reasonable limits to the feeding stuffs which it represents in the percentage of protein and fat which it contains.

Section 4. Each manufacturer, importer, agent or seller of any concentrated commercial feeding stuffs shall pay annually to the director of the Wisconsin agricultural experiment station a license fee of twenty-five dollars. Whenever a manufacturer, importer, agent or seller of concentrated commercial feeding stuffs desires at any time to sell such material and has not paid the license fee therefor in the preceding month of December, as required by this section, he shall pay the license fee prescribed herein before making any such sale. The license fees received by such director pursuant to the provisions of this section shall be paid into the treasury of the university and shall constitute a special fund from which to defray the expenses incurred in making the inspections and analyses required by this act and enforcing the provisions thereof, and he shall report annually to the regents of the university of Wisconsin the amount received and the expense incurred for salaries, laboratory expenses, chemical supplies, traveling expenses, printing and other necessary matters. Whenever the manufacturer, importer or shipper of concentrated commercial feeding stuffs shall have filed the statement required by section two of this act and paid the license fees as prescribed in this section, no agent or seller of such manufacturer, importer or shipper shall be required to file such statement or pay such fee.

Section 5. The director of the Wisconsin agricultural experiment station shall annually analyze or cause to be analyzed at least one sample to be taken in the manner hereinafter prescribed, of every concentrated commercial feeding stuff sold or offered for sale under the provisions of this act. Said di-

rector shall cause a sample to be taken, not exceeding two pounds in weight, for said analysis, from any lot or package of such commercial feeding stuff which may be in the possession of any manufacturer, importer, agent or dealer in this state, but said samples shall be drawn in the presence of the parties in interest or their representatives, and taken from a parcel or a number of packages, which shall not be less than ten percentum of the whole lot sampled, and shall be thoroughly mixed, and then divided into equal samples, and placed in glass vessels, and carefully sealed and a label placed on each, stating the name of the party from whose stock the sample was drawn and the time and place of drawing, and said label shall also be signed by the person taking the sample, and by the party or parties in interest or their representatives at the drawing and sealing of said samples; one of said duplicate samples shall be retained by the director and the other by the party whose stock was sampled; and the sample or samples retained by the director shall be for comparison with the certified statement named in section three of this act. The result of the analysis of the sample or samples so procured, together with such additional information as circumstances advise, shall be published in reports or bulletins from time to time.

Section 6. Any manufacturer, importer or person who shall sell, offer or expose for sale or distribution in this state any concentrated commercial feeding stuff, without complying with the requirements of this act, or any feeding stuff which contains substantially a smaller percentage of constituents than are certified to be contained, shall, on conviction in a court of competent jurisdiction, be fined not less than twenty-five nor more than one hundred dollars for the first offense, and not more than two hundred dollars for each subsequent offense.

Section 7. Any person who shall adulterate any kind of meal or ground grain or other feeding stuff with milling or manufacturing offals, or any other substance whatever, for the purpose of sale, unless the true composition, mixture or adulteration thereof is plainly marked or indicated upon the package

containing the same or in which it is offered for sale; or any person who sells, or offers for sale any meal, ground grain or other feeding stuff which has been so adulterated unless the true composition, mixture or adulteration is plainly marked or indicated upon the package containing the same, or in which it is offered for sale, shall be fined not less than twenty-five or more than one hundred dollars for each offense.

Section 8. Whenever the director aforesaid becomes cognizant of the violations of any of the provisions of this act, he shall report such violations to the dairy and food commissioner, and said commissioner shall prosecute the party or parties thus reported; but it shall be the duty of said commissioner upon thus ascertaining any violation of sections two, three or four of this act, to forthwith notify the manufacturer, importer or dealer in writing and give him not less than thirty days thereafter in which to comply with the requirements of this act, but there shall be no prosecution in relation to the quality of any concentrated commercial feeding stuff if the same shall be found substantially equivalent to the certified statement named in section two of this act.

THE RELATIVE VALUE OF SHELLED CORN AND CORN MEAL FOR FATTENING PIGS.

Summary of Ten Years' Feeding Trial at the Wisconsin Experiment
Station.

By W. A. Henry and D. H. Otis.

For the past ten years this Station has been testing the comparative value of whole corn and corn meal for fattening pigs. One or more tests have been made each year. With the exception of one year, the corn was supplemented with wheat middlings, and, in one instance, also with skim milk. Experience teaches us that corn, either whole or ground, as an exclusive

diet, gives unsatisfactory results with fattening swine.

The work for the past year was conducted in three series.

First Feeding Trial of the Year.

This consisted of twenty-four pigs, farrowed in July, August, and September, 1905, and averaging 68 pounds in weight when the trial began. Previous to the trial, these pigs were fed on skim milk, middlings, and a little corn. They were divided into two lots, as nearly equal as possible in regard to breed, age, weight, and condition.

Lot I contained six pure-bred Poland Chinas, five pure-bred Berkshires, and one cross-bred Poland-China-Berkshire. Seven were barrows and five sows.

Lot II consisted of six Poland-Chinas, four Berkshires, and two cross-bred Poland-China-Berkshires. Nine were barrows and three were sows.

All lots were kept in pens, 10 feet by 12 feet in area, opening into small yards on the south, which were protected by the surrounding buildings. The pigs were fed in adjoining pens constructed for feeding purposes, and used only at meal times. The sleeping pens were kept well cleaned and well bedded. Both lots of pigs had free access to charcoal, wood ashes, and salt.

The experiment began January 20, 1906. Lot I was fed shelled corn and heavy wheat middlings, equal parts by weight, with two pounds of skim milk daily per head. The shelled corn was fed first, and after it was consumed, the mixed middlings and skim milk were fed as a slop. Lot II was fed the same ration, except that corn meal, made from the same lot of corn was fed Lot I, was substituted for the shelled corn. The corn meal, wheat middlings, and skim milk were mixed together and fed as a slop. The water added in making the slop was slightly warmed. Each lot had its ration weighed out twice daily, and was given what it would eat. The corn used in these trials was a yellow dent, grown near Madison in 1905. The following analysis of this corn was made by the

Chemical Department from samples submitted near the middle of the feeding period.

Table I.—Condition of the Corn Meal Used in Trials in Feeding Whole Corn, in Comparison with Corn Meal, to Fattening Pigs.

Mechanical. (Showing fineness of grinding)	Per cent	Chemical.	Per cent
Passed through sieve 20 meshes to the inch	19.0	Moisture	13.95
Passed through sieve 16 meshes to the inch	5.7	Protein	9.13
Passed through sieve 12 meshes to the inch	27.7	Ether extract (fat)	3.26
Passed through sieve 8 meshes to the inch	25.9	Crude fiber	1.46
Portion too coarse to pass through sieve 8 meshes to the inch	21.7	Nitrogen free extract	70.65
..	100.00	Ash	1.55
			100.00

The pigs were weighed weekly. The feeding period lasted twelve weeks, and results obtained are recorded in the following tables:—

Table II.—Results of feeding Whole Corn, in Comparison with Corn Meal, to Fattening Pigs.
 Lot I.—Fed Shelled Corn, Wheat Middlings and Skim Milk

	FEED EATEN											To- tal					
	Shelled corn	Wheat middl- milk	S	S	S	B**	S	B	B	B	B						
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Weight at beginning, January 20.....	100	70	74	64	70	71	57	70	60	61	50	68	815				
Feed eaten and gain—																	
1st week	125.0	125.0	168	4	5	7	11	8	5	6	5	7	7	7	4	76	
2d week	129.2	129.2	168	8	7	6	10	8	9	6	6	4	6	7	9	86	
3d week	157.0	155.0	168	12	9	8	5	7	10	7	3	10	8	7	9	95	
4th week	158.0	158.0	168	10	9	9	9	6	8	8	9	5	12	5	10	100	
5th week	180.0	181.0	168	13	11	12	15	11	14	10	9	10	11	10	10	136	
6th week	163.2	163.2	161	0	-6	4	4	11	10	6	1	6	8	9	8	61	
7th week	169.7	169.7	168	14	12	10	12	9	13	7	9	12	10	8	9	125	
8th week	186.2	186.2	168	11	3	7	10	5	5	3	0	1	6	1	6	58	
9th week	201.2	201.2	168	13	8	13	10	6	3	12	8	9	14	14	10	120	
10th week	223.0	223.0	168	13	10	8	13	11	15	9	8	5	10	12	12	126	
11th week	233.2	233.2	168	14	9	8	8	7	11	9	5	12	7	7	8	105	
12th week	243.5	243.5	168	5	13	11	12	11	13	1	1	10	16	12	12	117	
Final weight .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Feed eaten and gain	2169.2	2168.2	2009	117	90	103	119	100	116	84	64	91	115	99	107	1205	

* S—Sow. ** B—Barrow.

Table III.—Results of Feeding Whole Corn, in Comparison with Corn Meal, to Fattening Pigs.
 Lot II.—Fed Corn Meal, Wheat Middlings and Skim Milk.

	FEED EATEN										S Total									
	Corn meal		Wheat middlings		Skim milk		S*	B**	B	B		B	B	B	B	B	B	B	S	
Weight at beginning, January 20.....	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Feed eaten and gain—	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
1st week	128.0	128.0	168	9	2	3	10	7	4	4	4	4	4	4	4	4	3	5	6	61
2d week	133.7	133.7	168	7	8	8	9	5	5	8	7	6	3	9	6	81				
3d week	164.7	164.7	168	9	11	8	8	14	7	9	9	6	10	8	6	105				
4th week	161.0	161.0	168	10	15	10	12	7	8	11	8	9	8	3	7	108				
5th week	188.0	188.0	168	10	10	12	15	13	18	9	11	13	11	10	9	141				
6th week	187.5	187.5	161	10	10	11	4	6	5	12	7	3	6	4	0	78				
7th week	199.7	199.7	168	16	19	2	9	11	7	8	10	13	14	12	11	132				
8th week	211.7	211.7	168	9	14	15	10	6	8	9	8	6	8	4	—2	95				
9th week	229.2	229.2	168	10	12	9	10	14	7	12	9	11	8	10	8	120				
10th week	240.7	240.7	168	10	9	15	15	9	10	12	6	10	10	9	4	119				
11th week	257.5	257.5	168	11	15	18	15	7	8	15	18	13	14	10	5	149				
12th week	271.2	271.2	168	15	11	9	6	7	8	8	11	11	9	9	5	109				
Final weight .....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Feed eaten and gain	2372.9	2372.9	2009	126	136	120	123	106	95	117	108	105	104	93	65	1298				

* Sow. ** B—Barrow.

A study of the results shows that:—

Lot I, fed shelled corn, wheat middlings, and skim milk, gained 1,205 pounds in weight, and consumed 4,337 pounds of grain and 2,009 pounds of skim milk. This lot required, therefore, 360 pounds of grain and 166 pounds of skim milk for each 100 pounds of gain made during the trial.

Lot II, fed corn meal, wheat middlings, and skim milk, gained 1,298 pounds in weight, and consumed 4,745 pounds of grain and 2,009 pounds of skim milk. This lot required 366 pounds of grain and 154 pounds of skim milk for each 100 pounds of gain made during the trial.

The lot fed corn consumed 408 pounds more grain, and gained 93 pounds more in weight than the lot fed shelled corn. It required 6 pounds more feed than the lot getting shelled corn, to make 100 pounds of gain.

Second Feeding Trial of the Year.

Ten pigs, varying considerably in age, weight, and condition, were divided as nearly equal as possible into two lots of five each. Those in Lot III varied from 70 to 272 pounds, the average weight at the beginning of the trial being 184 pounds. Lot IV varied from 89 to 268 pounds, the average weight being 175 pounds. Lot III contained one Duroc-Jersey, one Berkshire, and three cross-bred Poland-China-Berkshires, of which four were barrows and one a sow. Lot IV contained two Berkshires, one Duroc-Jersey, and two cross-bred Poland-China-Berkshires, all barrows.

Lot III was fed a grain mixture of two-thirds shelled corn and one-third heavy wheat middlings.

Lot IV was fed two-thirds corn meal and one-third heavy wheat middlings.

The methods of feeding, care, and management were the same as in the first trial. The results are recorded in the following tables—

Table IV—Results of Feeding Whole Corn, in Comparison to Corn Meal,
to Fattening Pigs.

Lot III.—Fed Shelled Corn and Wheat Middlings.

	Feed Eaten.							
	Shelled mid- Corn. dlings.		S.*	B.**	B.	B.	B.	Total
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Weight at beginning, Jan. 20	.....	....	216	70	173	272	187	918
Feed eaten and gain—								
2d week	108.0	51.7	5	5	3	11	2	26
1st week	129.0	66.5	9	4	7	11	11	41
3d week	135.2	74.5	10	4	6	16	10	46
4th week	131.7	62.0	10	5	9	5	3	32
5th week	152.5	77.2	10	9	14	20	13	66
6th week	139.0	67.2	2	8	8	15	8	41
7th week	146.0	72.5	18	10	15	12	13	68
8th week	147.2	72.5	—4	4	4	6	3	13
9th week	142.5	70.0	5	10	7	15	10	47
10th week	157.7	78.2	15	11	9	13	10	58
11th week	172.0	86.0	4	15	14	16	14	63
12th week	169.5	84.7	5	11	14	8	9	47
Final weight	.....	....	305	166	283	420	293	1,467
Feed eaten and gain	1,725.3	863.0	89	96	110	148	106	549

* S—Sow. ** B—Barrow.

Table V.—Results of Feeding Whole Corn, in Comparison with Corn Meal to Fattening Pigs.

Lot IV.—Fed Corn Meal and Wheat Middlings.

	Feed Eaten.							
	Corn meal.	Mid- dlings.	B.*	B.	B.	B.	B.	Tt
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Weight at beginning, Jan. 20... ..	220	268	89	93	205	875		
Feed eaten and gain—								
1st week	131.2	66.7	12	16	—7	2	8	31
2d week	130.	65.	9	13	15	4	14	55
3d week	146.	73.	6	9	8	9	10	42
4th week	159.5	79.7	15	19	5	11	15	65
5th week	186.5	92.2	17	11	12	11	18	72
6th week	171.5	85.7	13	11	2	8	8	42
7th week	175.5	87.7	14	25	11	15	22	87
8th week	177.	88.5	9	5	6	5	6	31
9th week	180.	90.	13	10	9	12	14	58
10th week	193.	96.5	12	19	9	13	20	73
11th week	205.5	102.7	20	19	10	17	18	84
12th week	210.	105.	13	12	9	12	15	61
Final weight	373	440	178	212	373	1576		
Feed eaten and gain	2065.7	1032.7	153	172	89	119	168	701

* B—Barrow.

A comparison of the results shows that:—

Lot III, fed shelled corn and wheat middlings, gained 549 pounds, and consumed 2,588 pounds of grain, or 471 pounds of grain for 100 pounds of gain.

Lot IV, fed corn meal and wheat middlings, gained 701 pounds and consumed 3,098 pounds of grain, or 442 pounds of grain for 100 pounds of gain.

The lot fed corn meal consumed 510 pounds more grain, and gained 152 pounds more in weight than the lot fed shelled corn. It produced 100 pounds of gain on 29 pounds less feed than did the lot fed shelled corn.

Third Feeding Trial of the Year.

The comparative value of shelled corn, versus corn meal, was further tested during the summer of 1906 with hogs running on Dwarf Essex rape pasture. Twelve pigs, farrowed in August and September, 1905, and averaging 190 pounds in weight, were divided into two lots as nearly equal as possible as to breed, age, sex, weight, and condition.

Lot V contained four Poland-Chinas and two Berkshires, of which four were barrows and two sows.

Both lots were provided with an abundance of Dwarf Essex rape pasture and fresh water.

Lot VI contained five Poland-Chinas and one Berkshire, of which four were barrows and two sows.

Lot V was fed shelled corn and heavy wheat middlings. The wheat middlings was supplied as a thick slop, and after it was consumed, the shelled corn was scattered in the feed trough and on the feeding platform, where the pigs ate it leisurely.

Lot VI was supplied corn meal and wheat middlings, mixed together, and fed as a thick slop. Both lots were supplied with wood ashes and salt *ad libitum*, and had access to plenty of shade. During a few days the pigs suffered from the extreme heat. Wallows were provided, however, for each pen, and on hotter days, they were allowed to spend a few hours in a running brook near the pens.

Both lots were fed twice daily. The feed was weighed at the beginning of each week, and what was left over was weighed back at the end of the week. Each pig was weighed weekly. The results are given in the following tables:—

Table VI.—Results of Feeding Whole Corn, in Comparison with Corn Meal, to Fattening Pigs.

Lot V.—Fed Shelled Corn, Wheat Middlings and Dwarf Essex Rape.

	Feed Eaten								Total
	Wheat Shelled	Mid-	B* 334	S** 335	S 320	B 330	B 325	B 324	
Weight at beginning, July 3.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Feed eaten and gain—	...	...	182	156	192	167	225	210	1132
1st week	100	50	7	7	7	4	7	8	40
2d week	150	75	13	4	3	6	10	10	46
3d week	150	75	10	3	14	9	10	14	60
4th week	150	75	6	5	4	5	6	6	32
5th week	150	75	16	15	14	20	17	16	98
6th week	200	100	9	0	11	6	4	7	37
7th week	200	100	7	9	11	10	14	9	60
8th week	200	100	5	8	11	10	13	11	58
9th week	200	100	—10	6	13	14	13	23	59
10th week	220	110	11	0	20	13	13	11	68
11th week	235	115	12	1	5	14	18	12	62
12th week	235	115	1	9	15	13	14	19	62
13th week	235	115	16	1	10	7	8	5	50
Total	...	...	285	227	330	298	372	361	1873
Feed eaten and gain	2425	1205	100	71	138	131	147	151	741

* B.—Barrow. ** S.—Sow.

Table VII.—Results of Feeding Whole Corn, in Comparison with Corn Meal, to Fattening Pigs.

Lot VI.—Fed Corn Meal, Wheat Middlings and Dwarf Essex Rape.

	Feed Eaten.								
	Wheat								
	Corn meal	mid-dlings	B*	B	B	B	S**	S	T't'l
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Weight at beginning, July 3	...	...	167	196	203	201	193	183	1143
Feed eaten and gain—									
1st week	100	50	8	10	17	10	13	7	65
2d week	150	75	12	13	18	18	7	8	76
3d week	150	75	8	14	5	3	10	9	49
4th week	150	75	4	9	8	10	6	5	42
5th week	150	75	15	15	12	13	11	10	76
6th week	200	100	6	4	7	10	10	13	50
7th week	200	100	14	14	13	15	10	8	74
8th week	200	100	17	17	14	17	11	10	86
9th week	200	100	1	13	15	13	16	12	70
10th week	220	110	12	10	4	3	9	5	43
11th week	235	115	17	14	19	20	4	8	82
12th week	235	115	16	17	14	7	16	17	87
13th week	235	115	9	15	23	21	24	17	100
Total	...	...	306	361	372	361	340	312	2052
Feed eaten and gain	2425	1205	139	165	169	160	147	129	900

* B.—Barrow. ** S.—Sow.

In the above trial, Lot V, fed shelled corn and wheat middlings, with access to rape pasture, gained 741 pounds, and consumed 3,630 pounds of grain, or 490 pounds of grain for 100 pounds of gain. As the table shows, sow 335 made poor gains. Although the lightest pig in the bunch, she was apparently in good, thrifty condition at the beginning of the experiment. As the feeding progressed, she was taken lame in her feet, her appetite was poor, and her weekly gains were correspondingly small. Had she gained proportionately with the others, the total gain of the lot would have been 63 pounds greater.

Lot VI, fed corn meal and wheat middlings, with access to rape pasture, gained 909 pounds, and consumed 3,630 pounds of grain, or 399 pounds of grain for 100 pounds of gain.

The lot getting corn meal consumed the same number of pounds of grain, but gained 168 pounds more than the shelled corn lot, producing a 100 pounds of gain on 91 pounds less feed than the lot getting shelled corn.

Summary of Feeding Trials at This Station, Covering a Period of Ten Years, in Which One Lot of Fattening Pigs Received Shelled Corn, and Another Corn Meal.

For the past ten years, this Station has been testing the value of feeding whole corn, in comparison with corn meal, as the main portion of the ration, for fattening pigs. During this period, eighteen trials have been made and the results published from year to year. The work of the past year, with a summary for the entire period, will complete the work of comparing whole corn with corn meal for fattening pigs, so far as this Station is concerned.

In this experiment it has been the aim to use sufficient animals and to extend the feeding trials through a series of years, in order to make the results reliable and reasonably conclusive. The 280 pigs used in this experiment belonged to various breeds, cross-breeds, and grades, as follows: Poland-China, 91; Berkshire, 52; Duroc-Jersey, 2; Yorkshire, 2; grade Poland-China, 2; grade Berkshire, 11; grade Chester White, 13; cross-bred Poland-China-Berkshire, 65; cross-bred Poland-China-

Table VIII.—Result of Ten Years' Experiment in Feeding Shelled Corn, in Comparison with Corn Meal, to Fattening Pigs.

Year	Trial	Lot receiving—	Average weight of pigs in experiment.	Length of feeding period.	FEED EATEN		Gains of lots	FEED CONSUMED PER 100 POUNDS OF GAIN FOR LOTS RECEIVING—		ECONOMY OF GRINDING EX-PRESSED IN PER CENT		
					Lbs.	Days.		Shelled corn.	Corn meal.	Shelled corn.	Corn meal.	Lbs.	Lbs.	Gained.	Lost
1896	1	Shelled corn	9	70	5314	...	633	1235	481	...	...	...
		Corn meal	9	70	...	5333	653	1348	...	442	8.0	...
	2	Shelled corn	10	70	3960	...	705	789	591	...	...	...
		Corn meal	10	70	...	4537	699	1076	...	487	17.6	...
1897	3	Shelled corn	9	84	3284	...	1642	984	501	...	...	...
		Corn meal	9	84	...	3971	1985	1349	...	442	11.7	...
	4	Shelled Corn	7	63	1170	...	1170	552	424	...	...	...
		Corn meal	7	63	...	1330	1330	576	...	462	...	8.9
1898	5	Shelled corn	8	84	2758	...	1379	830	500	...	...	...
		Corn meal	8	84	...	3132	1566	992	...	473	5.4	...
	6	Shelled. corn	8	84	2609	...	1304	799	489	...	...	...
		Corn meal	8	84	...	3078	1529	1030	...	448	8.3	...
1899	7	Shelled corn	19	84	7084	...	3542	2136	497	...	...	...
		Corn meal	19	84	...	7196	3598	2132	...	507	...	2.0
1900	8	Shelled corn	14	98	5852	...	2926	1571	559	...	...	...
		Corn meal	14	98	...	6183	3092	1938	...	479	14.3	...
1901	9	Shelled corn	12	84	3504	...	1752	893	588	...	...	...
		Corn meal	12	84	...	3831	1914	1038	...	553	6.0	...

10	Shelled corn	3	70	84	519	...	519	234	444	...	...	...
	Corn meal	3	72	84	...	489	489	218	...	419	...	1.1
11	Shelled corn	3	80	84	452	...	452	169	594	...	...	...
1902	Corn meal	3	80	84	...	480	480	166	...	579	..	2.5
12	Shelled corn	3	133	91	713	...	713	255	559	...	...	...
	Corn meal	3	134	91	...	703	703	274	...	513	8.2	...
13	Shelled corn	4	126	70	1139	...	...	208	548	...	...	...
	Corn meal	4	127	70	...	1408	...	246	...	572	...	4.3
14	Shelled corn	3	83	70	443	...	...	60	738	...	...	11.1
	Corn meal	3	84	70	...	582	...	71	...	820	...	...
15	Shelled corn	5	139	98	1616	...	1617	618	523	...	...	10.8
	Corn meal	5	145	98	...	1530	1530	530	...	577	...	...
16	Shelled corn	12	68	84	2169*	...	2168	1205	360	...	...	1.6
	Corn meal	12	68	84	...	2373*	2373	1298	...	366	...	...
17	Shelled corn	5	184	84	1725	...	863	549	471	...	...	...
1906	Corn meal	5	175	84	...	2066	1033	701	...	442	6.1	...
18	Shelled corn	6	189	91	2425	...	1205	741	490	...	...	...
	Corn meal	6	190	91	...	2425	1205	909	...	399	18.5	...
	Shelled corn	140	...	...	46736	...	22,590	13,828	...	...	...	...
	Corn meal	140	...	...	...	50647	24189	15891	...	...	...	...
	Shelled corn	8	175	82	2596	...	1255	768	501	...	...	...
	Corn meal	8	175	82	...	2813	1344	883	...	471	6.0	...

* Fed 2009 pounds of skim milk in addition to grain ration.

Chester White, 25; Razor-back, 6; cross-bred Poland-China-Razor-back, 5; cross-bred Berkshire-Razor-back, 6. The various breeds, cross-breeds, and grades were divided equally among the lots receiving shelled corn and the lots receiving corn meal.

The corn used for the experiment was, with one exception, over a year old. For six years corn was imported from Iowa. For three years old Wisconsin corn was used. During the last year, 1906, corn was secured near Madison, grown the same year. The results obtained with shelled corn cannot, therefore, be attributed to the use of soft corn.

The preceding table furnishes a summary of the trials from year to year and the totals and averages for the entire period.

The table shows that, in the ten years covered by the experiment, eighteen trials were made with a total of 280 pigs, one-half of this number receiving shelled corn as the principal portion of the ration, and the other half corn meal.

The feed required to produce 100 pounds of gain varied from 360 to 820 pounds. The poorest gains for feed consumed were made in Trial 14 where corn alone was fed to young pigs averaging 84 pounds in weight at the beginning of the trial. This emphasizes what is a common experience among hog raisers, that an exclusive diet of corn is not desirable with any class of hogs and is especially to be avoided with young pigs. The evil effects of this kind of ration were shown in the decreased thrift, appetite, and gains, and in the large amount of feed required to produce a 100 pounds of gain.

The best gains for feed consumed were made with young pigs in Trial 16, where the grain, consisting of equal parts, by weight, of corn and middlings, was supplemented with a small allowance of skim milk. The pig feeder is warranted, not only in using a variety of grains, but will find it to his advantage to add skim milk to the ration whenever he can get it.

The total and averages for ten years show that the 140 pigs receiving shelled corn as the principal ration ate 46,736 pounds of shelled corn and 22,590 pounds of wheat middlings, or a total of 69,326 pounds of grain, on which they made 13,828 pounds of gain.

The 140 pigs receiving corn meal as the principal ration ate 50,647 pounds of corn meal and 24,189 pounds of wheat middlings, or a total of 74,836 pounds of grain, on which they made 15,891 pounds of gain.

The pigs receiving the corn meal ate 5,510 pounds more grain and made 2,036 pounds more gain than the 140 pigs receiving shelled corn.

The pigs receiving the shelled corn consumed an average of 501 pounds of grain for each 100 pounds of gain.

The pigs receiving the corn meal consumed an average of 471 pounds of grain per 100 pounds of gain, thus producing 100 pounds of gain on 30 pounds less grain than the pigs receiving shelled corn.

In the eighteen trials there were eleven which showed a saving by grinding, the amount saved varying from 2.5 per cent in Trial 11, to 18.5 per cent in Trial 18. There were seven trials where there was a loss from grinding, the amount lost varying from 1.1 per cent, in Trial 10, to 11.1 per cent in Trial 14.

The average of the eighteen trials shows a saving from grinding corn of 6 per cent.

By taking the average gain per pig of both lots in each trial and counting the number of pigs that gained more than the average, and those gaining less than the average, it was found that, with the lots receiving shelled corn as its principal ration, there were 45 pigs that gained more than the average, and 95 pigs that fell below the average.

With the lots receiving corn meal as its principal ration there were 91 pigs that gained more than the average, and 49 that fell below the average.

The economy of grinding corn will depend on the price of corn and the cost of grinding. With an average saving of 6 per cent by grinding corn, the following table is constructed to assist the farmer in determining when to grind.

Table IX.—Saving Effected per Bushel in Grinding Corn for Fattening Pigs.

	Cts.										
When corn is worth...	25	30	35	40	45	50	55	60	65	70	75
Saved by grinding...	1.5	1.8	2.1	2.4	2.7	3.0	3.3	3.6	3.9	4.2	4.5

The table shows that when corn is worth 25 cents per bushel the saving from grinding is only 1.5 cents, not enough to cover the cost unless cheap power is available. As corn advances in price the saving per bushel increases three-tenths of a cent with each five cents' advance. With corn at 75 cents per bushel, the saving from grinding is 4.5 cents per bushel.

Where there is plenty of time for maturing the pigs, and it is not necessary to secure the maximum daily gain, it is doubtful if it pays to grind corn for pigs.

The test shows that where quick maturity is an important item, better results are secured from the corn meal. Pigs fed corn meal, eat more grain and make somewhat larger daily gains.

Corn meal can doubtless be used to good advantage in finishing off a bunch of hogs which were at first fed shelled corn. Changing over to corn meal near the close of the feeding period also furnishes a change in the character of the ration, which will be satisfactory to the animals.

There are conditions and circumstances where it is not advisable to grind the corn even though the corn be high priced. On the other hand, when fitting hogs for show, sale, or in high pressure feeding for market, the feeder will consider it advisable to grind the corn, even though it is expensive to do so. The feeder, knowing these results, will use them to suit his own conditions.

BUTTERMAKING ON THE FARM.

By Geo. H. Barr, Member of the Dairy Staff, Ontario Dairy and Cold
Storage Commission.

The main defects in dairy butter as compared with creamery butter are, (1) bad flavor, (2) staleness or rancidity, (3) too many shades of color, and (4) unsuitable packages and too many different styles. The flavor is of the highest importance, and no matter how good the butter may be in other respects, if the flavor is wrong, it is bound to be classed as an inferior article. Staleness and rancidity, so common in dairy butter, are due largely to the fact that the cream, and the butter made from it, are not kept at a low enough temperature.

Any taint that may be in the milk or cream will be, to some extent, carried into the butter. Therefore, the dairy buttermaker will see at once the necessity of having healthy cows, providing them with wholesome feed and pure water, and having the cream properly taken care of until time of churning.

**Feeds That Will Injure the Flavor of the Butter and Which Should Not
Be Fed to Milch Cows.**

1. Turnips and turnip tops.
2. Rape or rye.
3. Decayed ensilage.
4. Leaks, onions, or apples in large quantities.

Other Causes of Taints in Cream.

1. Cows' udders and teats in an unclean condition at milking time.
2. Milking in unclean stables.
3. Using unclean, wooden, galvanized or rusty milking pails.
4. Separating the milk in the stables.

5. Improperly cleaned separators.
6. Keeping the cream in cellars or other places where there are roots or vegetables.
7. Keeping the cream for several days at a temperature over 55 degrees.
8. Cows drinking water from stagnant ponds, or the leakage from barnyards.

Conditions That Are Necessary to Produce Fine Flavored Cream.

Pure water. The cows should have at all times an abundant supply of pure water to drink. When cows are compelled to drink the water of swamps, muddy ponds or sluggish streams and ditches, in which there is decaying animal matter, including their own droppings, there is a constant menace to their health, and unless the cows are in good health, they cannot give first-class milk. Moreover, the mud, often full of foul germs, which collects on the legs, flanks and udders of the cows and falls into the milk at the time of milking, is a direct source of infection.

Salt. When cows have free access to salt at all times, they will keep in better health, will give more milk, and the cream from this milk will have a better flavor, and keep sweet longer, than when they do not get any at all, or receive it only at intervals.

Milking. Cleanliness in the stable is desirable at all times, but especially at milking time the stable should be clean, and free from dust. The udders, teats, and flanks of the cows should be well brushed before milking. Only bright, clean, tin pails should be used to milk in. Galvanized pails are difficult to keep clean, and bad flavors have been traced to their use.

Methods of Creaming.

There are three common methods of removing the cream from the milk: (1) the shallow pan, (2) deep setting, and (3) the hand separator. All these methods are used to some extent.

The Shallow Pan.

This method has many defects, and we do not recommend

it. Cream from this method is apt to be too thin, by having too much milk incorporated in skimming. The large surface exposed in the pans, and the length of time that it stands, favor the absorption of odors and infection which comes from dust, etc., and also result in the cream becoming leathery, making lumpy cream for churning, which causes heavy loss of fat in the buttermilk. The comparatively high temperature of the milk and cream in shallow pans encourages the development of bad flavors. Like all other gravity methods, the shallow pan leaves a large percentage of fat in the skim milk.

The best results from using shallow pans are obtained by setting the milk immediately after milking, in pressed tin pans without seams, about 3 inches deep, placing the pans on a cool surface, such as a clean cement floor, or in a large pan or box where cold water is allowed to run around the pans. Skimming should take place about 24 or 36 hours from setting. The cream should be taken off carefully by separating the cream from the edge of the pan with a thin bladed knife, when the cream may be run into a cream can, care being taken to run in as little milk as possible.

Deep Setting.

The deep setting method is a very decided improvement on the shallow pans. The best results, both as to quality and effective creaming, are secured by putting the milk, as soon as drawn, into cans about 8 inches in diameter and 20 inches deep. The cans are then placed in a tank containing ice water and left for at least 24 hours before skimming. The tank will require to be 24 inches deep and large enough to hold as many cans as the herd will fill at two or three milkings. The tank must be water tight and provided with a 3 inch overflow 17 inches from the bottom, and also a plug at the bottom to drain off the water for cleaning. The tank should be fitted with a cover and the whole protected from the weather. It would be folly to use the deep setting method without ice in this country, where it can be put up so easily and cheaply, but if it is not available for any reason, the next best thing is to have the tank placed near the well, so that all water used for various purposes may be first

pumped into the tank, and then allowed to overflow into the stock trough or other receptacle. If ice is used running water in the tank would only waste the ice.

The ideal arrangement would be to have a special milk room with ice house attached.

The Hand Power Separator.

The hand power cream separator, is the most reliable and best method of skimming milk at the farm.

Some of the advantages over the other methods are:—(1) less loss of fat in the skim milk, (2) a better and more uniform quality of cream, and (3) the skim milk is in the best possible condition for feeding young stock. All the separators on the market will do efficient skimming if properly handled.

Handling and care of the separator. It is important that the separator run smoothly. Any trembling or shaking of the separator while skimming, will cause a loss of butter fat in the skim milk. Only special oil should be used, and it is well to make a run about once in three weeks, using kerosene oil on all the bearings.

In skimming, three things must be observed:—(1) The speed of the separator must be maintained according to the directions sent with it. The only reliable way to do this, is to count the number of revolutions of the crank by the watch. A low speed means loss of fat in the skim milk. (2) The flow of the milk into the separator should be uniform. (3) The temperature of the milk should not be under 90 degrees and for that reason, the best time to separate the milk is immediately after milking. A low temperature is also liable to cause loss of fat in the skim milk. The faster the milk passes through the separator, the less complete is the separation, and a thinner cream is given. Every separator has some device for changing the test of the cream. In most cases the adjustment is at the cream outlet. If so, by turning the cream screw in, the cream will be richer, and by turning it out, the cream will be thinner.

All the parts of the separator which come in contact with the milk or cream should be washed in lukewarm water, to which

has been added a small quantity of sal soda or other cleansing powder, and then thoroughly scalded with boiling water, each time the separator is used.

Location of separator. In some cases the separators are placed in the cow stables. This may be a convenient arrangement, but it is not by any means a proper place for separating milk, unless a special room well ventilated and lighted, is partitioned off, to exclude the stable odors and dust. This should have a smooth cement floor, which can be easily cleaned.

Cream and Its Care.

Advantages of a rich cream.—Skimming a rich cream leaves more skim milk for feeding young stock; there is less can room required for the cream; less cream to cool; it will keep sweet longer than thin cream will, other conditions being equal; it will churn more easily; and will make better flavored butter than can be made from thin cream. The cream should be skimmed of such richness that one gallon (10 lbs.) of it will yield from 3 to 3 1-2 pounds of butter.

Cooling the cream.—The cream from deep setting will not require much cooling, but cream from shallow pans or from hand separators should be cooled to under 60 degrees, immediately after skimming, and kept cool until about 12 hours before churning.

If cream is allowed to stand at a high temperature (70 to 75 degrees) for any length of time, the flavor will be injured, and it is apt to become curdled or lumpy. This condition will cause serious loss of fat in the buttermilk and the quality of the butter will not be fine.

We would recommend keeping the cream in shotgun cans and the cans put in a box similar to the one recommended for deep setting. Tin cans are preferable to crocks, because they are easier to handle, and if the temperature of the cream has to be changed for churning, it can be done very much more quickly and easily when in the tin cans, by surrounding them with either warm or cold water. Water or ice should not be put into the cream to raise or lower the temperature. Warm cream from

the separator should not be added to cream already cooled. The cream should be stirred well each time a fresh lot is added, and occasionally until it is ready to churn.

Preparing the cream for churning.—This means developing the proper acidity (sourness) and having the cream at the right temperature. No fresh cream should be added for at least 12 hours before churning. If the cream is sweet at this time, a small quantity (5 to 10 p. c.) of the clean flavored sour skim milk may be added with good results and the cream kept at churning temperature for 12 hours.

The appearance of the cream when ready to churn should be thick and glossy, and pour like thick syrup; it should smell and taste slightly sour.

The proper temperature of the cream for churning depends upon:

- (1) The richness of the cream,
- (2) The length of time the cows have been milking,
- (3) The breed of the cows, and
- (4) The feed of the cows.

It will therefore be seen how difficult it is to give any temperature as the best, for churning. The best temperature for churning can only be known by testing the per cent of fat in the cream. It is well, however, to know that the following conditions require low churning temperatures (54 to 62 degrees):

- (1) Very rich cream,
- (2) Cream from the milk of fresh cows,
- (3) Cream from the milk of cows receiving succulent feed, such as fresh pasture, clover, ensilage, and wheat bran.
- (4) Cream from the milk of Jersey or Guernsey cows can usually be churned at a lower temperature than that from other breeds.

Conditions that require high churning temperatures (64 to 75 degrees):

- (1) Very thin cream,
- (2) Cream from cows a long time in milk,
- (3) Cream from the milk of cows receiving dry feed, such as hay, straw, dry pasture, or cotton seed meal.

It cannot be definitely stated how high it may be necessary to raise the temperature of the cream to make butter under some of the above conditions, and the best rule that can be given is to raise the temperature high enough to bring the butter in about 30 minutes.

Too high a churning temperature is not desirable, it causes butter to come in soft lumps instead of in flaky granular form, and causes a greasy texture in the butter and also results in the incorporation of too much buttermilk, which is likely to sour and spoil the flavor of the butter.

Too low a churning temperature is also undesirable, although it is better to have the temperature a little lower rather than too high. Cream at too low a temperature is difficult to churn. When the butter does come, it will be in such a firm condition that it will not gather properly, and is apt to make a dry brittle butter that does not spread easily. It is nearly always necessary to have a higher churning temperature in the fall and winter than in spring and summer. Aim to have the cream at such a temperature that the churning will be completed in from 25 to 30 minutes.

Churning.

All the cream should be passed through a finely perforated tin strainer as it is being put into the churn.

Amount of cream in the churn. Churning will be completed in the shortest time when the churn is about one-third full. The churn should never be more than half full. If a small amount of cream is being churned, it is difficult to gather the butter properly and it is apt to be over-churned.

Coloring.—When coloring is used, it should be added to the cream just before churning is commenced. Coloring does not improve the quality of the butter, but in late fall and winter months a little coloring improves its appearance. The butter makers must be guided in using color by the tastes of their customers. Too deep a shade is repulsive.

Speed of the churn.—The proper speed for the churn depends upon its size. That speed which gives the greatest concussion will be the most effective.

Adding water to the cream in the churn.—If the cream has been properly prepared and is at the right temperature, the churning may be finished without adding any water. If for any reason the butter is coming a little too fast, it is advisable to add, just when the cream is breaking, some water with a little salt in it about two degrees colder than the cream. This will assist in separating the butter from the buttermilk. Two common causes for cream churning too slow, are (1) too much cream in the churn and (2) the temperature of the cream is too low.

When to stop the churn.—This is an important point and it has a great deal to do with the quality of the butter. The churn should be stopped when the granules are about the size of wheat or split pease. When the butter is churned to too small granules, many of them will go through the strainer into the buttermilk and cause a considerable loss.

Over-churning should be avoided as much as under-churning. Over-churned butter will retain a large amount of buttermilk, which will be difficult to remove in washing.

The buttermilk should be drawn off as soon as churning is completed.

The cream strainer.—A dipper with a wire gauze can be used for straining the buttermilk.

Washing the butter.—The butter should be washed as soon as churning is finished and only pure clean water should be used. If the butter is for immediate use, rinse the butter by sprinkling two or three dipperfuls of cold water over the butter, allowing it to run off at once. Then run in a little less water than there was cream and revolve the churn as in churning until the granules are about the size of large pease and draw the water off immediately. In very warm weather have the water about 2 degrees colder than the buttermilk and in cold weather from 2 to 3 degrees warmer.

If the butter is intended for packing, run in slightly more water than there was cream, about 2 degrees colder than the buttermilk, and revolve the churn quickly about half a dozen times and draw it off; then wash a second time using a little less water than there was cream, at the same temperature as the buttermilk,

and revolving the churn as in churning until the granules are about the size of large pease and draw off the water at once.

Salting the butter.—A large quantity of dairy butter is too heavily salted and there is very little uniformity in the amount of salt used. We would suggest that for prints 1-2 to 3-4 of an ounce per pound be used, and for packed butter not more than one ounce per pound.

In creamery buttermaking the salting is done almost entirely in the churn. If the amount of butter in the churn can be fairly well estimated, it is the best method to follow. Add the salt as soon as the washing water is drained off, sifting on half of the salt evenly over the butter; then turn the butter over with a wooden ladle or by turning the churn partly over, and sift on the balance of the salt, put on the cover of the churn and revolve slowly until the butter is gathered into a solid mass, and allow it to lie in the churn for ten or twenty minutes before working it. If the salting is done on the worker, the butter can be weighed and the salting done accurately. Take the butter out of the churn in the granular form, after weighing it, spread it evenly over the worker and sift all the salt on before working is commenced. Endeavor to have the salt well mixed with the butter while it is still in the granular form.

Working the butter.—For farm buttermaking, a lever butter worker is preferable to a butter bowl for working the butter. In working the butter a sliding or scraping motion should be avoided. The lever should be pressed downward, double the butter over with a ladle, or by inserting the lever under the butter at one side of the worker, roll it over and work as before. When the butter is sufficiently worked, it should present a smooth solid appearance when cut with a sharp ladle, and when pressed between the worker and the ladle the moisture should show in small beads evenly distributed over the cut surface. Butter which has been salted in the churn will not require as much working as that salted on the worker. Only fine dairy salt should be used and it should be kept in a clean place, as salt will absorb odors and thus may injure the flavor of the butter.

Package.

If there is any one thing that needs improvement in the dairy butter business, it is the package.

The butter is put up in all sizes, shapes and forms; it is wrapped in factory cotton, towels, paper, and some is not wrapped at all. For local trade there should only be one package, the brick shaped 1 pound print, wrapped neatly in parchment paper. It is much more economical to buy a good printer than the ordinary printers offered for sale. For packed butter there is nothing as neat and good as a 10 or 20 lb. spruce tub, lined with parchment paper.

Utensils and Their Care.

The churn.—The barrel churn is the most convenient and easiest to keep sweet and clean. Before using, it should be well scalded with boiling water and then cooled by revolving a few minutes with cold water in it. After churning, a pailful of cold water should be put in the churn and revolved to wash out any butter that may be in it; then thoroughly scald it with boiling water and leave it open in a clean, dry place. A little salt sprinkled in the churn after scalding, helps to keep it sweet. We would strongly recommend washing the churn occasionally with hot lime water to keep it sweet.

The Butterworker.—The V shaped lever butterworker is the most convenient for farm dairy work. In preparing the worker for use it should be well scrubbed with a brush and scalding water and then thoroughly cooled by pouring on cold water. The butter printer and ladle should be washed in the same way and then put into cold water for some time before using. Sometimes the butter will stick to the worker and printer. This indicates that they have not been properly brushed with hot water before cooling. A thorough brushing with hot water with a little salt added, before cooling, will remedy this trouble.

Thermometers.—It will be noticed that all through the process of making butter proper temperatures are essential to get the best results. It is therefore absolutely necessary that the successful buttermaker should have a correct dairy thermometer. One that is correct cannot always be purchased at the ordinary

stores, but they can be procured from any of the leading dairy supply houses. A float or glass thermometer is preferable to the metal backed style, as they are much easier to keep clean.

Scales.—A scale is very convenient for dairy purposes as well as for other household work. They can be purchased from hardware merchants or from the dairy supply houses.

Parchment Paper.—Print butter should always be wrapped in parchment paper of good quality, and it will add to the attractiveness of the package if the name of the farm or dairy, and the address of the proprietor, are neatly printed on each wrapper. Many dairy buttermakers seem to forget that the merchant who buys their butter must resell it, and that the appearance of the butter has much to do with a customer's decision in buying. No one cares to buy a slovenly package of butter, for it is fairly safe inference that if the outside of the butter looks clean and attractive the inside will be all right, and vice versa.

To get the best results in farm dairy work—

- (1) Keep good cows,
- (2) Feed them liberally,
- (3) Keep them comfortable and clean when in the stable,
- (4) Skim a rich cream,
- (5) Keep the cream cool,
- (6) Churn at the temperature that will give a flaky granule in the butter,
- (7) Use clean pure water for washing butter, not more than three degrees colder or warmer than the butter-milk,
- (8) Put the butter up in neat, clean, attractive packages.
- (9) Keep everything in and about the dairy clean and attractive.

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