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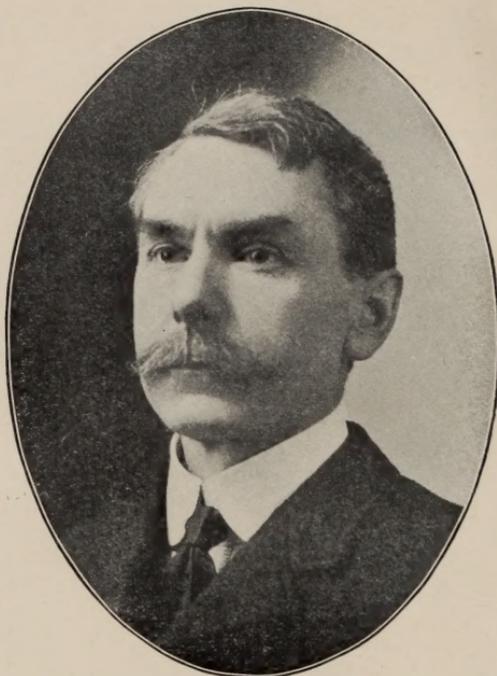
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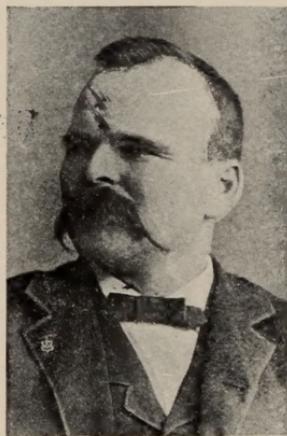


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JOSEPH NEWMAN, President



L. A. SPIES, Vice President

ILLINOIS DAIRYMEN'S ASSOCIATION

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Thirty-first Annual Report

OF THE

Illinois Dairymen's

Association



Convention Held at Rock-
ford, Illinois, January 10th,
11th and 12th, 1905. ❧ ❧



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Compiled by GEO. CAVEN, SECRETARY
Stenographic Report by MARY G. McGOORTY



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Letter of Transmittal

Office of Secretary,
Illinois Dairymen's Association.
Chicago, Ill., 1905.

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

I have the honor to submit the official report of the Illinois
Dairymen's Association, containing the addresses, papers, and
discussions at its thirty-first annual meeting, held at Rockford,
Illinois, January 10, 11, and 12, 1905.

Respectfully,
GEO. CAVEN, Secretary.

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List of Officers, 1905

President—

JOSEPH NEWMAN, Elgin.

Vice President—

L. A. SPIES, St. Jacob.

Directors—

GEO. H GURLER, DeKalb.

JOSEPH NEWMAN, Elgin.

L. A. SPIES, St. Jacob.

M. LONG, Woodstock.

W. R. KIMZEY, Tamaroa.

L. N. WIGGINS, Springfield.

J. R. BIDDULPH, Providence.

Secretary—

GEO. CAVEN, Chicago.

Treasurer—

JOHN COOLIDGE, Galesburg.

BY - LAWS

OF THE

Illinois Dairymen's Association

Officers.

Section 1.—The officers of this 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 of account 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 31st Annual Report

OF THE

*Illinois Dairymen's
A s s o c i a t i o n*

Held at Rockford, Ill., Jan. 10, 11, 12, 1905

The Illinois Dairymen's Association met in annual session in the hall at Rockford, January 10, 1905, at 1:30 p. m.

President Joseph Newman in the chair.

The President:—

It is very unfortunate that our sessions this year conflict with the Farmers' Institute of this section, which is holding meetings at this time in Metropolitan hall across the river. However, the institute does not hold evening meetings, so we expect our meeting will be crowded tonight. They have a very interesting and noted speaker from New York, Professor Cook, who holds them this afternoon.

We will now open the thirty-first annual meeting of the Illinois Dairymen's Association and, as usual, we will commence with prayer, by Rev. Mr. Bodman.

PRAYER.

Rev. Mr. Bodman, Rockford.

O Lord, who art the source of all life and the source of all truth, in whom are held all the treasures of wisdom and knowledge, bless us, we beseech Thee, that are weary that we may find the light and the truth and the life that are in Thee. Defend us from insatiable hunger of the human mind for knowledge, truth and life.

We thank Thee for the degree of truth already acquired by man. We thank Thee for its numerous achievements in the past and for the present. We thank Thee that Thou hast stirred up the human heart to seek better ways of doing things, more efficient ways, ways which give to us an outer result which is better but which give to us an inner result in the developing of our faculties.

We pray that the lives of our fellow men may be precious in our sight; that the day may come when the different classes of laboring men may look upon one another less and less as rivals, and more and more as friends.

Bless, we beseech Thee, the sessions of this convention, may they be pleasant and profitable to us. Then send us forth, we beseech Thee, to our various activities to further this word and thy Kingdom that to all men may see a brighter and better day. We ask this in Thy mercy, through Jesus Christ, Amen.

The President:—

In locating our meeting this year, there were two cities which desired it,—one was Elgin, my native home, and one was this beautiful city. I am never, in a sense, a fighter, especially

for anything for myself, and in this instance I took the ground that the immediate vicinity of Elgin had received the best amount of education the last sixty years right in this line of work, and that other sections needed it more than we. Therefore, we voted to come to Rockford and, without any formal address of welcome, I know that we are welcome here but we shall be pleased to hear from Mayor Jackson on the subject.

ADDRESS OF WELCOME.

Mayor Jackson, Rockford, Ill.

Mr. Chairman:—

In greeting you gentlemen of the Illinois Dairymen's Association I bring to you a welcome from the citizens of Rockford who appreciate the honor of your presence here today, knowing, as we do, that you represent one of those important branches of our commercial industries which through your efforts has been gradually elevated into the front ranks until today this great state of Illinois is classed with the foremost in the manufacture of your product. Knowing all this, gentlemen, can we feel other than honored by your presence here on this occasion?

Your president has referred to the city of Elgin, and I believe that only the men familiar with the dairy products of this country realize that the city of Elgin, and the output of her industries has done more, possibly, than any other output in the great state of Illinois to advertise us throughout the United States.

We appreciate very much the fact that you have selected Rockford as your meeting place this year, knowing as we do that we are unworthy of it from a point of commercial significance in the line you represent: but, on the other hand, I will ask you to

picture for a moment a city of forty thousand people, situated on either bank of a stream as beautiful as Nature can produce; picture this city with all her industries and then tell me if this welcome which I bring you today is not worthy of your consideration.

In reference to the dairy output there are a few thoughts which come to my mind. I pose not as one who is informed in this line, but I think of it in this light: through the scientific, practical efforts of those who are identified with these institutions in our state we find the output coming to our homes from time to time in purer form; and, inasmuch as the very life blood of our nation depends upon the purity of our foods, I believe that this is a matter which should appeal to every citizen.

When you depart from us we hope that it will be to sing our praises throughout the state in no milder terms that we today sing yours, and once more, in conclusion, I extend to you a cordial welcome and greeting from the citizens of Rockford. Thank you.

The President:—

It is very fitting that a response should be given to this hearty welcome by a citizen of Elgin, and I will call upon Mr. D. W. Willson, editor Elgin Dairy Report, for a response.

RESPONSE.

D. W. Willson, Elgin, Ill.

Mr. Mayor, Ladies and Gentlemen, Members of the Illinois Dairymen's Association:—

When your secretary of the association asked me to make the response to the address of welcome to be given by the mayor,

it occurred to me that this was simply a perfunctory part of the program, one that would not require much to be said, simply to express our thanks for the kindness in the ordinary way; but the cordial welcome given to the association by your mayor, and the excellent way in which he discussed the problems and questions relating to the industry which this association represents, induces me to say something more than merely extending the glad hand in reply to that very kind and cordial welcome to this beautiful city of Rockford.

So I have taken a little trouble to lay down a few things and give you some facts which may interest him and all of you regarding the dairy industry, and also say a few words about the Rock River valley.

The Rock River valley to those who live around and in it is practically God's country. They all believe there is no better place to live than the Rock River valley for all that goes to make up manhood and womanhood. I agree with them to the extent that we have in our own country quite as good a land, quite as desirable a land, which we call the Fox River valley. So we are trying to even up on these things.

When the pioneers of this country came from Chicago west they found the first highlands west of Chicago along the Fox River valley. They found the stream, found the river, a beautiful river bound by springs on all sides, and they settled there believing that they had found something that was good, something that could not be improved. Some of the more enterprising and pushing ones went on further west. As you know, somebody has said "Westward the trend of empire goes" (I may not have quoted that correctly), and they reached the Rock River valley, where they found another country, flowing not exactly with milk and honey, but a country in which it was a good place to settle and in which it has been a good place to live for many years; and their children have found it so, and Rockford today is the result of those pioneers coming out here and developing the agricultural interests, the natural agricultural conditions that were found in the Rock River valley.

Agriculture, as you know, is the basis of all, or practically all, of the wealth of this part of Illinois and what the farmers have done has been great, and grand, and glorious. They have developed from grain raising and other things that pertain to the early history of this country, and now, as a stock growing and dairy section the Rock Rover valley cannot be excelled even by the Fox River valley, so we are here to respond to the mayor's welcome in a cordial, neighborly, friendly way.

Now a few thoughts along the dairy line, as to what it has done and what it can do, may not be uninteresting. Newspaper men, as you probably know, are fond of figures, so we will give them a few figures to digest and send out so that the people who read the papers may know what the dairy industry is, what it is capable of.

I want to say one word in reference to this. I say that the dairy industry not only develops the natural resources of the country, but makes it possible for farmers to become manufacturers and also develops the manhood and womanhood of the owners of the farms.

Your mayor has made some remarks regarding the character of men in connection with this industry, and we agree with him entirely in that respect. It may not be out of place for you to learn something of the value and extent of the dairy industry of the country, as well as that pertaining to the immediate territory that is known as the Elgin district.

The number of farms reported for the census of 1900, on which dairying was practiced, was 4,514,210. The number of cows kept for dairy purposes 18,112,707. The total pounds of butter produced 1,492,699,140 pounds; cheese 299,006,818 pounds; condensed milk 186,921,787 pounds. The value of the dairy products, as given by the census report, \$1,563,199,860. This will give you some idea of the great extent of the dairy industry in the country generally, New York alone producing over \$26,000,000, while Illinois is fourth in the value of dairy products, amounting to over \$13,000,000. These figures are large but they do not express fully the value of the dairy industry to

the country, nor its far reaching effects in building up and developing the highest type of agriculture.

The improvement in the methods and plans of producing milk, caring for cattle, housing and treating them, in the last thirty-five years would read like some of the tales of the Arabian Nights. In fact, this growth and development has kept pace and been somewhat in advance of development not only in commercial and manufacturing lines, but also of agriculture in general.

It is about twenty years ago that I came from the East to introduce at that time the new method of separating cream by centrifugal force. If you will pardon the personal allusion, a little experience in the neighboring town of Winnebago, in which was placed the first centrifugal separator in your county, in the factory then owned by Messrs. Mellen and Swan. They were receiving from 15,000 to 20,000 pounds of milk per day, and were raising the cream in open vats, making from two and one-half to three and one-half pounds of butter per hundred pounds of milk. The first day's skimming from the use of the separator showed a result of nearly five pounds of butter, to the hundred pounds of milk. The increase was so great, that Mellen and Swan could hardly believe it. The second day showed equally as good results. This resulted in a telegraphic order for two more separators to be shipped by express. The capacity of the DeLaval separator at that time was about 600 pounds of milk per hour. Today separators are made capable of handling from 3,000 to 5,000 pounds of milk per hour, with scarcely a trace of the fat in the skim milk. This great improvement in the separator fully illustrates the improvements that have been made from that time, illustrates what has been accomplished in developing and advancing machinery and methods in connection with the dairy industry.

In your own midst, in our city of Elgin, is an establishment, known as the Elgin Board of Trade, the great price making factor for fancy creamery butter for the whole country. Established over thirty years ago, it has grown and extended its mem-

bership, until today it has a membership controlling factories in not only our own state, but in the adjoining territory, which has produced in the thirty years, 634,283,516 pounds of butter; 197,808,761 pounds of cheese, of a total value of \$158,341,202.

Coming down to present day statistics, we find for 1901, the members of the Elgin Board produced 44,763,486 pounds of butter; 6,840,415 pounds of cheese, with a total value of \$10,011,510. For 1902, 45,121,360 pounds of butter, 5,847,400 pounds of cheese; of a total value of \$11,355,570. For 1903, 46,294,471 pounds of butter, 4,177,407 pounds of cheese; total value of \$10,979,951.

The average price of butter on the Elgin Board of Trade for the years named: 1901, 24.5; 1902, 28.5; 1903, 24.5; 1904, 21.8.

These figures, while they are large, do not take into account the value of the farms upon which the cows are kept, nor the establishments and their appliances, in which the butter and cheese are manufactured.

Now, Mr. Mayor, with these figures you can appreciate somewhat of the enthusiasm with which the members of this association take hold of their work. You can understand from these figures that we are doing large things in connection with the dairy industry, that we are furnishing the people with products which they all desire to have, and are a very considerable factor in the every day commercial and business life of this country.

We shall appreciate in the proper spirit, your very hearty welcome, and enjoy the hospitality you have offered us in such a way as to make our visit profitable and useful not only to the citizens of Rockford, but to the association as well. Thank you.

The President:—I see that I have put another Elgin man down for a paper this afternoon, but it seems to me our program is quite long and I wonder if it would not do to let that report go into the paper and you can read it. What do you say, gentle-

men? Would it be just as satisfactory for you to read it in the paper tomorrow morning as for me to read it here this afternoon? This is your meeting, it is not for me to dictate.

Mr. Gurler:—Mr. President, there is only one excuse for that. I think your thought is very good. If there is any question of having time for the rest of them and your address, I don't know but your thought is all right, but it seems a queer way of treating the President.

Mr. Smith, of Michigan:—Mr. President, I submit as one of the speakers from abroad, that this thing is too valuable to have it buried in the musty files of some morning paper. It should be read this afternoon.

PRESIDENT'S ADDRESS.

Ladies and Gentlemen of the Illinois Dairymen's Association:

Another year has made its record and passed into history. It has been in some ways a notable year. Events in the far east have claimed the attention of the whole world; our own country has passed through a presidential election with all that that means. It has been a year of remarkable educational advantage to the world at large and to the dairymen, the World's Fair at St. Louis being a wonderful school. From a business standpoint, the year has been on a whole, successful.

In the dairy world, it has been pleasant and prosperous. How has it seemed to the farmer? From his point of view, the normal prices of dairy goods during the summer months may have seemed low. If so, he has the remedy in his own hands. We have advised every year to have more cows fresh in the fall to milk during the winter when prices are highest, and there is more time to attend to the raising of calves. If this were generally done, it would work to advantage in two ways. It would

tend to raise the price of summer milk, and to keep the winter price well up. If there was less milk in summer, there would be less surplus of summer goods to go into storage, to come out in the winter and demoralize the winter market. The present prices, certainly make this a subject for serious thought.

From the manufacturer's standpoint, it has not been as favorable. The changing of the system from whole milk to hand separator plan is still going on, and in a great many sections, it is about half and half, which makes it expensive to operate, and while the manufacturer can make better butter on the whole milk plan with less expensive machinery, still it is the farmers' interests after all which have to be considered; which pays him the best.

As soon as they decide, the manufacturer will adapt himself to the situation and receive a fair remuneration for his work; the hauling is the great expense in either case, and some arrangement should be made whereby the hauling charges in every instance should be chargeable to the farmer, where he does not deliver with his own team; with this system once started and lived up to, one of the creamerymen's troubles would be eliminated.

From the dealer's standpoint, well: to let the farmers and factorymen tell it, they must have had a very satisfactory year.

This has all to do with the worldly side of the question, and through it all what knowledge have we gained that will make us better dairymen in the future?

The present day dairymen of Illinois need to profit by the education they are receiving, and put the same into practice, if they wish to keep up with the other states. Outside of the immediate Elgin district they have become careless, and the competition has been such that they will take milk in any quantity and in any-shape to the factory and if any objections are raised by the creamery boys, this quotation is always ready, "If you don't want my milk the way I bring it, I will take it to the other fellow who does." Hence, if he wishes to keep his place running, he takes it in, giving freely advice how to remedy it in

the future, which, however, in many instances is not heeded. They are also careless because they feel the business does not pay them. We can talk sentiment to a certain class and it will have weight, but, its the "good hard dollars" that have the most effect, and not getting them is largely their own fault.

In this so-called dairy section of Illinois, which lies outside the immediate Elgin district, how many farmers when they sell a cow sells the best one? The one which will bring him the most money, then, I venture to answer the question by saying that nine out of ten will sell the best; what is the effect on his profits?

I can refer you to Prof. Glover's statistics on the subject, and to assure you this has been the preaching from Elgin right along. I quote from the Elgin Gazette of 1865, now forty years old.

Keep the Best Stock.

Some farmers are in the habit of selling their best live stock and keeping the poorest to breed from. This is bad management. If a farmer has a good cow, she is worth as much to keep as to sell. The same applies to all other stock. The rule should be, keep the best and sell the poorest.

We will illustrate a case as follows:

Farmer A has a cow that gives 20 quarts of milk a day, from which nine pounds of butter are made a week. One cow he values at \$80 and the other at \$40. He sells the \$80 cow and keeps the other for his own use. Now let us see how the account will stand, in regard to the profits of these cows. The best cow produces nine pounds of butter a week, say from May 1st to December 1st—30½ weeks—274½ pounds at 30 cents—\$82.35.

The other cow produces in the same time, 122 pounds of butter at 30 cents a pound—\$36.60, which is \$45.75 profit less than the best cow affords.

It costs, in this case, the same to feed each cow, and it is safe to say that the advantage in keeping good cows over poor

ones is not improperly shown in the above statement. A farmer actually throws away from \$25 to \$40 each season when he sells a first-rate cow and keeps a poor one in her place.

How much wiser it would be if you farmers would sell two of the poor cows and always keep the best, even if you only received the same money for two that you would for the best one, then feed a balanced ration.

What I said in regard to more winter dairying, applies here also. The cows kept over winter should be good cows only. It takes training to be a judge of animals, and as Elgin buys the most of her cows, we are not surprised to find that most of her dairymen are good judges; their school is largely experience, coupled with heeding good advice that has come down from their forefathers. That same old paper has the following on this subject:

Selecting Cows.

First, I get a broadside view of the animal, at a distance of about two rods, as I have noticed for years that there was a great similarity in the proportion of all first-class milkers; being very small in girth just back of their forward legs as compared with the girth just forwards of their hips. I have never known a first rate milker, of any breed, not thus proportioned; so that if this form is wanting in an animal I have recommended to me I do not care to look any more, unless I want a breeder for some other purpose than the dairy. For breeding oxen, I should want a cow of reverse proportions, i. e., larger girth forward.

I next feel the size of the "milk veins," and trace to their entrance into the chest, which in superior cows are large, admitting the ball of the largest finger; if divided, or sub-divided, as is sometimes the case, I judge of the size of each orifice, as I care less for the size of the vein itself, than the orifice. Next, I examine, by sight and touch, the udder or bag, which must be capacious in order to hold much milk, with teats wide apart and free from large seed warts or sores of any kind; I then inquire how long she goes dry before calving, as I don't want a family

cow to give milk less than 46 weeks out of every 52; also as to the quality of the milk; and to close, I milk her with my own hands.

Add to these suggestions, a proper barn and barn-yard, cows well cared for, especially on stormy days, then milked properly with clean hands, using clean pails and cans, cooled as quickly as you can; ever remember that cleanliness and cold are the essentials to get you dairy products to market in the best of shape; then, if the business does not pay you, look elsewhere for the reason, but, if these instructions are lived up to, the burden of the manufacturer and dealer has been made much lighter and your state can again carry the Banner, instead of simply walking in the ranks.

For Pure Dairy Products.

I have been much pleased with the work of Dr. Reynolds and his department in the city of Chicago in his endeavors to have clean milk of proper quality brought to Chicago and then to have it delivered and sold honestly. It is one of the safest and best of foods and the people will use daily, double the quantity, if they can depend on getting it right.

All dairy products, coming under the head of human foods, the state should enlarge the "Pure Food" act, place a dairyman at the head of it who will act in conjunction with the city authorities, as well as to have authority on the farm, in the factory, and over transportation.

The powers of the Pure Food Commission should be enlarged and not another commission created, with assistants to see the law put into effect; I know it is difficult to keep honest by law, but, we must continue trying.

The present number of inspectors are not enough for Chicago, to say nothing of the state work. If one will read the commissioner's report he can readily see the immense amount of work necessary to be done to insure purity in even the common foods. Truly, we are an avaricious people, when manufacturers and dealers will knowingly place health destroying foods before

the people for a few cents extra profit, to be gained only by deceit and corruption.

By far the most serious difficulty to overcome is the fraud practised in the sale of dairy products by retailers to their customers and to show this is still kept up, I quote from the Pennsylvania report of December 15th, 1904, Vol. 2, No. 11, of the Dairy and Food division, showing that all samples purchased for butter, last October and November, everyone was a deception, hence, a fraud practised on the innocent customer. (Here Mr. Newman quoted from the report.)

A mass of evidence of this nature can be made up from all sections of the country, showing the need of stringent laws to protect the public from such rascality. Yet, in the face of this, the enemy is now forming his company into battle line to ask Congress to change the 10c tax law for their benefit, but, thanks to the National Dairy Union, Our "Knight" is also on the watch at Washington to see that our rights—the people's rights—are maintained.

Our duty is to stand by faithfully, following and carrying out his orders and by keeping the powder dry and plenty of it on hand, we will be successful in this fight as in the past. Every interest will be willing I am sure to contribute his or her share to the expense of the N. D. U. and look at it as a profitable investment. The present price of butter is only possible because of this law, without it, colored oleomargarine would be sold as and for butter.

We are friendly to those who desire to eat oleo and have proven it by reducing the tax for them, and the present cost of the ingredients going into the manufacture of oleo; you should buy it at retail for 10c per pound and at that price, pay those who handle it 20 per cent profit. Are they satisfied with this? No, for they are a greedy lot, and only handle it because they see larger profits to them on their investment. So stand to your guns and support the National Dairy Union.

Our Dairy School at the College of Agriculture, under the charge of Prof. Hart, is slowly increasing in numbers and effi-

ciency; for his assistants he has Mr. Hayden and Mr. Hopper, with part of Chief Fraser's time; for the number of students this should be an ample force to give the best of training. As it becomes older and better known, we hope to see the Dairy Department crowded.

Should Revise Cheesemaking.

We trust the work in cheese making will revive the manufacture of that sadly neglected article in our state and should advise going deeper into that study, for quite a little interest is developing in the northwest corner of the state in making different kinds of what we call foreign cheese, namely: Swiss, Limburger, Brick, Premost and the different cream cheeses. Some are comparing very favorably with the imported kind. I do not wish to be understood that by giving some attention to this, that we should neglect the larger interests, namely, butter and city milk supply; all these interests can be helped best by faithful and consistent field work, by good men going from point to point, giving sufficient time at each place to accomplish something.

I believe the work done by Prof. Glover and Prof. Lee and Prof. Hopper worth more to the state than that accomplished at the school. I do not say what importance the practical Dairymen of the state view that part of the work and we had hoped from the appropriation secured from the last legislature, Dean Davenport could see his way clear to put a man permanently in Southern Illinois besides Mr. Hopper's work near St. Louis and then put the whole field work in Prof. Glover's charge. The extra \$10,000 dairy appropriation was asked for that purpose. We shall, undoubtedly, hear from our committee why this was not possible. I cannot describe to you just how I felt when I knew that we were to lose Prof. Glover from our field work. A more honest, fearless, faithful, efficient worker, and one who loves his work. I do not expect to meet, and the only balm to my feelings was the fact that we will get the benefit of his future work if we will only take the best dairy paper in the world, "Hoard's Dairyman."

Every dairyman I have talked with feels the same way, in regard to it .

In this connection you should make known your wishes as to your official connection with future appropriations for dairy work at the University, which includes field work; the dairy clause in the last two appropriation bills ends as follows: " Provided that the work undertaken and outlined in this section shall be carried out on lines to be agreed upon by the Director of the Agricultural Experiment Station and an advisory committee of five to be appointed by the Illinois Dairymen's Association." To prevent any misunderstanding in regard to our responsibility, I would suggest this clause be left off, in future bills. Our advice, if needed, can be just as freely given.

Dairy Breeders in Show.

I would again call the attention of breeders of dairy cattle to the fact that it would be to their interest to have a class in the Annual Live Stock Show at Chicago, and I believe a combined effort on their part would secure it. Such a department, with Col. Mills, of Springfield, in charge of it, would be a great attraction and mutually helpful.

The work of Supt. Auten at the State Fair should be encouraged and it will become one of the principal attractions there. The State Board of Agriculture should put a large refrigerator across the end of the dairy building put the butter display in charge of E. Sudendorf of Clinton, Ill., or Mr. Hunt of Hebron, Ill., and thus get it on a higher and larger plane than heretofore.

In arranging for your appropriation, have in mind funds for a field secretary who could be among the dairymen of the state all the time, working in their interests and could be quite useful to the University also; would it not be legitimate for them to spend part of their appropriation that way? I do not want to increase appropriations, for while the people have elected a new governor by a safe majority, his administration should not be handicapped in that way.

In deciding to come to this beautiful city, we knew we would be royally welcome and I am sure our meeting will be well attended, and while our dates conflict with the Farmer's Institute, we will try to make it mutually helpful.

In this center of Northern Illinois creamery interests, we have thought best to devote not a little of our program to the creameries, as well as the farmer and have secured the best talent the world affords to instruct and entertain you. Please remember that the discussion of a subject oftentimes brings out the best and most practical side of it, so ask all the questions you want to of each speaker and so make this one of the most helpful meetings you ever attended.

The knowledge you have or gain, tell it to your neighbor and thus help us spread the gospel of the best and most helpful side of agriculture so that our 1,000,000 cows will increase the annual income of our state \$10,000,000, besides, enriching the soil of the farms they are kept on. What has been accomplished, we should be thankful for; it is the steady, intelligent grind, the keeping everlastingly at it, that will keep dairying in Illinois in the front rank, just as was done by our exhibit of dairy goods at the Louisiana Purchase Exposition at St. Louis, for which our state received a gold medal, thanks to the work of Supt. Hunt and the dairy committee, which our resolutions should recognize.

The President:—As the audience is rather small, I will only appoint two committees. The first, the Membership Committee. Of course we have to have the sinews of war, hence it is necessary to have a Membership Committee.

Chairman, Mr. E. N. Cobb, of Monmouth, for the dairymen; Mr. Ben Bollman, of Rockford, for the local man, and Mr. Davis, of separator fame, for the supply men.

These gentlemen will find membership tickets and badges at the secretary's desk, and I would like to have them go to work this afternoon and see that every man and woman attending the convention is a member of this organization.

The Committee on resolutions will be Mr. H. B. Gurler, Lovejoy Johnson and George Caven.

The Committee on Nominations will be appointed tomorrow morning. You understand that all resolutions have to go to the committee before being read, so anyone having resolutions he would like passed will please hand them to the Secretary or the Chairman of the committee.

The next on the program is an address by one of the younger professors at the University, who has been doing field work largely the past year in the St. Louis district. We will call on Professor Hopper.

AMONG THE DAIRY HERDS IN SOUTHERN ILLINOIS.

Professor H. A. Hopper.

During the last decade no line of human interest or activity has made greater progress than has agriculture, and in no branch of agriculture has there been manifest more genuine interest and achievement than in dairying. This may seem a bold statement but when we come to consider the great strides that have recently been made in dairy investigation and instruction, in all parts of the country, and compare this progress not only with that made in other lines of agriculture but with other occupations of men as well, we must accept it. This is as it should be, for dairying is fundamental. It is the thing in which we were all first interested and the one which must claim our constant attention so long as we face the necessity of producing cheap and wholesome food. Milk and its products, butter and cheese, make up one of our large groups of human food, but their use is not as great as it should be. Beef is called "Man's Imperial Food." Its use is universal, and will continue to be so for some time to come, but when economic conditions force us to a point where

finer distinctions in cost and digestibility of food must be made, the steer will pass from the stage and in his stead the dairy cow will reign supreme as an economical producer of human food.

Many things indicate that a movement for better dairying in all its phases is taking hold of the minds of men. It is not so much a question of more dairy farms and dairy cows as it is an application of better methods of milk production on the dairy farms which we already have. Some parts of Illinois should be devoted to milk production because of soil, atmospheric conditions, and transportation facilities, while other parts may well let this industry almost entirely alone except to supply local demands. In the dairy regions of this state milk is not produced nor handled under as favorable conditions as the necessities of economy and public health demand. In the more intensive dairy districts some interest has been aroused indicating better things in the near future, but in too many places the armor of indifference has not yet been penetrated. All dairymen have heard of the Babcock test and balance rations, but how many make use of them? What we need is a greater appreciation of the value of these aids and a willingness to apply them in solving the difficulties which come up on every farm. Years ago when the fertile prairies were broken up for cultivation, there was no thought entertained that perhaps the fertility of the soil might soon be depleted by constant cropping, but we know now that the vast store of fertility has suffered greatly from the demands made upon it and all because the landlord failed to act in accordance with his best knowledge. The same thing holds true today; dairymen do not put into practice and make use of facts and appliances designed to aid them.

About a year ago the department of dairy husbandry of the University of Illinois began dairy field work among the herds of Southern Illinois along lines similar to the work at that time in progress in Northern Illinois. The object is to get in touch with the dairymen through the testing of individual cows in the different herds, thereby showing the owners how easily the unprofitable cows may be sorted out by weighing the milk from

each cow and applying the Babcock test. An effort is made to bring about more rational feeding and conditions looking toward the production of better milk. Dairymen everywhere are prone to think that almost any place is good enough for the cows, without stopping to consider that wholesome milk cannot be produced in stables festooned with dust laden cobwebs, the floors rotten and never thoroughly cleaned, and where the cows are so filthy as to be actually repulsive to any one not accustomed to such things. The importance of tight floors and ceilings is emphasized together with the use of whitewash and sunlight as aids in producing clean milk, not only for manufacturing purposes but also for direct consumption. Another important object of the work is to secure information to aid the experiment station in its efforts to meet public demands. It is an effort on the part of the state to educate the dairymen concerning those things which are of vital interest to them.

The conditions surrounding the production of milk in the southern part of the state are quite different from those existing in the northern counties, the difference being due to a less rigorous climate, peculiar soil conditions, and the use of certain crops not available in the north. The recent interest taken in dairying in the southern part of the state comes as a recognition of the value of dairy cattle in building up and maintaining soil fertility in addition to the direct return from their products. I have been told that not many years ago the soil of certain counties had become so reduced in fertility by continuous cropping that they were called "chicken" counties, from the fact that the bulk of their live stock consisted of poultry. Consequently when the interest in dairying began to take root the people were unprepared for it, as they had neither barns nor cows nor sufficient knowledge to produce suitable foods for dairy cattle. These conditions still exist in some places, but where the dairy enthusiasm has been once aroused you would be surprised at the progress made and how easily, seemingly large obstacles have been overcome. Not all parts are adapted to dairying, but in those places where the start has been made a great change is taking

place. It is safe to say that Southern Illinois will be known in the future by her dairy products because the dairymen are beginning to put into operation more improved methods.

Over a year ago we began testing the individual cows in twenty-four herds, to determine the annual production of milk and butter-fat for each cow. Certain herds were selected at various places, the owners of which would consent to keep the records accurately. They were furnished scales, sample bottles, and record sheets and weighed the milk from each cow every milking, taking a composite sample from each cow every ninth week. In all the herds but two the weighing is done each milking throughout the year, no difficulty being met with in inducing the owners to do so. The result obtained in this way are much more valuable than those where the owners confine their weighing to the weeks when the composite samples are taken. From these continuous milk records and the tests of the composite samples, the year's production can be estimated very closely, the greatest variation not exceeding 5 per cent of the actual amount. The owner furnishes a report of the kinds and approximate amounts of food consumed so that, knowing the cost of the foods and the value of each cow's production it is easy to determine which cow is profitable and which ones are being kept at a loss. This you see is a practical and simple method which can be applied by anyone to determine the comparative value of his cow. It is simply a matter of weighing the milk from each cow separately, keeping a record of the amounts and testing a composite sample from each cow every ninth week.

When we began testing herds in Southern Illinois it was not a question of finding cows enough, but rather to decide from the many available herds which ones to take. The dairymen see the value of testing their cows for they have come to realize that the cow is the fundamental factor in dairying and the one with which they must grapple first. When you reflect that good cows were not to be had, the necessity for careful study of each herd with reference to its improvement will be apparent. In some cases the supply of dairy cows in other states has been drawn

upon to meet the recent demand in Southern Illinois, but these animals have failed to give satisfaction. The demand for milk has come to their very doors and must be met. Since they cannot buy cows to suit them they are beginning to grade up their herds by using the Babcock test and pure-bred sires, the importance of which will be shown later.

In doing this field work I have made no new discovery, nor have I been able to lay out a new scheme whereby shiftless dairy-men may secure large returns from their herds by ignoring all the fundamental principles of breeding and feeding. I have observed, however, that the most successful men are those who are modestly putting into practice the bed-rock principles underlying their business. I recall one instance of a dairyman who had been plodding along in the old rut with scrub cows for years. He knew he was not doing his best, but did not see his way clear to do better. We furnished him with scales, sample bottles, and milk record sheets and he set out in earnest to find the truth about his cows. He kept his records carefully and soon after the second test a decided change took place in his herd. I visited him at that time and learned that from his herd of ten cows he had sold seven of his poorest ones for \$160.00 and in their stead purchased a fine young pure-bred Holstein cow at a cost of \$150.00. The owner said he intended to have at least one good cow and should this one die he would replace her by one equally as good or better. Pointing to the spring scale hanging in his stables he said, "I would not take \$100.00 for them if another pair was not forthcoming, for they have been worth it to me. It is needless to say that he is using a pure-bred sire in his herd. In another instance the manager of a herd began testing as I have indicated. He took deep interest in the work, evidently desirous of learning as much as possible from it. He would study his milk sheet to see the influence of changes in food, weather, and lactation upon the amount. After a time he removed two or three cows which he was sure were unprofitable. The herd was inferior and I have expected this but was not prepared to see him dispose of the entire herd during

the summer. He had decided that they were too poor to retain even in a place where milk was commanding a high price. These were replaced by cattle shipped in from other parts which have proved equally unsatisfactory and now the owner has decided to keep a pure-bred sire, use the Babcock test and raise the heifer calves from the best cows.

I might enumerate many cases to show the interest which is being taken in the improvement of the herds. Some of the men who at first thought the weighing would be laborious have recently said that they would not keep cows without weighing the milk continuously. I have in mind the patrons of a flourishing creamery who are in earnest. For some time they have been in the habit of taking samples from different cows and having them tested by the butter maker, who furnishes them bottles and encourages them in their efforts to weed out the poor cows. We are testing four herds at this place and know that they are making progress. At present they are laying plans to organize an association to work in connection with the creamery so that any patron may have his cows tested. This is one of the most progressive features I have observed and I believe might well be imitated at many creameries. When the patrons of a creamery rise to the situation in this manner the reputation of their calling is not in jeopardy. Enough has been said to show that the desire and determination for better dairy cows in Southern Illinois is great. If we foster this spirit the day is not far distant when our herds will be uniformly large and economical producers in place of our present inferior nondescripts of which Bill Nye said their only claim to the name of dairy cows rest upon their pronounced inclination to freshen every year. This brings us to a phase of the subject which I believe means more to Illinois dairying than perhaps any other one thing. I refer to the introduction and use of pure-bred sires along with the application of the Babcock test.

We need more milk, we need better milk, but in all parts of the state north, south, east and west our milk is costing too much. In order to manufacture products economically we must have

machines which will work up the raw materials with the least possible loss. The machine which yields the greatest income, has a large capacity, is efficient, and requires the least proportionate energy to maintain it in motion. The dairy cow although somewhat comparable is not a machine, for all her functions are sustained and guided by a sensitive nervous system which does not yield itself to mechanical calculation. Efficiency and capacity, however, are the qualities lacking in our dairy cows and the ones which we must improve. The average dairyman is not giving much attention to the kind of cows he is breeding, if, indeed, he is considering the matter at all. The sire is more than half the herd, especially when a bull bred along dairy lines is used upon a lot of females of no known breeding. It is a significant fact that any dairyman can raise a better cow than he can buy with the same money, providing he has a pure-bred bull. Starting with nothing but ordinary cows and breeding to dairy sires of good breeding a fine working herd can be formed in a few years. In a herd of 40 cows where the bull is retained two and a half years it need cost but one dollar per head to make every calf at least a half blood or better. To show the low average production in some herds and the striking results obtained by persistent grading up, I want to call your attention to the following table:

**Average Production of Cows Obtained by Testing and Weighing the Milk
for 27 Weeks.**

Herds in Which an Effort Has Been Made at Improvement.

	Milk.	B. Fat.	Milk Per Day.	B. Fat Per Wk.	Value B. Fat @ 25c lb.
Herd A	4038.1	181.7	21.3	6.70	1.67
Herd B	4368.9	156.6	23.1	5.81	1.45
Herd D	4481.4	176.9	23.7	6.54	1.63
Herd F	5404.6	190.1	28.5	8.05	2.01
Herd I	3861.3	138.0	20.4	5.11	1.27
Herd J	3532.2	150.1	18.6	5.56	1.39
Herd T	3890.7	140.9	20.6	5.22	1.30
Herd V	3561.3	146.6	18.8	5.43	1.35

Herds in Which No Effort Has Been Made at Improvement.

	Milk.	B. Fat.	Milk Per Day.	B. Fat Per Wk.	Value B. Fat @ 25c lb.
Herd G	2802.4	105.6	14.8	3.94	.98
Herd S	3439.8	129.0	18.2	4.78	1.19
Herd U	2289.6	103.4	12.1	3.83	.95

In this table the average production per cow for 27 weeks is given together with the value of the average butter fat per week at 25 cents per pound. The cows in the herd here indicated were being tested simultaneously. The practice in most of the herds is to allow the cows to freshen from late winter to late spring so that the stage of lactation of the cows in one herd is fairly comparable with the others. In considering the table the first thing we notice is the immense difference in the average production of milk and butter fat for the different herds. In Herd F the average production is 5404 pounds of milk containing 190 pounds of butter fat, while in Herd U the average production of milk was 2289 pounds containing 103 pounds of butter fat. Between these extremes we have all gradations showing the great difference in productive ability. In the column at the right we see that the average butter fat per week in herd F was worth more than twice as much as that in herd U. Looking at the table from another point of view you will see that the herds have been grouped with reference to the effort that has been made in improving them. The upper group shows herds from which the owners have culled out their poor cows in various ways and replaced them with better ones from time to time. In some a pure bred sire has been introduced. In the lower group are placed three herds in which there has been no effort at amelioration and their production reflects very well their condition. In general the sire used in the herds of this group is closely related to all the cows in the neighborhood and no female is disposed of until long past her days of usefulness, if she ever had any. In herd F a pure-bred sire has been kept for several years, a rigid selection being made among the females, resulting in a uniform herd of high average production. The contrast between these

herds is strong but it simply emphasizes the fact that the man who puts push and brains into his work is rewarded by greater returns.

The Southern Illinois dairyman has an advantage over his brothers in the northern part of the state because of the adaptation of certain valuable crops to his part of the state. I refer to the great use which is being made of cow peas and soja beans, more especially the former. In the successful feeding of dairy cows there must be a liberal though not extravagant use of protein. Since protein is the most expensive ingredient, its production on the farm avoids the purchase of expensive concentrates, and points the way to economical milk production. Cow peas do well in nearly all parts of Southern Illinois and are quite largely grown in the more intensive dairy districts. This plant yields a liberal quantity of palatable and highly nutritious roughness, and for these reasons its use is becoming more general as its great value becomes better known. Soja beans are equally valuable but not so well known. With a proper adjustment of the corn, clover, and cow pea crops the cost of producing milk may be reduced one-half, because they may all be produced on the farm. In any part of the state where these plants flourish they should be grown, for in no other way can the cost of production be so readily reduced.

In conclusion I wish to call attention to two things of great importance to every milk producer. First: The longer dairy conditions are studied the more evident it is that there is a strong demand for products of higher quality. To meet this we must have higher standards. People prefer uncolored oleo to rank butter. Most people relish good ch ese but will go without rather than put up with a doubtful substitute. The amount of milk used for direct consumption could be increased three-fold in a short time if the public realized its nutritive value and knew that it had been produced under sanitary conditions. Here is the demand awaiting the efforts of the man who will clean up his place, advertise his goods and invite inspection. Not all dairy-men are so situated that they can reach the special city markets

but each one can contribute his efforts toward raising the quality of the output of his creamery or factory and profit thereby.

Second: To keep down the cost of production we must have better breeding and better feeding. Buy a hand Babcock testing outfit for \$5.00 and test every cow in the herd. You can't afford not to do it. Weigh the milk from each cow and keep her record, for unless you do, in 99 cases out of 100 you will be unable to tell which are profitable cows and which are not profitable. Guessing at the amount is keeping thousands of dairymen poor. Scales in the dairy barn are as essential as a range in the kitchen. Use a pure-bred sire and build the herd with the heifers from the best cows. In a community where milk is being produced nothing but a pure-bred dairy sire should be used. The failure of the American dairyman to stick to a dairy sire of the same breed accounts for the present inferior condition of the dairy herds. Dairy cows must be carefully fed. Provide green crops other than pasture for summer and keep the cows out of the heat and away from the flies. Grow leguminous crops and thus cut down the amount of costly concentrates necessary to balance up the ration. Provide warm stables for expensive food is wasted when cattle rustle through the cold stalk fields. The corn stover that goes to waste in our fields every winter ought to be in a silo, or shredded and stored away in the barn to be fed where the animals are comfortable.

DISCUSSION.

Prof. Smith:—Mr. President, I would like to ask Mr. Hopper if he had observed any feeding of soja bean hay or silage in Southern Illinois?

Mr. Hopper:—I have not.

Mr. Smith:—Have you observed the fact that Wisconsin has recognized in a little bulletin the fact that the feeding of such silage is not to be recommended for a dairy herd?

Mr. Hopper:—No sir, I have not.

Mr. Smith:—If the gentlemen will excuse we, Wisconsin to the front. They have stolen some of our preserves in the soil

bean matter, because we experimented with soil bean before they began. We found last year that soja bean produced bad butter. I left it to the fault of the buttermaker. Now Wisconsin station is out with the statement that soja bean silage is rather a dangerous thing for dairy cows because there seems to be some principle in it which is hostile to the quality of the butter. Is that not right, Prof. Farrington?

Prof. Farrington:—I am sorry to say, Mr. Smith, I have not read that report thoroughly this year. I did not make these experiments and I cannot answer.

I was intensely interested in this paper that was given here, and the point about it that made more impression on me, perhaps, than any other was the statement made by the gentleman that people down where he was working are intensely interested in this line of work. About seven years ago I began some of this work, myself, among the patrons of our creamery at the Wisconsin Dairy School and within a radius of ten miles some thought we ought to pay something for having their cows tested.

I think this is a very encouraging outlook, when in Southern Illinois he finds so many dairymen are anxious and interested in having herds of cows tested. I used to be in the state of Illinois and I have been down in Southern Illinois, and I am surprised at this fact and I am sure it is gratifying to me. I would like to ask in regard to this table, how much more milk these cows give than is represented by the milk produced in twenty-seven weeks. Have you any idea?

Mr. Hopper:—I do not understand your question.

Prof. Farrington:—You have the average milk per cow for twenty-seven weeks in a year. About how much more milk did that cow produce during the year?

Mr. Hopper:—That represents the average product in each of these herds for twenty-seven weeks the cows were tested. The testing and weighing went on simultaneously in these different herds; some were in an early stage of lactation, some in a late stage, but the tendency is to have the cows freshen either from

late in the winter to late in the spring, and in general the discrepancy in one herd would balance up that in another.

In the better herd, in herd F, the cows would probably produce anywhere from eight to twelve thousand pounds of milk per year: and in herd U they would probably produce about four or five thousand, the best ones. The others will not produce more than thirty-five hundred pounds.

Prof. Farrington:—Do these figures represent 75 per cent of the cow's production for the year?

Mr. Hopper:—Well, I had not looked at it in that light: I took twenty-seven weeks. In some cases that would represent about 75 per cent of the production in that herd. In other cases, where the animals had milked longer, as in Herd F, it might represent a larger percentage than that.

The President:—Were these twenty-seven weeks consecutive?

Mr. Hopper:—Yes sir.

Mr. Cobb:—When did that period commence?

Mr. Hopper:—About last December.

Mr. Cobb:—I would like to say a few words in regard to this question of soja beans and peas. I was in Tennessee when there was more cow peas sowed separate in that great state than any state in the world. I had two silos for ensilage at that place, one silo for clear corn and the other for corn and peas, and the tonnage of the two silos was nearly equal. The cowpeas when they were cut were probably one-third ripe, ripe enough so they would come out of the pod if you wanted to shell them.

We have kept a milk record for twenty years of every ounce and pound given by our herds. We fed the ensilage from the corn silo first because it was somewhat the smaller silo. We were only figuring on a small amount of ensilage during the fall months because the cows were running on good pasture. We opened up the larger silo, the silo with peas and corn, about New Years. We had read about balancing the protein and feed in the silo with sunflowers, and my boys said, when we came to the silo with cowpeas and corn that we were going to save half the mill

feed and going to increase the milk yield of the cow. When we came to feeding the silage from this silo I told the boys they had better keep up the bran ration for a few days at least and watch the milk record carefully. There was no change whatever in the milk yield from the silo with corn than from that with corn and peas mixed equally; no change whatever, and we kept up the same mill feed that we had in the case of the clear corn silage.

Another experiment that we made at the same time was in the fact that we had well cured pea hay in the barn. When we fed that well cured pea hay in the barn we could reduce the mill feed and have the same amount of milk, or more.

Mr. Spies:—I hail from Southern Illinois. I do not know that it will be of any benefit, but I was going to make a statement that we were not permitted to make a year ago, and I do not know whether it will be best to have it published at this time, as the same conditions of things still exist.

I live down there and am doing business with the condensing people there and I like them, but they hold us down on one thing, continuously hold us down on ensilage, and that is one reason why the people take the interest they do to improve their herds. I have been working among them for the past fifteen years, and the reason they are interested in the test is because they have been told and have found for themselves that it is for their own benefit, that they can improve their herds by testing their cows and getting better sires, and if they cannot afford to improve their herds any other way than to go and buy pure bred heifer calves, because they can buy them cheaper and raise them and grow both sides that way gradually.

Our people down there are paying too much for their feed; they are buying too much feed. They can raise that feed themselves and the silo would help them wonderfully, but the reason they have not been doing it is because the condensaries will not take the milk produced by ensilage. They discourage it. I built my first silo in '87 and built another one since. When the second one was built there were several others, and they are a success down there as they are here, but the condensaries are

afraid of the bacteria they claim they find in the milk, although I have sold a condensary there as high as one thousand pounds a day of my own production made from ensilage milk and they condensed it themselves, and found that ensilage milk was just as good—that is it did not retard or decrease the keeping qualities of the condensed milk and in that way it was a first-class success.

I am a strong advocate of the silo, because it is going to do as much good as anything else, but I have been requested by the people down there to say nothing, have been muzzled down there as long as I will stand it. I will back up any body of farmers that want to build silos, because it is going to be a blessing to them. The prices of milk are better down there than here, and still farmers think they cannot afford to make milk because it comes too high. They sell milk at \$1.00 per cwt., and still they say they cannot afford to make it. You gentlemen know it does not cost \$1.00 per cwt. to produce it up here, and it does not cost them that, but some people, I guess, are not making anything even at high prices, even at \$1.50, the price right now, some people say there is no money in the milk business, that is in milking and dairying, because the milk costs them too much—and yet there is a possibility, there is good cattle down there. There have been some imported cattle in that country, there since 1884. There have been some of the best registered stock down there. where the calves have been sold as low as \$12.50. The farmers did not know they should have these kind of calves, but they have found since those calves have grown up there is money in them.

I am glad Mr. Hopper came down there and backed up what they had been taught, and now they are convinced. That is the reason they are interested. I know the gentleman Mr. Hopper referred to who sold the six cows and purchased one. The man made a good investment; he sold six cows that were not producing much profit and bought one that ate only one-sixth of what the others did and gave perhaps not quite as much milk, but a good deal more than the others were giving in proportion.

That man has gone still further and bought several more of the same kind of cows; he paid \$110 for the cheapest one. This man is a good example of what the people ought to do in Southern Illinois.

I do not now have to blush when I am asked where I am from. A while ago if I said I was from Southern Illinois people said, "Down in Egypt," but Egypt today is doing something, Egypt is producing something, Egypt is coming to the front, all of which is because they have brushed up against some of the people from this country, they have brushed up against and have observed people that did the thing right, made money and had some left, the fact is, made money faster than they can at anything else. Those are the conditions and I am glad Southern Illinois is coming to the front, because there has been a great deal of effort expended in that section in every way. Of course the first thing necessary to make dairying a success is a good dairyman, the second a good dairy cow, and the third a good dairy market.

H. B. Gurler:—A few days ago I met a young man from King county in DeKalb, who is interested in five thousand acres on the Fox river. He was talking about building a silo; he said he was going to build it although the condensaries would not take ensilage milk. He said, "I am going to build a silo anyway; if they will not take my milk I can make money to have a silo and put it in some other use than to get along without a silo and take milk to the condensary." There is a point to think of.

Another point, I have the question raised frequently about my keeping silage and high grade milk. I am just as sure I can make a sweeter and better milk by feeding silage than I can without. One Chicago gentleman, who was largely interested in the milk business in Chicago some eight years ago, nearly every time I met him began to reason with me about feeding silage. I got tired of it finally and said, "I will bet two to one you cannot tell milk from silage from that made from ordinary feed, unless it is a sweeter, nicer milk of the two." He had no money to bet and he never said "silage" to me since.

It is no fault of the system, but the fault of the men back of the system and we must take as good care of our silage as our wives have to take care of canned fruit. If we never used the word "silo" and called it feed-can, and called silo contents "canned feed"—that is what we are doing, canning feed for our stock, and we have to use the same judgment the women use when they can fruit, and when we get down to that and live up to it we will remove every particle of objection to the silo.

Mr. Cobb:—I think if the condensaries would use as much effort to enlighten people and educate them in the use of silage and how to take care of it, as they use against them, that we could all feed silage to our cows.

The President:—Perhaps it is only fair to say this in regard to our last meeting, which was held at Greenville, the headquarters of the Helvetia Milk Co. They were probably the only market for the farmers in that section and we did not allow the subject of silage there to run out very broad from the fact that we knew the farmers could not dispose of their milk if we led them in that line very broadly. That is one reason the question was not discussed more fully, but here you may say just what you please and how you please on the subject. We know it means cheap feed, and good, wholesome feed.

Prof. Farrington:—I want to relate a short experience we have had in regard to feeding of silage. Of course we all know that Mr. Gurler has demonstrated that perhaps the best milk in this country can be made by feeding silage, but there are any quantity of people who do feed silage that do not make a pure milk out of it. At our dairy school creamery we get milk from about thirty farms, and of course on these farms are all kinds of farmers; some have five, some forty cows. It happens that what we might call the best herd that was supplying us with milk was a thoroughbred herd, owned by a wealthy man who prides himself on his cows. He has a very nice barn and his cows are kept clean; they are carefully groomed every day, the barn is swept out. You do not see the least sign of dirt or filth on a cow. He feeds silage, separates his milk and sends the cream to the dairy

school. In the past three months we have been much troubled from the cream from this particular herd; it had such an offensive smell we did not want to use it, and we sent word over to this man asking if he could not do something to remove the bad odor from his cream. He wanted me to go over to his farm and I did so, and looked over his herd. I found his barn clean and he said his herd was in much better condition than most of the herds that were supplying us with milk and he did not see why his cream should be complained of. I went there several times but could find nothing. We had to keep his cream separate from the other cream, because it had a strong odor, and several times we suffered some loss. When I went over there this winter one day one of the first things I noticed when I went into the barn was the odor we got from his cream when it comes to the dairy school. He had three silos; he had good ventilators for taking the air out of his barn and that went up through the peak of the roof, and he fed the air into the barn through these silos, and so all the air that was in the barn was contaminated with this odor of silage. That showed in a minute the trouble in his barn, and he had not happened to realize it. We had him close up these silos, after taking the silage out, remove all the silage from the cows after they had finished eating, and also feed silage after rather than before milking, and they have improved that cream very much.

I know it has been spoken of on dairy platforms and in dairy papers and it has been proved conclusively that you can feed silage freely, and it is only a question of finding out how to do it. This is one experience we have had, and we found the cause and remedy for the difficulty.

Mr. Wilson:—I want to give a little experience I found in one of our agricultural colleges where they were feeding silage. They were showing the barns and all the appurtenances thereto, how nicely they were doing. We were in one barn and if anybody should milk in that barn with the silage flavor that was prevailing there, I am sure the cream would taste of that silage. I do not know whether they could prevent that or not, but the

flavor was so strong that anyone with any sense of smell could tell it. The question is can we prevent that flavor from being absorbed by the milk when it is fed in the barn and what was in the barn from bedding? It did not come from the silo, and the young man who was showing the barn said they could not get it out. They cleaned out the silage after the cattle were done eating, threw it outdoors every day, but the smell was there and staid there. The barn was well ventilated, was under the control and direction of one of the best agricultural experiment stations in this country.

Mr. Gurler:—I do not want to take up time here, but I know you can get that out of the barn. I know I do it and keep it out.

Mr. Hayden:—I will give a little experience at the station last winter. We were trying an experiment on a small scale of feeding some cows on ensilage and others on other feed, clover hay, etc. We took samples of the milk from each of those cows. The silage was fed while we were milking. We took samples of the milk to the college and invited in a number of students to taste the samples. Of course they did not know which was which or anything about it, and when we asked them to pick out the samples which tasted best to them they almost invariably picked out the silage milk.

Mr. Smith:—I told Mr. Gurler that I would not tell this, but you have made me mad and I am going to tell it.

We took a thousand pounds of milk, heated it up to 92 degrees F., put the old-fashioned Champion milk cooler out in the silo where the ensilage odor was strong, and at the same time we areated that heated milk in that silo with that odor. I submitted the milk to our people in the dairy school and said. "This is a test. I want to see what kind of butter you can make out of that milk that has been areated in a silo." They took it, areated it in the pure air, ran it through the separator, bamboozled the cream in ways I am too ignorant to know of, except they pasteurized it; then added 20 per cent starter, which you butter-makers will know of; churned the butter, packed it and sent

most of it to Chicago; had it scored along with a tub of butter made in the right way from milk that had not been so ill-treated, and it scored within one point of the other. I hope the butter was consumed right away, for I am not going to tell you the condition of that butter from silage milk two or three months after. For immediate consumption perhaps it would have been all right.

The reason is just as Mr. Gurler stated—the question of the silo is a question of the silo only. It is not true that everybody can make good silage milk; even experiment have their faults, except in Michigan, and it is possible that when some man who is naturally cross-grained runs across this silage milk he can detect some odor in it that should not be there, and the unsophisticated farmer unless he uses great care in the matter is certain to get his milk “out of whack.” There is a good deal of sense in the condensaries objecting to this milk. In Michigan, where we have several large condensaries, they have never objected to silage milk, in fact the best recommendation for the silo was written and published at the expense of the condensary.

Mr. Cobb:—I have been up in Milwaukee this last fall. The breweries there would not use cane sugar or beet sugar at all; they say there is lactic acid in cane and beet sugar and that they use corn sugar because there is no acid whatever in it, and the acid spoils the beer. Why should it not spoil condensed milk the same as beer?

Mr. Smith:—That is all nonsense. There is no acid in beet sugar, is there Prof. Farrington? It is 99.7 per cent pure sugar.

Mr. Cobb:—That is what they told me.

Mr. Smith:—They had some fermentation in their minds.

The President:—We know there is condensed milk made in sections where there are no silos that spoils. I know of thousands and thousands of dollars worth burned up, and I presume the rest of you do. I do not think they can lay it to ensilage, in fact I know they cannot.

It has often occurred to me that with our several experiment stations, especially at Madison, Wisconsin, and Minnesota,

that it would be a good idea to set up a little plant of that kind and let us know more about this milk, this canned sugar milk. Why not, Professor Farrington?

Prof. Farrington:—It takes a good deal of money to build a condensary and run one.

Mr. Cobb:—It takes a good deal of money to run an experiment station.

President:—I think if we pay our money to experiment stations they should take heed of matters we want to know something about. I know large factories that pay thousands of dollars every year in taxes, which are making some of this milk, and they are entitled to some of your valuable work. I think they would like to know something from your work. It is only a suggestion, however.

Prof. Farrington:—They certainly should and probably will, although when such lines of work are taken up it is often a good policy to say little about them until results are found, and the mere mention of the fact that such work is in progress will have to be sufficient at present.

I want to say one more word about feeding silage, because Mr. Gurler is here and he has been so successful in making good milk from silage. Are there not some simple directions that we can find for farmers to help them understand how to feed silage, and feed it without any objection being made to the milk, and of course there are some reasons but they have not been formulated. I think directions of that sort would be valuable and, in this experience that I had, the one thing that helped us out more than anything else was suggested to this man that he feed his silage after milking, and I think that is one point that can be made use of by people who are trying to instruct farmers in feeding silage, to feed it after rather than before milking.

Mr. Smith:—Mr. Chairman, I only rise to this point. You cannot by legislation make any man honest, and you cannot make a nasty, slip-shod man a good clean dairyman by any amount of instruction. You can help him, but when you come to see that pure milk photographs everything that happens from the

time the cow is fed until the milk is delivered, you will find where we correct the nasty man in one point we only accentuate his filthiness somewhere else.

I remember as a small boy I used to take the milk in over there at the old Gould creamery, in this state, gone out of existence before you younger men were born. Mr. Gould used to instruct the men around St. Charles and Geneva to be particular about one thing in the straining of the milk, insisted they should use cloth. I remember one thing in particular, and that is that some of the farmers did use cloths because we found the cloths in the can.

President:—I want to say to the audience that this association has compiled a little pamphlet on the silo by Professor Glover, and we will be pleased to have anyone take a copy with you. This will tell you how to build and how to fill the silo, what to grow for the silo, as well as how to feed it.

We have to leave this subject; we have gone on longer, perhaps, than we should in deference to the speakers to follow, but I am a great believer in discussion and I believe we can get more out of it than by simply reading papers.

I would like to ask Professor Smith, Professor Farrington, Mr. Spies and Mr. Gurler in their opinion the benefit to taxpayers in having these men from our experiment stations going around and doing field work. What do you think Professor Smith?

Mr. Smith:—As far as Michigan is concerned, our Governor Warner, in his annual address, said that heretofore the missing link in the dairy instructions has been between the publication of the work done at the college and the work done by the press. We recognize, as you do, such papers as Hoard's Dairyman as being the most potent factor in the uplifting of the dairy business. The missing link is between that and the farmer and the governor recommends in his annual message the sending out of men for that purpose. We have had our eyes on Illinois before coming down here, on the work of Mr. Lea and Mr. Hopper, and the governor knew that when he recommended it, and I am sure the bill providing for these men will be introduced and

passed. We believe in Michigan that it is a most helpful thing.

Prof. Farrington:—It seems to me that this is a question that does not need to be discussed, it is too clearly beneficial. Different lines of work must necessarily be done by experiment stations. We have to have someone to make investigations that will perhaps add to the underlying practices which govern the best practice in agriculture; but you have got to have a press ready and some traveling instructors that will convey to the farmers, who are doing the work and living on the farms, information obtained by experiment stations. I think this intermediate work, this putting the work out in such language as can be applied to the farmers is fully as valuable, if not more so, than the scientific investigation. I am sure my interest is almost entirely directed not to chemical research in the purpose of investigation, but I am almost entirely occupied in trying to make those things that have been found out understood by the people to whom they can be of benefit.

Mr. Spies:—It pays us to continue this work. I find that the hardest thing is to reach the fellow that needs it the worst, and this field work is the only way to reach him.

Mr. Gurler:—I know this, Mr. Chairman. Many of the dairymen in this state feel they do not know how to get at this thing. If a man will come around, as Mr. Hopper and Mr. Glover did here, and get them to going, they will take care of themselves afterwards. They need help to get started properly. I feel that we cannot spend money to better advantage.

The President:—We have with us this afternoon Professor Smith, the director of the experiment station of Michigan Agricultural College, who will now address you. He will be with us again tomorrow, when we hope to hear from him again.

REMARKS.

Professor C. D. Smith, Agricultural College, Mich.

Mr. President, Members of the Illinois Dairymen's Association:

By express mandate of the governor, I convey to you his good wishes. Michigan is particularly fortunate in having in the gubernatorial chair the president of our State Dairy Association; Illinois could well go and do likewise. We have both a splendid governor and a splendid president of our dairy association in one man.

By virtue of my relation to the State Dairy Association I bear you, also, the good will of that association. I come from a state where the work of the association is quite different from that carried on by this association. I bear the good will of men who are studying the same problems as you are—the production of the best quality of the best dairy goods at the lowest price.

I want to say something, like the Irishman, before I begin and, a good deal like another Irishman, I am apt to put my foot in my mouth before I open it.

Mr. Glover is an old student of mine. I will not say all of the knowledge he got in the dairy line he got from me, but I helped start him off. Some of your best university men, your grand men like Davenport, Mumford, and Holden (not now of your state but further west) are graduates of our institution, so the brains that come from the institution partially come from Michigan.

The Cow Owner Side of the Creamery Proposition.

Since Mr. Glover is to spend a half day in discussing the form of the dairy cow and its relation to the milk production, I am going to eliminate that part of my paper relating to dairy farm. He will present the matter much better than I could do.

Naturally in considering the cow owner's side of the creamery question, we have first to study the man himself. Among the other attributes modern dairying lays not least emphasis on enthusiasm, confidence and faith. We are hearing much these days about hand separators because they extend the territory which a given creamery can cover. Its purpose, instead of having numerous butter factories which manufacture from 500 to 1,000 pounds of butter per day, there shall be one large central plant which shall receive cream by rail, trolley line and wagon and make up the product of 5,000 to 100,000 cows in one building. My own ideal of a successful dairy country is one where every man keeps cows as his main business, as the main avenue through which the product of his fields reach the market. In such a country I would have a cow for every fence corner and a creamery at every street crossing. The milk hauling question would be solved by having a sufficient number of cows within two miles of the factory to supply its utmost wants. Not longer hauls of cream but shorter hauls of milk. Not separating the united product of all the farms by a steam machine. Modern economy, I am sure, is going to point to this consumation with the hand separator as a temporary expedient. Any such result is to be obtained only by the elimination of the two cow or the three cow dairy. These small dairies are to be eliminated, not by reason of the number of men that keep cows but by increasing the number of cows that each man keeps. This in turn implies confidence, energy and skill. In my own experience we noted that as our herd increased in numbers our profits per cow increased and I believe that our experience is duplicated in that of every citizen who goes intelligently into the dairy business. You will understand exactly what I mean. It seems to me vastly wiser to look forward to a very dense cow population served by a larger number of creameries rather than to a sparse scattering of cows, the cream of which is hauled to a central plant disconnected from the cow owners and the milk producers and making the cream into butter solely for what profit there is in it with no interest in the cow owner whatever.

While I am saying nothing in regard to the form of the dairy cow which an energetic and progressive dairyman will keep, I may say that the Babcock test and the scales must be the ultimate jury which decide the fate of each member of the herd. Again referring to our own practice I may say that it paid us in dollars and cents to weigh the milk of each cow night and morning and to make a record of such weights on the milk sheet. The testing need not be done so frequently, the only point being that whenever a test is made it shall be a composite sample from several milkings and not the test of a portion of a single milking. When the scales and test show that a cow is not up to the requirements that animal should be ruthlessly destroyed.

After the cow comes the feed. Here much might be said did not other papers on the program discuss the matter at considerable length. In Michigan we make up the bulk of the ration of clover hay and corn silage, finding the clover vastly superior to timothy and silage cheaper than roots. Some succulent feed we insist upon and choose silage in preference to roots because of cheapness. The variety of corn to be used is decided by the date of ripening and the abundance of its foliage and ears. By carefully selecting the seed before the crop is harvested we are able to maintain the fertility of our variety and strains selected so that we have to make no changes in seed from one year to another. We avoid the hurtful influence of bad autumns by harvesting and selecting enough good seed on a warm dry autumn to last for several years. Experiments at the college have shown that two year old seed harvested in a dry warm fall gives much better yields than one year old seed selected in a bad fall. So the rule among the Illinois farmers may well be to always keep enough seed corn on hand to last for three years.

In Michigan we have corn following clover, hauling the manure from the stable as fast as it is made and spreading on the clover sod to be plowed under in the spring. It is well known that clover belongs to the class of plants that derive part of their nitrogen from the air. How much nitrogen they will obtain is not appreciated. In one case we set aside a small plot some

eight feet long and eighteen inches wide from which the earth was removed to the depth of two feet. By means of a spray of water the earth was washed from the clover roots, leaving a mass of rootlets so dense as to make one wonder where the earth could have found place between them. The clover field was yielding one and one-half tons of dry hay per acre. When the roots were cut off at nine inches below the surface and analyzed it was found that the clover roots gave to the soil as much plant food, as much nitrogen, phosphoric acid and potash as ten good loads of barnyard manure per acre. Naturally the crop contained much more and I doubt not that where the second crop of clover is plowed under, tops and all, it adds as much available plant food to the soil as a good coat of twelve or fifteen or perhaps twenty loads of manure per acre. Better harvest the hay and feed it, returning the manure to the soil than to plow under this valuable feeding stuff.

Nor are there any losses to be noted by reason of spreading the manure on the snow in the winter. When the snow disappears the plant food sinks into the soil. Our experiments along this line were elaborate and fairly sufficient to show no great loss from following our method.

It is more than probable, it is certain, that our rotation would not fit Illinois conditions. We are recommending and using a three year rotation, corn, fall wheat, clover, corn. Here we plow after the clover and before the corn and not again for three years. The rotation furnishes us bedding, the best hay in the world except alfalfa, and silage. With a good field of peas and oats or peas and barley to supply some additional protein we do not need to buy much grain food. What we do buy furnishes protein, and furnishes it very cheaply. In fact we select in the market the food that furnishes the protein at the least cost per pound, and if it is adapted to the dairy cow we buy it.

But the farmer is interested also in furnishing pure milk. The markets and the factories are not as discriminating as they ought to be in this respect. Physicians and health officers have done much to educate the consumers of raw milk as to the dan-

gers from bad germs therein. They have given the little knowledge which is a dangerous thing. Instead of securing a willingness to pay for a clean article a good price, they have developed a prejudice against all milk. It seems to me that there is room for a bureau whose sole function it should be to exploit the values of milk in the ration of both children and grown people.

Before we can expect much increase in the demand for good milk the farmer must be ready to produce it. In the presence of Mr. Gurler it illy becomes me to foist my inferior knowledge on this topic upon you. I shall content myself therefore with a few suggestions.

First, it requires no inconsiderable skill and care to produce pure milk. The cows must be healthy; the feed and water must be sound and free from evil contamination; the stable must be well lighted and well ventilated, with cement floors or the equivalent, with smooth side walls, and a smooth and clean over-head; the stalls must be so arranged as to keep the cow from soiling herself in her own droppings; the milkers should perform their duty in the morning before the stables are cleaned out, the excrement being covered with straw or sawdust; the milking should be done before silage or grain feed is offered to cows; the cows should be brushed as to sides and udder before the milk pails are brought in the stable, a simple fastening under the neck preventing lying down until the milking of the given cow begins; the hands and clothes of the milker are clean and the teats are not wet with milk; the pails and all utensils are clean; the milk is removed from the stable after straining through three thicknesses of cheese cloth or its equivalent; the milk is removed from the stable at once and cooled and aerated in a room where the air is free from dust and germs.

The whole object of this care is to keep the milk free from bacteria. Certain forms of pails are recommended where the milking is done through cloth strainers into the pail. I neither favor or disfavor them. The Connecticut experiments show little advantage. At best they attempt to keep out bacteria. Better not have the germs there to fight.

When the bacteria have entered the milk and have lived in it for a few hours, pasteurization may kill them, but it cannot remove the effects of their lives, the excreta from their bodies. Moreover, as pasteurization is usually carried on, it kills the germs which sour milk, the lactic acid germs, only, leaving in the milk the spore bearing germs ready to do their work. It is these germs that make the milk actually dangerous for children and unhealthy for grown people. By pasteurizing therefore, the milkman removes the signals which nature hangs out to warn the consumer that the milk is approaching the unhealthy stage. I hear men boast that their milk will keep sweet for seventy-two or even ninety-six hours. It by no means follows that the milk is healthy when kept thus long. Because the milk is not sour it is not therefore good. I believe that I am safe in saying that milk is past its best estate when it is twenty-four hours old and when it is attempted to keep it for long periods by pasteurization the danger is encountered of killing the harmless bacteria while leaving alive our worst enemies.

DISCUSSION.

Mr. Coolidge:—I am interested in this question. It seems to me if milk over 24 hours old is not good a great many people will always use bad milk in the large cities. How can we get our milk to them so they can use it every 24 hours and still be not over 24 hours old? This is a serious question to my mind.

Prof. Smith:—It is a serious question which I cannot answer. I only recognize in what I have to say the fact that the danger in the use of milk increases with its age and pasteurization does not lessen the danger but rather increases it. The only way, if you have to supply milk that is 24 hours old or older, is to keep out the bacteria which causes the poison.

Mr. Coolidge:—Let me ask another question. Does the pasteurization of milk kill any germs? Does that germ have any effect on the spore bearing germ if allowed to live? Doesn't that spore bearing germ develop just the same with age?

Mr. Smith:—Lactic acid does not hinder the developing of the spore bearing germ but substantially they increase along with the lactic acid.

Mr. Coolidge:—It seems to me if the spore bearing germs develop just the same then pasteurization of milk is a good thing.

Mr. Smith:—You do not get my point. If you kill the lactic acid germs, then the man will drink the milk which is actually more deleterious than the sour milk would be.

Mr. Farrington:—I would like to have Mr. Hayden tell us what he thinks of the effect of killing the lactic acid germs on the spore bearing germs.

Mr. Hayden:—I don't know as I can say much on that question, but my impression is that it has, as Prof. Smith says, some detrimental action on spore bearing bacteria, has some effect on their growth. I have not done much work on that line, but expect to do more in the near future.

Mr. Smith:—Can you tell me from what probable source in the history of the milk do most of the spore bearing germs come into the milk?

Mr. Hayden:—I think in the ordinary way the milk is handled most spore bearing germs come from dirt dropping from the cows udders, or from dust in the stable. Most of them get in during the time the milk is in the stable.

Mr. Smith:—Do any of the dangerous germs get into the milk from poorly washed vessels?

Mr. Hayden:—Yes sir. Typhoid germs do.

Mr. Smith:—That is where they are washed in bad water, but suppose they are improperly washed?

Mr. Hayden:—There might some bacteria get in that way, but I think most of them come from filth in the stable, and I think it is generally considered so by medical authorities.

Mr. Smith:—Where milk is pasteurized, which would be killed first at the lowest temperature, lactic acid or the germs producing poisoning?

Mr. Hayden:—Lactic acid would be killed first.

Prof. Farrington:—I do not think you can safely assume that the spore bearing germs will always produce this poison; but when you hold milk that contains any number of germs fully developed, lactic acid germs or spore bearing germs, the lactic acid germs are killed first and the spore bearing germs injure the casein, and when they do the products they produce are putrefied products, so when pasteurized milk spoils it is spoiled by the putrefication germs developing there, acting on the casein, which produces this repulsive odor and smell by their action. I do not think it is safe to conclude that because they do this the spore bearing germs produce this odor and that they are always the source of potomaine poisons.

Mr. Smith:—Would not that be more apt to be harmful upon the children?

Prof. Farrington:—I do not think anyone knows.

Mr. Smith:—We do know that lactic acid germs are not harmful. Perhaps you don't know that even if a buttermilk had some sour milk in it it is acceptable on account of the acids it contains, whereas I imagine that a milk in which they had been killed but which had suffered from effects of putrefication would be not only repulsive but unhealthy.

Member:—Sour milk would not be good food for little children.

Mr. Smith:—I don't know, we have no children in our family, but I think if you started out in that way you would have to keep it up. We do with calves.

President:—What temperature kills lactic acid germs, how long at that temperature, and what temperature kills other germs?

Prof. Farrington:—I never made a special study of this question. Mr. Hayden is one of the students from our bacteriological department, but I had the impression that a temperature of 130 degrees F. if milk or cream is exposed to that temperature five minutes would kill the lactic acid germs, and a temperature

of 180 F. for a half hour or longer, perhaps, is necessary to destroy spore bearing germs. I do not think any exact temperature or time can always be found as a positive death point for all germs, but perhaps in general terms those two temperatures as applied to those two classes of germs might be approximately correct.

Mr. Hayden:—My experience has been 140 degrees for killing lactic acid germs.

Prof. Farrington:—I was trying to divide them into two classes.

Mr. Smith:—The point I made, Mr. President, I insist that the only safe way for us farmers to do is to keep these pesky little things out of the milk, then go to Chicago, or any other large city, and say, "We are doing our share, gentlemen. Do not decry the use of milk; it is a good food, the most economical food you can use in your family. We are giving it to you at least comparatively free from harmful germs. You folks take care of your children and if they do die, don't lay it to us," and the best way to do that is not to sell pasteurized milk. People are getting to look on pasteurized milk as milk that was in the beginning positively dirty with the possibility of a cure in the shape of pasteurization.

The President:—Professor, why do you object to putting cotton on top of the pail to catch those fellows?

Prof. Smith:—I have no objection whatever to the use of cotton in the top of the pail if the stable is clean and the cows are clean, but don't you see that the use of cotton in a pail where you are milking a dirty cow and rubbing dirt off her sides all the time? It means that cotton simply collects the dirt and filth so you cannot see it in the milk, and holds it there while you wash off all the bacteria on it. In a good clean stable, by all means use the Gurler pail and cotton, but in a stable where you cannot control keeping the udders and cows clean, don't use the cotton. In a stable where the udders and sides of the cow are kept clean, the cow stands up with clean bodies, and what the cow has

separated no man has joined together in the milk—in such a stable you can use cotton with safety.

Mr. Cobb:—Why do you use cotton if there is nothing to keep out?

Prof. Smith:—I do not say there is any immediate necessity for it and Connecticut has proven that it does not lessen the number of bacteria. I would like to have Mr. Gurler explain what advantage he finds in the use of it.

Mr. Gurler:—I don't know as it is my place to get up and defend that milk pail. I have no interest in it. I got it on the recommendation of some leading physicians of Chicago. I do not know that I need to say any more about it. The pail is not patented, anyone can use it and need not unless they want to.

Prof. Smith:—I don't think there is much use in using it in a dirty stable. I don't think there is much difference whether you get the dirt in the pail or get it on the strainer and get a portion in the pail.

Mr. Gurler:—There is one point that has come to my mind, that is from the consumers of milk. There is a lamentable amount of ignorance in regard to pure milk among the consumers. I think there is a field for our experiment stations to do some work to get the consumers of milk to think right and appreciate what pure milk means. I am sure it would more than double the consumption of milk if they could have milk clean and pure. When I am at home I consume two quarts of milk daily myself, my own certified milk, and sometimes more than that, but when I am away from home it is seldom I want milk. I take tea or coffee.

I do not know but many of you read the report of the German chemist who made an examination of the milk supply of the city of Berlin. I never forgot one of the closing sentences of his report. He said, "The people of the city of Berlin consume in their daily milk supply three hundred weight of cow dung." It is not elegant, but it is a forcible expression. I am not familiar with the conditions in Berlin and do not know whether they do

any better in this country, but I suspect not as well. I tell you when you get down to business and make clean milk, the consumers of milk will use much more of it. I have experiences with my milk among little babes that are amusing and instructive. I have known in my own town of some instances where a babe that was sick would be put on my milk at the recommendation of the doctor. When the child recovered the parents would undertake to put it back on common milk, and that little child, not able to talk, would spit it right out. My little grandchildren were raised on this milk. I remember they went into one of the best families of DeKalb to visit, and take tea. The family keep their own Jersey cow and have their own man milk it, but these little boys took one mouthful of that milk and would not touch any more of it. They had been well enough trained so they did not make any remarks, but their mother was mortified for fear they would. But you take those little children and their taste is delicate; they will detect things we will not notice at all.

I don't know why it is not within the province of our colleges and experiment stations to put out literature among consumers of milk to assist their understanding. Don't make us dairymen do all the educating of the consumers of milk.

Mr. Wiggins:—I had some little experience in certified milk, and you can encourage the experiment stations to tell people how to use milk, how to take care of it and how to feed it, but they will not read what you do publish. The only way I can see to get at that is for every man who produces sanitary milk to get out little pamphlets, such as Mr. Gurler is doing, and make a systematic canvass of their customers. Ask them if they have read that article, and if they have, take up a little discussion with them. Of course it is impossible to do that with a large trade, but so far as possible get around it in that way. Get a little thing that a housewife will read and which will interest her. They will not take up a pamphlet from an experiment station and read it; they say it is too scientific, they cannot get any sense out of it. It is up to the producer to get the consumer to appreciate and take care of this good milk after it is properly produced.

President:—I think one trouble is, the consumer thinks there is something in it for the man that is preaching the gospel, and does not take to it.

Prof. Smith:—I wish Mr. Hopper would state the results in the sanitary conditions of those stables.

The President:—Just one minute. I would like to state that any of you having railroad certificates, if you will leave them with the secretary they will have attention. Machinery Hall is open right across from the Nelson House, on the third floor. Be sure and get your badges and membership tickets at the secretary's table.

Tonight we will hold our meeting at 8 o'clock and Prof. Farrington, of the Wisconsin experiment station will speak and give us a stereopticon lecture on the World's Fair Dairy Cows Demonstration. Those who could not see the cows there will like to see them in life-like form on the canvas. We shall also have some fine music which the local committee has provided for us, and Jules Lumbard has come clear from Omaha to sing for us.

I will now ask Mr. Hayden to answer that question.

Mr. Hayden:—I may say that in two ways I have seen some tendency towards improvement of sanitary conditions. First, and perhaps the most important, is the introduction and use of areators, but this has been largely due to the influence the condensary people have brought upon producers of milk themselves. Another point which is quite gratifying is the fact that several of the dairymen with whom I come in contact are putting in cement floors. They are not doing it on a very grand scale so far because they are new in the game. We have only been in touch with them about a year up there, but some of them are considering this more seriously and some of them, as I understand, have already made some improvements with cement floors, which indicates that they are taking hold of the matter in a very good way, especially from a sanitary point of view.

Prof. Farrington:—To whom do they sell in that town?

Mr. Hopper:—The milk situation may be divided up into about three classes. First, and most important perhaps, is the

direct consumption at St. Louis. The large percentage of their milk is pasteurized and sent out through different companies, the rest being sent out by individuals sending it to dealers in St. Louis. Another direction, and a very important one in which the milk is used up is at the condensaries. The condensing interests of Illinois, as all know who have been there or were there last year at the fair, are very important, especially the Helvetia Milk Co. They can an immense amount of milk and they have pretty good control over their patrons, and the patrons are thoroughly interested in milk production. The last, and least important, is the milk which goes to creameries and cheese factories, which do not flourish very extensively in southern Illinois. The creameries did flourish much more abundantly than they do at the present time some years ago, but since the condensaries have come in they have caused a falling off, and the more ready means of communication with the cities also takes the milk away; but in places where milk is not readily used by the condensaries or shipped to the city, the butter factories have a chance to flourish.

Prof. Smith:—Are they putting in stalls to keep cows clean.

Mr. Hayden:—In a few instances they are putting in ordinary stave stanchions. So far they have not come to a stage of giving much consideration to the more advanced forms.

The President:—You feel encouraged over the result of the work in Southern Illinois during the past year?

Mr. Hopper:—Yes, I feel that although there has been very little done so far, the indications are that a great deal more can be accomplished in a short time. A few illustrations might show something of the interest the people are taking. I was over at an institute meeting at one of the towns near where I was testing herds. I had never made any effort to advertise the work, but the people had heard of it and several men with whom I was talking seemed to think it was my duty to test every cow in Illinois. I explained to them the situation. One of them was located near the herd I was testing and I told him to work in

conjunction with this herd, that we could not get every cow even though we would like to do so. Several instances like that came up, which show that those people are really interested in the work.

The President:—If there is nothing further, we will stand adjourned until 8 o'clock this evening.

Tuesday Evening Session

Meeting called to order by the President at 8 o'clock p. m.

Music by the Temple Quartette, of Rockford. Responded to an encore.

The President:—The late fair at St. Louis is, of course, in all our minds. We remember the splendid showing the dairy cattle made there, and Professor Farrington, of Wisconsin, who had charge of that demonstration, will now tell us something about it, with pictures as well as a talk.

PROFESSOR FARRINGTON.

Mr. Chairman, Ladies and Gentlemen:

I wish to say that I always enjoy meeting with the Illinois Dairymen, because a meeting of this association was one of the first dairymen's meetings I ever attended, about fourteen years ago, so it is always a pleasure for me to come to Illinois and meet once more the Illinois dairymen.

I don't know how many of you attended the World's Fair, but I know before the fair opened there were a number of letters sent around, and I received one asking me to make an estimate of how many persons I expected would attend the fair from Wisconsin. It seemed to me rather an absurd question to ask anyone and have it answered rather fairly. I was somewhat surprised to read in the newspapers at the close of the fair that there was a total attendance of twenty-two millions. I presume that does not mean twenty-two million different people attended, but the total admissions was twenty-two million.

If the World's Fair visitor arrived at St. Louis and left the Central station on the north, took the Market street car going west to the end of the line, he would arrive at what is called the agricultural entrance. I presume some of you took the trip and went to the fair in that way.

At the agricultural entrance, in the early months of the fair, after you passed through the gate, you had to traverse quite a long field before you arrived at any of the fair buildings. About the first of August they began to put up what they called the "cattle barns" for accommodating stock that were competing for prizes in the show-ring; but previous to the first of August about all that was in that section of the grounds were four dairy barns. These barns were built as soon as any of the larger buildings at the fair grounds, and one was occupied by one of the herds of cattle sometime before the opening of the fair.

The dairy cow test at the world's fair is going to be one of the essential features of an American World's Fair. I presume some of you remember the dairy tests that were made at Chicago where they had three different herds competing, of twenty-five cows each—the Jersey, Guernsey and Short Horns. They had four different tests—a ninety day cheese contest, a ninety day butter contest; another fifteen days, which was for younger cattle, and a fourth that was to demonstrate the milking qualities, consisting of solids not fat in the milk, as well as the milk. At the close of the Chicago exposition a great

deal was said in most of the dairy papers about the wonderful cows, "Merry Maiden" and "Brown Bess." I presume dairymen are as familiar with these names as some of the horsemen are with Joe Patchen and other fast trotters. That stimulated making dairy records, and the results obtained at Chicago were absolutely fair and honest results.

When the St. Louis exposition was talked of one of the features that was talked of early in the arrangements for this exposition was to have some sort of dairy cow test. A dairy cow test seems to be essential for an American world's fair and I presume every fair in the future will have some test of this sort.

At the Chicago exposition you will remember, probably, that the value of the milk that was produced by the cows was determined not only by analysis and by the Babcock test and lactometer, which showed percent of fat and solids not fat in the milk, but the milk from each breed was taken to the dairy building, skimmed and made into butter in the butter test. The butter was scored and award was given to cows not only on total production but on quality of butter that was made. That is, butter having a certain score was valued at certain price and butter of another score at a different price. The value of such a record as that depends, as you dairymen all know, a great deal on the buttermaker, the man who handles the milk and the cream; the cows are not responsible to a great extent for the quality of the butter she makes.

This dairy cow demonstration, as it was called, at St. Louis, was one step in advance of the Chicago test in that direction. It was hard to get the different breeders or persons interested in different breeds of cows to agree on a certain set of rules and regulations to govern these tests. At the time of the Chicago world's fair it was necessary, in order to get men handling different breeds of cows, to have the award based somewhat on quality and quantity of butter. This dairy cow demonstration at St. Louis marks an advance over that period, as it has been demonstrated since that time that the capacity of a cow should be judged

entirely by the amount of milk she gives and its quality, as determined by the Babcock test, which shows percents of solids not fat. The making of cheese was entirely eliminated and had nothing to do with making of award for cows in this test at St. Louis. As far as possible the cow was judged entirely on her own record.

Of course this St. Louis demonstration was open to any breed of cows in the west that cared to enter. One breed was collected entirely a year before the exposition was to open so as to acclimate them to the climate of St. Louis, select the best ones and determine which should be in the final running and take part in the test. This was the case only with one herd. The other three herds that entered were brought to the fair early in the spring. There were four herds in all; they occupied four dairy barns. In one barn two herds were housed and in two other dairy barns one herd occupied a barn by itself; the fourth barn was used for the cows that were in what was called the "dual purpose" cow test. There were three tests conducted at the St. Louis fair—one butter test, another milk test, and the third dual-purpose test.

In the butter test the award was based entirely on the weight of the milk which the cow gave, and test of the milk, and from this weight and test the weight of butterfat in the cow's milk was calculated. Along with this weight of milk and test of the milk, a careful record was made of every ounce of feed that was given to each cow every day. In the milk test the weight of the feed was taken into consideration, the percent of fat in the milk and the percent of solids not fat as shown by the lactometer reading. In the dual test the weight of milk of each cow was taken into consideration, and that was valued at 40 per cent in making the award, the weight of the milk and its composition. That is, the dairy performance of the cow was valued at 40 per cent of her total performance; the beef points, what was called the beef points of a cow's formation, 35 per cent, and the beef points in her calf 25 per cent, making a total of 100 points. It was hoped to demonstrate which was the best cow for butter, the



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best cow for milk and which was the best dual purpose cow, taking into consideration the milk and beef points and the calf of the dual-purpose cow.

The regulations were discussed for nearly a year before they agreed on a set that everyone was willing to bring cows on and have them entered and take part in such a test. A great many meetings were held by persons interested in these tests, and of course a great difference of opinion was expressed, but they finally got a set of rules and regulations to which they would all agree.

The weighing of the milk of each cow and of the feed given her was commenced officially on June 15, and that was kept up until October 13, a period of 120 days, when the cows were in this race. You have all heard of a horse race, but in a race of this sort no account whatever is taken of the value of the feed the horse eats. That is one way in which these cow races, if you may call them that, go the horses one better. It is an economical question, and the value of the feed the cow receives is taken into consideration as well as the weight of her milk, and its test.

In order to go into details of the work and have it properly arranged, it was necessary to have thirty men connected with these cows in the different parts of this work.

The cattle associations selected the cows of the breed they represented and placed a man as superintendent in charge of them. The superintendent secured men of his own selection who milked, fed and cared for the cows under his direction. No restrictions in regard to the amount or kind of feeds given the cows were placed on these superintendents, but every pound of feed was weighed and charged to each cow daily. These weights of feed as well as the weights of milk at each milking were recorded on blanks provided for the purpose by men employed by the exposition who were stationed in each barn during the entire day. In addition to the two recording clerks, a Jefferson guard was detailed to each barn, he being on duty day and night.

The feed provided by the breed superintendents was stored in the various barns in a feed room which was locked and the

key held by the record clerks of that barn. The grain ration for each cow was weighed daily and placed in a locked box marked with the number of the cow. One day's ration of hay or green feed was also weighed into a numbered burlap sack which was sealed with a wire or metal band seal.

At feeding time during the day the record clerks unlocked the boxes and cut the seals, allowing the herdsmen to feed each cow as much of the weighed feed as he choose and then relocked and resealed the boxes and sacks. Feed left uneaten was not weighed back but left in the box or manger until disposed of either by the cow or the superintendent. Feed once mixed and charged to a cow was never credited afterwards.

At milking time the milk of each cow was weighed and sampled by the record clerks. The samples were taken with a small Scovill sampling tube and placed in quart milk bottles which were numbered and kept in a box which was either sealed or locked at all time when not in use.

The cows were milked three times each day, at 4:00 a. m., 11:30 a. m., and 6:00 p. m., a composite sample of the three milkings of each cow being placed in one sample bottle.

The day began at noon, so that after the mornings milking the bottles contained a sample from three milkings. The bottles containing the samples were taken to the laboratory where they were cooled to nearly 60 degrees F. by placing ice water in the boxes. Three men were there employed in testing the samples. The tests made were a determination of butter fat by the Babcock test and the solids not fat by means of the lactometer readings and the use of tables showing the percentages corresponding to these readings.

Each sample was tested by two men and their results compared. When differences of over 2 per cent occurred a third test was made; a difference of 1 per cent was not considered sufficient to make it necessary to make a third test but the higher result of the two was accepted.

The laboratory records as well as the daily weights of feed and milk made on blanks provided for the purpose and three

copies of each day's results were made by using manifold paper: these blanks were turned over to the office force where four clerks were employed daily. The daily record blanks were first inspected by the office clerks and their legibility and accuracy noted. The first sheet was kept in the office for making book records while the first carbon copy of the daily figures recording the cows in each herd were given to the superintendent of that herd, the second carbon copy of each daily record blank was posted near the office where it was available to anyone interested in it.

In the office the four record clerks copied the figures from the daily record blanks into permanent record books which showed the daily weights of feed given to each cow, the total weight of each feed given each cow to date, the daily and total to date weight of milk and the daily tests or per cent fat and solids not fat in each cow's milk. From these figures the daily and total weights of butter fat and solids not fat contained in the milk of each cow was calculated.

The Method of Feeding.

The cows of each breed were fed and cared for as directed by the representatives in charge of them. There was a uniform system of recording the results but each herd superintendent was given a free hand to feed his cows any kind of a ration of normal cattle feeds that he considered best adapted to the animals in his charge. All the cows were milked and fed three times each day and a statement about the daily routine in one stable will give a general idea of the method of feeding in all the barns.

At 8:00 a. m. the numbered and locked feed boxes were taken to the feed bins and the daily ration of grain for each cow was weighed into her box, which was then locked and placed on the floor in front of her stall.

Three sacks of hay were then weighed out for each cow, sealed and placed near her grain box; one feeding of silage was

then weighed into a feed box and to this silage in the box was added about one-third of the grain which had been previously placed in the locked box. This mixture of silage and grain was given to each cow immediately after the noon milking, which began at 11:30 and was finished about 1:00 p. m. By 1:30 p. m. the cows had eaten their grain and silage and they were given one of the three rations of hay, which had been previously weighed and sealed up in sacks. After feeding the hay the cows were all watered by carrying water to them in buckets.

From 2:00 to 5:00 p. m. was a period of rest for man and beast. At 5:00 p. m. a ration of silage was weighed out for each cow; to this was added a portion of the grain from each cow's locked box and this mixture was fed immediately after milking, which began at 6:00 p. m. After eating the grain and silage each cow was given one sack of hay and all were watered and left for the night at about 8:30 p. m.

In the morning the first thing done was to milk the cows, then feed silage, grain and hay as at previous feedings. The cows were watered again at about 8:30 a. m. It will be noticed that in this barn the cows were not feeding while they were being milked. In some of the other barns the cows were fed their grain ration just before milking to that they were eating while being milked.

There was quite a difference in the proportion of grain and roughage fed the cows in the different herds. Two herds were fed large quantities of green feed, such as green clover, green corn stalks, etc., with the grain, and other herds fed no green stuff but larger amounts of concentrated grain feed with silage and hay.

Some idea of the amount and variety of feed consumed daily by one cow in the different herds is shown by the following figures:

One Day's Ration of One Cow in Each Herd.

Feed.	Brown			
	Swiss. lbs.	Holstein. lbs.	Jersey. lbs.	Shorthorn lbs.
Alfalfa Hay	7	..	18	9
Cut Alfalfa Hay .....	..	15	6	..
Corn Silage .....	..	..	16	24
Green Cut Corn	40	15	..	..
Green Cow Peas .....	..	35	..	..
Wheat Bran .....	..	2	3	4
Linseed (Oil Meal) .....	..	..	2	2
Ground Oats .....	..	..	2.5	2
Hominy Feed	8	5	2.5	3
Gluten Feed .....	..	..	5	2
Corn Meal .....	..	..	1.5	..
Corn Hearts .....	..	..	2.5	2
Cottonseed Meal	1	1	..	4
Distillers' Grains .....	..	..	..	4
Union Grains	15	14	..	..
	—	—	—	—
Total	71	87	59	54
Including grain	25	22	19	21

Such reports as these are probably a revelation to many a man who has fed and milked cows for years. It is not customary to give more than five to ten pounds of grain per day to cows on the home farms, and the majority of them probably get less than five pounds. A capacity for assimilating large rations is necessary for producing large quantities of milk and butter, and most of these World's Fair cows were fed to their limit of endurance. A daily feeding per cow of near twenty pounds of grain, together with thirty to sixty pounds of green feed was not uncommon, although there were some variations in the amount during the 120 days of the test.

It will be noticed by these figures that two of the herds were fed only three and four kinds of grain per day while the other two were given seven and eight kinds of grain per cow per day. Small quantities of a large number of different kinds of feed seemed to be considered by some of the feeders as best adapted to the productions of milk, while others fed larger amounts of a few kinds.

Milk and Butter Produced by Each Herd in the 120 Days.

No. of Cows	Brown.	Holstein.	Jersey.	Short-
	Swiss.			horn.
	5	15	25	25
				in Class B
Milk, lbs.	26,508	96,169.9	124,524.2	103,800.5
Average Test	3.62	3.43	4.7	3.6
Butter Fat, lbs.	957.8	3,298.4	5,810.6	3,835.0
Butter, lbs.	1,120.5	3,817.0	6,844.9	....
Value of Butter at 25 cents.....	\$280.12	\$954.25	\$1,711.25	....
Solids not Fat in Milk, lbs.	2,351.7	7,630.9	10,902.4	8,938.9
Cost of Feed	\$164.47	\$515.72	\$720.40	\$664.0

Total Feed Consumed by Each Herd During the 130 Days.

No. of Cows	Brown.	Holstein.	Jersey.	Short-
	Swiss.			horn.
Feed.	5	15	25	29
Alfalfa Hay	2,091.8	11,386.4	44,971.1	32,997.0
Green Clover	3,298.0	10,255.0	.....	.....
Oats and Peas	4,989.4	17,725.0	.....	.....
Cut Green Corn	21,821.0	59,203.5	.....	.....
Bran	525.0	1,811.0	7,851.5	11,588.5
Oil Meal	275.6	541.0	5,384	4,737.0
Cotton seed Meal	518.45	695.5	1,706.0	4,602.0
Malt Sprouts	2,120.4	.....	.....	.....
Gluten Feed	2,416.3	966.3	12,591.8	9,666.0
Hominy Feed	4,544.7	3,207.7	1,928.5	7,583.5
Clover Hay	2,001.9	96.0	1,274.0	6,206.0
Union Grains	3,561.7	22,384.3	.....	.....
Ground Oats .....	.....	99.5	2,917.5	8,211.0
Corn Meal .....	.....	789.2	9,454.7	967.0
Corn Hearts .....	.....	4,483.1	4,167.0	6,901.5
Cut Alfalfa .....	.....	8,432.0	18,202.9	.....
Cow Peas .....	.....	1,706.0	.....	.....
Middlings	134.5	.....	.....	.....
Silage .....	.....	.....	36,782.5	51,587.0
Distillers Grains .....	.....	.....	2,688.7	6,221.0
Rolled Oats .....	.....	.....	202.0	.....

* One cow died at the end of the first period of sixty days.

Record of the Best, Poorest and Average Cow in Each Herd.
Produced Per Day.

Milk, lbs.	Brown Swiss.	Holstein	Jersey.	Short- horn.
Best Cow	(1) 51.0	(20) 67.5	(37) 48.4	(63) 43.4
Poorest Cow	(3) 38.5	(7) 47.1	(36) 38.9	(62) 21.4
Average Cow	44.2	53.4	41.5	34.6
Test of Milk.				
Best Cow	3.4	3.5	4.8	4.0
Poorest Cow	3.8	3.2	4.1	3.9
Average Cow	3.62	3.43	4.7	3.8
Butter Fat, lbs.				
Best Cow	1.748	2.355	2.334	1.737
Poorest Cow	1.477	1.507	1.615	0.843
Average Cow	1.596	1.832	1.936	1.277
Butter, lbs.				
Best Cow	2.042	2.753	2.750	2.057
Poorest Cow	1.731	1.756	1.898	0.988
Average Cow	1.870	2.012	2.28	1.495
Solids, not Fat, lbs.				
Best Cow	4.363	5.171	4.357	3.720
Poorest Cow	3.585	3.614	3.441	1.902
Average Cow	3.919	4.239	3.634	2.980
Feed Cost of Milk per Quart.*				
Best Cow	\$0.0109	\$0.0090	\$0.0110	\$0.0109
Poorest Cow	0.0133	0.0122	0.0130	0.0215
Average Cow	0.0124	0.0107	0.0116	0.0132
Feed Cost of Butter per Lb.				
Best Cow	\$0.136	\$0.110	\$0.097	\$0.117
Poorest Cow	0.155	0.164	0.132	0.234
Average Cow	0.147	0.135	0.105	0.153
No. of Cows in Herd	5	15	25	28

* Assuming two pounds to the quart.

Among the many valuable lessons taught by these exhaustive records is the great superiority in economical production of milk and butter by some cows over others which may require nearly the same feed and care. Many people fail to realize what a wonderful animal a cow is.

It is certainly amazing, if one stops to think of it, that a cow of average capacity secretes in her milk, one hundred and thirty-

six million fat globules per second, and that a cow gives 8,000 pounds of milk in 120 days, as did one of those in the St. Louis dairy tests, in manufacturing milk at the rate of nearly one and one-half quarts per hour, day and night.

Few investments are accumulating interest at the rate of eight cents per hour as was the case with this cow, if her milk is worth about five cents per quart.

Another feat accomplished by this cow was the production of 903 lbs. of milk solids in 120 days, or about seven and one-half pounds of solid, digestible food every twenty-four hours. Isn't that a wonderful performance and doesn't it increase your respect for a cow?

The cost of the feed of this cow was \$36.57, and if the 8,000 lbs. of milk made from it is worth five cents per quart its total value is \$200. This was produced in four months, or at the rate of \$50.00 per month. The feed cost of \$36.57 is equal to about \$9.00 per month, making a possible net return of nearly \$41.00 per month from this cow.

During the 120 days she gave over eight gallons of milk per day (67.5 lbs.) and this contained two and three-fourths pounds of butter, which is a wonderful record to be kept up for so long a time. The feed cost of this butter was eleven cents per pound; and of the milk, nine-tenths of a cent per quart.

This cow ate during the 120 days, 10,347 pounds of feed, of which about one-fourth (2,652 lbs.) was grain or concentrated, and in addition to her milk production, she gained 54 pounds in live weight.

Another wonderful cow in the World's Fair tests gave 5,800 pounds of milk during the 120 days, and it contained within one-third of a pound as much butter as the first cow mentioned. She ate 6,543 pounds of feed, of which about one-third (2,100 lbs.) was grain. The feed cost of the butter produced by this cow was nine and four-tenths cents per pound, and that of her milk was one and one-tenth cents per quart. She made practically the same amount of butter as the first cow, but ate

about four dollars worth less feed. She gained 77 pounds in live weight.

Dairymen of this and of every other country are greatly indebted to the management of this World's Fair for the accumulation of so much valuable data. No college experiment station, state or government, has ever carried on and probably never will conduct such an experiment as this has been. The cows represented a great variety of animals, such as can only be gotten together by an enterprising organization like a World's Fair management. The men in charge of the cows in each herd were feeders and cow-owners of long experience, and the weights and records have been kept with scientific accuracy.

The careful watch that was kept over the feeding of the cows, and the accurate weighing of everything given to and taken from them, make the records extremely valuable. There was no guesswork in any of the weights, and the entry of every figure was verified within twenty-four hours of the time it was recorded.

To dairymen in general the most important question to be studied is the economical production of milk. Can the milk production of a certain herd be improved by the changes in feed suggested by these records, and will it not be profitable to make a change in the herd and replace some cows with better ones?

There is no fiction in these World's Fair records, and they should stimulate many thousands of dairymen to do better. The standard has been placed many points higher than it was one year ago, and it is to be hoped that these records will not lack for company as time passes, but that within a few years a goodly number of cows will be found in the new class that has been established by the cows at St. Louis.

The President:—We will hear from our old friend, Jules Lombard. For the last thirty or forty years there has not been a dairy convention complete without our old friend to sing for us.

Vocal solo, "I Fear No Foe," by Mr. Jules Lombard, of Omaha. Responded to an encore, "Maggie," by request.

The President:—I wish to say that tomorrow night we shall hear Mr. Lumbard again, and I hope Mr. Bagley. Such things as you have heard tonight and this illustrated lecture is worth coming miles to hear.

We had on our program tonight that we should hear from Professor Hart, of our own university, but his subject is a little more fit for the buttermakers who will be here tomorrow, and so Professor Smith has kindly consented to say a few words to us with pictures. Before his address, however, Dr. Sowle, of this city, will favor us with a reading.

Reading by Dr. Sowle, of Rockford, "Bill's Letter." Responded to encores by "Love Story by a Foolish Boy," and "A Boy's First Piece."

The President:—You will not forget tomorrow morning, coming over here, to visit Machinery Hall, right opposite the Nelson House. There is a fine display there and I would like to have you all see it, but promptly at 9:30 o'clock I would like to see you here, because we will hear Professor Hart's address in the morning.

As you will see by the samples we have given you today, we are giving you the best speakers on dairying that this country or any other country affords, and I hope to see every chair in this hall filled tomorrow morning.

We will now listen to the Temple Quartette.

Music by the Temple Quartette, of Rockford.

The President:—We will now stand adjourned until 9:30 o'clock tomorrow morning.

Wednesday Morning, Jan. 11, 1905

Meeting called to order by President Newman.

The President:—We will first take up the address by Professor Hart, which was left out last night. He will tell us how the college of agriculture can help the butter and cheese-maker. I know there are quite a few buttermakers and cheese-makers in the audience this morning, and they will find this subject very interesting. I would say before the gentleman commences, he is one of our good men, who is going to leave us, going down to Brazil.

PROFESSOR HART, URBANA.

Mr. Chairman, Ladies and Gentlemen:

I am much pleased to be able to attend this convention of the Illinois Dairymen's Association. It is the second convention of this kind in this state that I have attended and it may be the last, for as your President has already announced, I have been tempted by the offer of a higher salary and a wider field of work to go to Brazil, and I have yielded to that temptation, just as some of you might do under like conditions. As far as my work here is concerned, I can say that I have been well treated in every respect and that I leave with great regrets. In no way has my work been limited, curtailed, interfered with or impaired, and I have had the utmost liberty to work inside the lines laid out for me when I started in this work in connection with the State University and experiment station.

This question of education is one that is constantly before the people who are beginning to look at it in a different way than they did only a few years ago. Our buttermakers are waking up to the fact that a special training is necessary to best fit them for their work. We find them flocking into the agricultural colleges taking special courses. They are endeavoring to put themselves abreast of the latest thought to get the benefit of the best experience. Dairymen, as a class, are taking more interest in better cows, more rational feeding, modern methods and improved machinery, principally because they add to their profits, and this awakening is largely due to the influence of the State University.

We have in Illinois one of the best educational systems of any state or of any country. We have first the graded, then the high schools, and, crowning all, the University of Illinois at Urbana. The university is divided into a number of different colleges and schools, and one of the foremost, and the one in which we are most interested, is the agricultural college, which has nearly four hundred students. About 74 of these are taking dairy husbandry, some taking several classes on the subject, because our work there is divided into courses or classes. For instance, there is a course in dairy cattle, in which the students learn about the different breeds, their characteristics, their strong points, and the handling of these breeds. There are courses in testing milk, and other dairy products in buttermaking, in cheesemaking, in advanced work in factory management, and a course pertaining to the handling of milk for the city trade, and so on, as we endeavor to cover the field of dairying from the production to the final disposal of the milk, whether it is used in the retail trade or manufactured into butter or cheese.

Now any student or any citizen of Illinois can take advantage of these facilities; he can acquire a university education if he wants to do it. If there is a will to obtain a university education he will find the way. A few weeks ago I was talking with a student in his senior year, who wanted to go to one of the other universities and conduct a class. He told me he started

life in a coal mine, with a very limited common school education, having been taken from school when only ten years old to work in a coal mine. After a while he learned the carpenter trade and worked some years at that trade in Chicago, but he was not satisfied with that, he wanted further advantages. He felt that his education was limited, and he wanted to take a university course. You might have thought he would have taken some technical course, would have gone into the engineering course; because he was working at carpentering that he would take a course in some way identified with his trade. But he had a fondness for agriculture, and went into the Agricultural College. Because of his lack of early opportunities he went into the preparatory classes, and the man was then married, with a family. He opened a little grocery in the city and with the profits of that paid his expenses, maintained his family and gave himself an education. A man handicapped as that man was, with a young family and without any advantages in the way of education in early life, has obtained a university education and will graduate in June. Any boy or girl in the state of Illinois can obtain a university education if he wants to. The fees are low, cost of living is not high, and the way is not hard for those who really desire a university education.

Some students do not take four years course in four years; they have to work to get money to pay their expenses as they go along. It may take six, seven or eight years to graduate, but finally they get through. So, I say, a buttermaker, or dairyman, or anybody, can if he wishes, obtain a university education.

I might say something about our equipment at the Agricultural College. In the first place I want to speak about the experiment station or college herd of dairy cattle. We have in dairy cattle there, as you learned last night, a very fine herd of Holsteins. We shall hear something more about this. Then we have representatives of the Brown Swiss, the Guernsey, Jersey, Ayrshire and Short Horns, so the students can see and learn to know and may compare these different breeds.

The students handle the cattle in the stock judging pavilion.

They judge and compare records and learn something about the merits of the different breeds of dairy cattle. The records of these cattle are kept, so they can use these records, having access to them to find out if their judgment on the cattle will correspond with the records.

The milk from this dairy is sold at retail, not as a matter of profit (although the milk sells at the highest price of any milk in the city) but to illustrate this work, so the students interested in the sanitary production of milk will have information along this line, that they may see and know the requirements for the production of sanitary milk.

Our manufacturing plant there is conducted as a cheese factory and creamery. We have, as I said, the surplus university milk, and also have about thirty-five patrons sending us milk and cream. A little over a year ago we commenced to develop this side of the dairy and found that it was difficult to induce patrons to send us their milk or cream. One of these creamery promoters had come into that locality and established a creamery some years ago, and it had not been a success. I believe butter was made only once. The people had not the cows at that time and were not prepared for dairying, so we on account of their previous experience found it hard work to get them to send us their milk. We induced two or three patrons to start at first, and finally others came in until we now have about thirty-five patrons. About twenty-five of these patrons send us cream; they live at too great a distance to send us milk, and most of them have put in hand separators since we started about fifteen months ago. A few cans of cream are shipped in, but we come in contact with most of the patrons daily and can influence them to bring us the kind of milk and cream we want. We have eight or ten patrons living near the university that bring us in milk and our practice illustrates both the whole milk and gathered cream methods of buttermaking.

Our method has been to pasteurize the cream from the farmers as well as the cream from our own separation and from our own dairy. That gives us an opportunity to make a better

quality of butter than if we churned the raw cream. I did not come here, however, to speak of the merits of pasteurization over churning raw cream, because I believe most dairymen are already convinced that that is the better creamery method. We pasteurize the cream and sell our butter mostly in the local markets. We make as high as 300 pounds some days and now average about 150 pounds a day.

We are well equipped for this work, having all the necessary appliances for making butter after the most approved methods, so that creamery men coming to us will find our equipment up to date and of a greater variety than in their own creameries. They can see and handle these different machines and practice various methods of handling the milk products. We sometimes churn the raw cream and compare the butter with the butter made from pasteurized cream; we sometimes churn the butter from sweet cream, pasteurized sweet cream and raw sweet cream. We do this so as to give students an opportunity to compare these methods, a better opportunity than they would have in handling the cream in their own creameries, because they cannot afford to experiment. They must every day make butter in the best possible manner so as to turn out the best goods, while we with our variety of equipment can afford to experiment, because these experiments have an educational value. A good many of our experiments are designed to illustrate certain points and there is nothing carried on there that is not on practical lines.

We have a refrigerating plant, so we can see the effects of storage at different temperatures. We also make cheese. During this semester the class in cheesemaking will be given instructions in cheddar, Swiss and other varieties made in this country. We have had some very good brick cheese, and some of you have seen our cheese on exhibition at the World's Fair at St. Louis.

Then as regards the staff. As you know, Professor Frazer is at the head of the department of dairy husbandry, and has charge of all the experiment work, field work and college work

in dairying. The staff in connection with the university is made up of Mr. Hayden, who has charge of the work of testing milk, a very important department. His work is more in line of instruction and testing the different cows of the herd. Mr. Hopper is engaged in the work of feeding and breeding dairy cattle, assisting Prof. Frazer in this work, and my own work is dairy manufacture, that is making the butter and cheese. Then we have men engaged in field work. Mr. Lee at present is the only man devoting his whole time to this field work. We have had other men in the field. Just now things are quiet in the creamery line, so there is not the same necessity of having men in the creameries as there is in the spring and summer when a good deal more butter is being made. We expect to do more work along this line, because it is a line where we can be immediately helpful to the buttermaker.

This field work is designed to do this—help the men in their factories; help them make a better quality of butter, make it more economically, show them how to get more profits out of the business, so in that way our work reaches dairymen as a whole, even those that are producing milk for direct consumption in the city trade. If we manufacture a large quantity of milk into butter and cheese outside of Chicago it will help dairymen sending milk there, because it will tend to lessen the quantity of milk sent into the city, and if the supply is not equal to the demand the prices will increase.

Then again, our field men go about among the creameries and visit especially the creameries that are in need of help and stay there the longest, trying to make a higher grade of butter all through the creameries of Illinois. Mr. Hopper is engaged in this work in Southern Illinois much of his time. The business is not so firmly established as in the northern part of the state and they have difficulties down there that we do not have to contend with, because the people there do not pay as much attention to dairying. However, they are improving in that respect and you would be surprised to see the advance dairying has made in Southern Illinois, the number of new creameries, and the way

business is extending. Their conditions are quite different: they have cheaper lands and may be able to produce milk cheaper than you can on your high priced land when they know their business better.

In our work at the university we can help the buttermaker through correspondence. Many buttermakers write to us for advice: they write for men to go out to help them in their creameries and, as I stated before, they also write for advice about machinery, about methods, about improvements, about conditions of their factories, about changes in equipment, and so on, so we are able to advise with them and help them along these lines. I may add that these questions that come up on different points of dairying, no matter to whom they are addressed, are handed on to the man whose special department it is. For instance, a question about feeding dairy cattle Professor Frazer answers—the rations, the kind of feed that is economical to buy to supplement the feed the farmer already has; a question regarding butter and cheese is turned over to me; a question regarding testing of milk to Mr. Hayden, who takes charge of that department. We have the work divided up in this way and try to give the farmers and dairymen the benefit of our experience along these lines. Any question we cannot answer (and sometimes we cannot answer a question satisfactorily) we frankly tell the man that it is beyond our knowledge and he can work the question out for himself, and sometimes some of these questions suggest different lines of experimental work that we are able to follow and give information that will be of general interest. Any question of general information we try to get the information among a larger class than we could reach by correspondence alone.

Then we have applications from creameries for butter-makers, also applications from men for positions. We try to put these parties into correspondence as much as possible so we can help both classes. We often have applications for men to take charge of herds and sometimes supply men because the demand for men in these positions, I must say, is greater than the

supply. Through farmers' institutes and through meetings like this which we attend throughout the state, we are able to do some good. Buttermakers attending these meetings take part in the discussions and get information in this way.

Our field men are doing another line of work; they are testing herds. You know Mr. Glover has been doing this work for some years in northern Illinois; Mr. Hopper has recently commenced testing herds in Southern Illinois, so we get a good deal of information valuable to the dairymen all over the country, and valuable especially to the men where these tests are being carried on. They visit those farmers regularly, have the milk weighed and keep a record of the weights, and they are able to suggest something in regard to rations so that cows can be fed more economically and produce milk at less cost, and they are able to point out the cows that are not paying for their keep. These results are applied by dairymen living in that neighborhood, so we are gradually raising the standard of production so that our cows, instead of making about 151½ pounds of butter will average a great deal more.

You heard last night of these large records, in some cases running up to six and seven hundred pounds. It is not possible for all dairymen to attain this, but they should have some result to aim at and try to bring their cows up to 300 pounds of butter a year.

We have shown at the university that two cows standing side by side, fed on exactly the same rations, in the case of one cow the butter would cost three times as much as the other. You see there is a great field for investigation along this line and a great field for dairymen to improve their cattle along the lines of economical production of milk and butter.

Another way in which we reach the dairymen and butter and cheesemakers is our annual conventions. We have a stock-breeders, corn growers', and dairymen's convention held at the university every year. The dairymen's part has not been connected with the convention as long as the others but, owing to the necessity for instruction in these lines and the demand for

it, this work is being undertaken. We have at that time at the university a number of men of national reputation along the lines of agriculture, and we arrange our classes so the students in dairying attending the two weeks' convention can hear those men along the line of general work in agriculture on some special line more or less remotely connected with dairying. I think our buttermakers largely are not taking advantage of the instructions along the line of general agriculture; they are not making that progress in agricultural science they should. They confine their attention largely to this one narrow groove. It's a good thing to be a good buttermaker, but a man who confines his attention exclusively to that thing gets narrow; he cannot have that same interest in his patrons that he could if he had more information and could give them advice about the sanitary production of milk, about the economical production of milk, about growing the crops, filling the silos, and all the things of general interest to dairy farmers. If he knows something about these topics his field of usefulness is much broader and he can keep his patrons, and can get them to supply the kind of milk he wants, without such hard work than if he were simply a buttermaker and confined his work entirely to the factory.

We want to make these two weeks' conventions successful. We have programs here on this desk and I should be glad to have you take one. We take up dairy work in the broadest sense so that if a dairyman comes to the university who is not so much interested in the manufacturing of the milk into butter as in the production of the milk, he can devote his time to the questions relating to the production of milk; another man interested in manufacturing can devote his attention to this line of work, so we try to meet requirements of all, whether producers or manufacturers of dairy products.

The college of agriculture can be helpful to the dairymen through its regular college work. The most of this work I have spoken of is special, but then we have the regular four years' college course leading to a degree. We have students entering the university with the idea of taking this course and graduating

from the college. I have stated that it is within the ability of any young man to take a course at the agricultural college and get a degree from the university if he wanted to do it, and it would pay him to do that from the very lowest standpoint, the standpoint of dollars and cents. Anybody that has gone through the university and taken the agricultural course would bear me out in this—it pays to do it from the standpoint of dollars and cents. But beyond all this and of far greater value it will pay him through the wider outlook it will give him on life and his duties as a citizen, and it will make him a far better citizen.

The old idea of the agricultural college, and the idea some of us had of it several years ago, was a place to learn farming. The students were taught how to milk and churn, how to sow and reap and bind, plow and harrow and prune and graft, and feed and all of these things were taught with a very little of the science upon which these various operations were founded. But all this is now changed, the practical work illustrates the work done in the class room, so that a student is instructed along the lines where he will get the most good from the time he spends in the university. A great many of our students are special students, that is, they cannot come up to university requirements for entrance into the regular college work, but they may take any class they are prepared to take. Any student can go to the university, enter any class he is prepared to enter and stay any length of time, so we have not seen much necessity of conducting the short courses that are so popular in some institutions. If a man goes to college to take the short course he has an idea that the whole subject is boiled down for him and that he will get the benefit of four years' study in a twelve weeks' course. Some work holidays and Sundays and get mental dyspepsia trying to accomplish so much in a twelve weeks' course.

Occasionally a student attempts a study he is not prepared for, but he soon adjusts himself to his surroundings. We are trying to educate students along practical lines, and the demand for their services is greater than the supply. The only reason many of them have not entered into dairy work is they can make

more money in some other line. A man who has to work in a factory or creamery ought to have a technical education; he should not drift into this business because he has to, but he should elect sometime before going into the factory, he should say, "I want to be a buttermaker. I have an ambition to make the finest quality of butter and have charge of a good creamery." Then if he wants to prepare himself for this he can do so best at the university. Having graduated from a high school and being able to enter college and the regular college classes, he takes the four years' university course. He has to take chemistry and bacteriology, because on these sciences agricultural production and dairy practices are largely based, so he gets a thorough grounding on these subjects; he gets some geology and biology, veterinary science, agronomy, farm machinery. All these subjects are required; other subjects he can elect. He can take either horticulture, if he has a penchant for flowers, fruit or vegetable growing, or he can elect along some line of animal husbandry, while the man who wants to follow dairying as an occupation will register for the different dairy courses. A buttermaker with a university training will be better able to cope with difficulties which arise in different creameries and take hold of the situation with better judgment than a man with no such training, and such men are hard to find to act as instructors in our creameries.

A university course does not necessarily equip a man to take charge of a creamery by any means, but during the four years' training of this university course he has the summers to himself, the time when creamery matters are most active. He has that time to spend in creamery work, and I would advise him to tie himself to no one creamery, but would advise a man who wants to make the most of his opportunities to take advantage of the practical instruction given in different creameries. The question of wages should not be a question of paramount importance. He ought to get an all round education, in a whole milk creamery one year, cream gathering another, possibly a sanitary milk plant another, then in a cheese factory, and in that

way learn some of the requirements involved in handling milk, butter and cheese. Still he would not be equipped to take charge of a creamery. I would not like to turn over a creamery, if I was the manager, to a man with just that training. I would want him to put in two short seasons as assistant or helper; then I say a man equipped in that way ought to be able to run a creamery successfully; should be able to build up a business; should be able after some experience to take charge of a large business, and I know there are opportunities for men equipped along this line.

I have given you an idea, then, of the work conducted by the university along different lines. I do not think it would be wise for the staff connected with the university to be bottled up. It will do good for them to get around among the dairymen and find out what they want to know. They should investigate more along this line. I regret that in the brief time I have been connected with the university I have done very little experimental work to report upon. I have not been there long enough. We have been trying to develop along other lines; trying to build up a good patronage so it would give us an opportunity to have milk and cream for the carrying on of this experimental work.

I have also been doing work in the manufacture of ice cream, another point in which all dairymen should be interested, because it is going to be a business that can be conducted in the creamery with cream supplied by the farmers, and is a business that is growing by leaps and bounds. You would be surprised to know the magnitude of the ice cream industry in this country and the profits made out of this business, and it is a promising line for experimental work. We have been doing something along this line and we have in preparation a circular describing this work.

I have tried to indicate some of the lines in which the university can be helpful and has been helpful to the buttermaker and have tried to show what a buttermaker should know to make good quality of butter, and that is all they care to do. It is a laudable ambition, but there is something better than that

a man can aim at; and when he has achieved that there is something further to aim at. We want to make ourselves just as useful as we can in the community in which we live and to the country at large, and we can do that by educating ourselves. I do not believe in education from a selfish motive but because a man can make himself more useful in the community. In that way he will find better satisfaction in his work, and he should be a leader in the community in which he lives; he should take an interest in all public questions, in the farmers' clubs; should visit his patrons in their homes and see conditions under which the milk is produced; get his patrons into competition to see who can produce the finest quality of milk and produce it most economically. These are the great needs in our creameries. Every buttermaker will bear me out in this, and if he simply takes milk or rejects it because it is not good it will be of little benefit to his patrons. He must take an interest in all the conditions bearing on the production and handling of milk, and in this way can do some good that will result in his own benefit.

I thank you very much for the attention you have given to these remarks, and for the many kindnesses I have received at the hands of the dairymen of this great dairy state of Illinois. I repeat I should like to continue to work for the dairy interests of Illinois, as all the signs point to great progress in the near future, and my wish is that one and all of you may contribute to this advancement and share in the prosperity that is bound to attend it.

DISCUSSION.

President:—I would like to know how many cows you have at the station, of all kinds.

Mr. Hrt:—Mr. Hayden or Mr. Hopper can tell that.

A:—About forty.

Q:—How many milked?

A:—About thirty-five.

The President:—You say you use the surplus milk for the benefit of the scholars in butter and cheese making. Do you have enough surplus milk to do what you would like to with it?

Mr. Hart:—No, but in addition to the milk we get from patrons we have enough, and the cream that is brought in as well gives us plenty of milk and cream.

Mr. Gurler:—How do you buy that milk?

Mr. Hart:—We buy it on the basis of butter fat. We have to pay high prices for it; last year paid 40c, and in the winter we had to offer as high as 50c. We only had four or five patrons through the season and paid 50c for butter fat. We are now paying 55c per cwt. for butter fat, but the returns from the products are allowing us to pay this price because we manufacture ice cream and there is money in it, and we are selling our butter at 30c retail. We sell to the merchants and they retail for 35c, so we have the overrun and pay for the milk out of the proceeds of the butter and other manufactured goods.

Mr. Gurler:—I do not wish to criticise anything; they are doing as well as they can, but it seems to me deplorable that those dairymen in the vicinity cannot be made to see that there is a profit to them in producing milk without being guaranteed such a price for butter fat.

The President:—What price, 35c?

Mr. Gurler:—I understand this price was made for the season.

Mr. Hart:—Oh no; it runs as low as 22c.

Mr. Gurler:—How do you regulate the price?

Mr. Hart:—We have a sliding scale, based on our requirements for milk and the probable price of butter.

Mr. Gurler:—The idea is paying what you are practically compelled to pay to get goods to do the business with?

Mr. Hart:—That is it. We get it as cheaply as we can.

Mr. Gurler:—Are you doing the best you can?

Mr. Hart:—As the dairy situation improves and we get more milk we expect to pay less.

Mr. Gurler:—It seems there ought to be some practical way of the university doing some work to demonstrate to those dairymen that they can make a nice profit at less price, which would induce them to undertake raising milk. Records are available, and why not try to urge dairymen through meetings; give them all our bulletins, try to post them along lines that will be beneficial to themselves, and lines followed by men who are taking more interest in dairying.

Mr. Hart:—You see you have to contend with a considerable university population there. Four thousand students during the winter, and there is a good deal of milk consumed right there, so we cannot get milk from the immediate vicinity of the institution. If we were located in the country where there was not so much of a demand we could get milk cheaper, but the cities of Champaign and Urbana use a great deal too.

Mr. Gurler:—To show you a little more plainly what I mean, as much as fifteen years ago I tried, as a representative of the dairy committee, to get a farm of land, a four hundred acre farm or a portion, as a dairy farm and make a practical demonstration of the cost of producing milk and butter; but I failed utterly at that time to have any effect on the dairymen.

Mr. Hart:—That is about the case down there. The land sells from \$150 to as high as \$200 an acre for its agricultural value, and they say they do not have to milk cows; they can sell corn. Sometimes they grow a little clover and get some nutrient in that way, as the land has been excessively rich; but they will have to come to it in a short time, and they will find that they must keep cows in order to keep up the fertility of the land. I have been on farms of over 160 acres where they did not have a cow, just lived on what they could buy and sold corn to buy it with. Few of them are interested in beef cattle.

Mr. Gurler:—Some of them are in trouble along that line. I was talking with some of the intelligent farmers at a meeting, and these farmers had been growing corn after corn the last few years, and they have had trouble with the corn. This last summer the worms had commenced in the root and ate clear

up and the corn fell off. One man said they had not had a good yield of corn in the central part of the state this year, as we had in the north, and the reason was because they followed corn after corn and had not followed the simple method of rotation.

Mrs. Purviance:—I wish to say that in Logan county, just adjoining Clinton, the work that has been done there has been much appreciated, and, as Mr. Hart says, the land is very high priced and farmers have been farming it in agriculture. They have been putting in corn, wheat, etc., but we find that our ground is running out and we find that by taking up dairy work that it is increasing our production, and owing to this I notice a great improvement in our county in the last eight years. We have been in this dairy work about eight years and there is a great improvement and a great deal of interest down there. We have about eleven or twelve dairymen in Lincoln and the interest is growing very much, and I think this is due to the instructions we receive each year from the university. This year we had Mr. Hart with us, who gave demonstrations in our butter work and it was one of the best things we ever had. We wish to increase this interest and hereafter we are going to try to have this work taken up in every county by the farmers' institute. We believe by doing that we will create greater interest, encourage farmers in this work and help them to keep up fertility as well. That is the only way we can keep it up.

We are in the central part where we have no creameries; we have no way of selling our cream unless we make it into butter. We are somewhat handicapped in this respect, but we are working hard and I think the interest is growing and I believe we are going to make a success of it. The university is standing back of us and I think if the farmers will only look at this in the light they are now taking hold of it, we are going to make it a great success.

Mr. Gurler:—This makes me think of a little incident in our town. One of our bankers owns several farms. As I was going along the street he called me in and said, "I want to talk

about fertility." One of his farms was rented and had been cropped until it had gone down to a point where he could not get his rent, and to make him see it from his own standpoint I said to him, "You can no more keep on cropping your land than you can continue to check out of your bank without depositing."

Mr. Hayden:—The average yield of corn is five or six bushels per acre less than in the dairy section of Illinois.

Mr. Gurler:—That has not been so for a term of years. Is that a fact as a rule?

Mr. Hayden:—Yes, in the corn belt about 35 bushels per acre.

Mr. Gurler:—I thought it was only the last year or two; I did not suppose that conditions had existed for a number of years.

The President:—There is no question that the best work done in the university the last ten years is Dr. Hopkins' work. He will give you advice and you will find that the root of it all is that you must adopt a method of agriculture that will keep up your land, and hence the dairy department, it seems to me, is the strongest and best side of agriculture.

Mrs. Purviance:—They are mostly renters on the farms in our country; they have been running for a number of years and it is almost impossible to get a crop that will make more than 25 bushels. We have been on our farm for fifteen years, and last year we had 25 bushels of corn to the acre, that is the average. This year we had a little over fifty bushels to the acre; we had over 250 acres, and that was better than anyone around, and we owe it all to the dairy.

Prof. Smith:—The Michigan people have been looking to Illinois as a perfect paradise, but if these things are done in the green tree what can you expect in the dry? If Illinois, with all the advantages of having the best blood of the East poured into it and the best land that the sun shines upon, does things like this, what do you expect of us ordinary mortals up in Michigan, where we have everything to contend with? I want you to

remember these things—that you are not going to have these conditions exclusively very long. I have been down through Texas and Colorado, and they are not going to sell you cotton-seed meal to make into butter long. The men are getting awakened down there and when they put their hands to the plow your northern men gone down there to take hold of the work are going to beat you every time.

The President:—We will close this subject by saying to our honored brother from Michigan that while he is plowing in Michigan we will be harrowing in Illinois. (Laughter.)

The next subject on our program this morning is an address by Professor Glover, formerly one of our field men in the state, but who is now associated with Hoard's Dairyman of Wisconsin. While we were sorry to lose him, we are pleased to know we have his services and get the best results from them not only for ourselves but for our friends.

JUDGING DAIRY CATTLE.

Professor Glover.

In the beginning the brute mother simply supplied her young with milk, and this being accomplished her maternal functions ceased. Man had not taken possession of her, and she only yielded enough nourishment to feed her young. In the hundreds of years that have gone there have been many changes in the relation of man to the animal creation. The wild mother, who, in centuries past, was able to protect and support her progeny, has, through man, become entirely dependent upon him for her existence. By the hand of man she has developed to

an individual that not only produces enough milk to rear her young, but also provides bountifully to the support of the human family. In this wonderful transformation, from the supporting of one to the supplying of many, her form has undergone a perceptible change, and her increased milk flow is not due entirely to her comparatively quiet life and to a better system of feeding. If this were all the beef cow would produce milk and butter in quantities equal to that of the dairy animal. It is a well known fact that, many of the so-called highly developed beef animals do not give enough milk to raise properly their young, yet, they are given not only all the comforts that it is possible for man to give to any beast, but they are given the best ration that can be compounded by the most skillful feeder.

It would seem, then, that the milk giving proclivities of the dairy cow must be due to something more than simply feed and good care. There is still back of these two important factors a great fundamental truth which seems to largely determine the usefulness of all animals, and that is, selection for a particular thing. Darwin says: "Changed habit produces an inherited effect, as in the period of the flowering plants, when transported from one climate to another. With animals the increased use or disuse of parts has had a more marked influence; thus I find in the domestic duck, that the bones of the wing weigh less and the bones of the leg more, in proportion to the whole skeleton, than do the same bones in the wild duck; and this change may be safely attributed to the domestic duck flying much less and walking more than the wild parents. The great and inherited development of the udders in cows and goats in countries where they are habitually milked, in comparison with these organs in other countries where they are not milked, is probably another instance of the effects of use." From this it is plain that use and selection are important factors in the development of animal life. In the beginning there was undoubtedly an unconscious selection of animals and not with any preconceived notion of type. The farmer unconsciously, perhaps, selected calves from mothers who he thought were the best milkers, thereby propagating the

best. No man had any wish or expectation of permanently altering the form of the breed. Nevertheless, we may infer that this process continued during centuries would improve and modify the conformation of the animal in the same way as Bates, Collins, etc., by this very same process, only carried on more methodically, did greatly modify even during their life times, the forms and qualities of their cattle. The selection for centuries of the best milking animals, and the constant demand of man for more milk has now unquestionably established a definite type known to the milking strain of cattle. Whether the selections or the standards used are the best is not necessary to discuss. It is sufficient to say that through years of constant milking the domesticated animal produces considerably more milk than her wild parents, and she has a very much modified form.

During all this time the animal has been called upon to do much harder work than her ancestors, consequently through use she has developed certain organs that might be called abnormally large, and even artificial, while on the other hand, through disuse certain portions of her body have become atrophied. The wasting away of certain portions has caused the parts which are used by her in the manufacture of milk, to stand clearly marked and well defined from her sister whose whole function is to make beef. The dairy cow's special function has developed four main centers which are actively engaged when the animal is producing milk. The centers are namely: The digestive organs, the circulatory system, the nervous system, and the milk secreting system.

Digestive Organs.

The digestive organs, on account of her special work, have become exceptionally large and they are capable of handling large quantities of food. So efficient is the digestive tract in some animals that a single cow has been able to consume, digest and assimilate enough material to produce in one year nearly twenty times her own weight in milk. As a rule the best cows show

externally their feeding capacity by the depth, width and length of body. A wide muzzle which shows a large mouth, is also an indication of large digestive organs. Perhaps a very brief statement in regard to the food until it is absorbed by the blood will not be out of place. The food is acted upon by the saliva of the mouth and then passes from the cow's mouth into the gullet, and from there into the paunch or first stomach. It remains in the paunch for a short time when it is remasticated and then passes to the second and third stomachs and finally lodges in the fourth, where it is acted upon by the gastric juice. The food remains a short time in the fourth stomach, then it passes out into the small intestines where the bile of the liver and pancreatic juice are poured out upon it. On account of these actions the soluble nitrogenous matter, carbohydrates and salts are now ready to be absorbed by the blood and to be carried to the different parts of the body to be made use of.

In brief, the food is absorbed in the intestines by small veins called capillaries, which convey it to the portal vein, which carries the blood to the liver and then goes to the right side of the heart. The emulsified fats reach the same place but through a slightly different course. All of the digestible materials of the food are now in the blood and have reached the right side of the heart. From here the blood goes to the lungs to be purified and then returns to the left side of the heart to be forced to the different parts of the body. There are numerous arteries leading to the different portions of the body, but the blood that reaches the mammary glands is the part that most concerns us. The aorta runs along under the spinal column and after branching several times finally gives off the anterior and the posterior abdominal arteries which supply the udder with their numerous branches. It then passes through the udder and is recollected in milk veins which run along the belly of the animal and finally direct to the heart again.

So far as the digestive organs have performed the work of getting the food constituents made into blood. The heart is now propelling it to the lungs to be purified and to all portions of

the body, so that every part may be properly nourished according to its needs. The part that makes the greatest demand will be the one that is best supplied. The udder if rightly developed will demand a large share and the portion that it receives will be indicated by the size of the escutcheon, the milk veins, and milk wells.

In view of the important part that the digestive organs take there is nothing wonderful that they should be large and spacious for in a heavy milking cow they are called upon to prepare an abundance of material from which the milk is made.

The Nervous System.

The nervous system of the dairy cow is of highest importance for good work. It is so often supposed that an animal with a well developed nervous system is irritable and excitable. A high nervous temperament means an animal that is full of nerves and well developed. A nerve-full system would be a better term than nervous system, which to many is very misleading. The wonderful development of nerve energy permits such an animal to do work far beyond what would be expected of it from its physical appearance. In cattle we may divide them into two classes, the nervous and the lymphatic temperaments. The nervous temperament will be represented by the dairy cow and the lymphatic temperament by the beef animal. In these highly developed nervous animals they have not the tendency to lay on fat like animals possessing the lymphatic temperament which is sluggish in disposition. Craig says: "The animal of nervous temperament is one that is sensitive and active, giving all regions that greatest vitality and all the organs the greatest productive powers. The well developed nervous system is indicated through the head, which should have a wide forehead which shows intelligence and a well developed brain. The eye should be prominent and full, not 'wild eyed,' but clear, bright and mild. The nerve force is also indicated by the spinal column, croup and tail. The spinal column should

be large and vertebrae far apart and prominent, for this column is the trunk through which the nerves are distributed to the many organs of the body. The large croup or tail head, are also indications of a well developed spinal cord.

Milk Secreting and Circulatory System.

The milk secreting system, which is shown by the udder, milk veins, and wells, is of no less importance because it is mentioned last. The udder is the only organ in the body from which milk is elaborated and it is this complicated organ that is capable of secreting milk from the blood. The udder should not be too large, but in proportion to the cow's ability to fill it. Perhaps, the large udder is not always a measure of productiveness, yet, I consider it a very important part of the dairy cow. It is not the large, pendulent and fleshy udder that counts, but the one with hind quarters full and square, and extending high between the hind legs. The front quarters full and square and extending well forward. The udder should be plastic, pliable and lay in folds when it is empty. The teats should be large and evenly placed. The teats in themselves have nothing to do with increasing the flow of milk, but the average person will do cleaner and better milking with the cow that has good sized teats. This is a factor not to be ignored when the dairymen have to depend largely on hired help.

The milk veins should be large and branching, for they indicate the supply of blood to the udder, especially when the cow is fresh. It is probably better to depend more upon the number and size of milk wells than upon the veins which are sometimes misleading in size on account of the thickening of the walls of the vein.

On account of these four active centers the domestic animal has changed her form and she tends to become wedge shape and spare and angular. Perhaps it is not necessary for a dairy cow to become this shape, but the majority of them are, and it is plain that this form is the result of the kind of labor that

the dairy animal performs. It was Professor Haecker who brought before the public the relation of type to performance and proved without doubt that the spare and angular cow is superior to the fleshy and to the one lacking in depth of body. Notwithstanding the immense amount of experimenting that has been done to prove this, it too often happens, that in the showing the points of fancy and form are placed ahead of utility. In the three years that I have been doing field work 644 cows have a complete yearly record, of which 422 have records for one year, 178 for two years, and 44 for three years, with all this together with what I have observed visiting the best herds in Northern Illinois, I have not changed materially my idea in regard to dairy form. But on the other hand it has been confirmed, notwithstanding, that I have records of seemingly high-class dairy cows that have been poor producers and cows not of the dairy type with high records. The rank and file, however, of cows that have proven themselves good performers at the pail, have also conformed very closely to the accepted dairy conformation. However, I wish to state that I believe that the ideal dairy form admits of considerable flexibility and that better results will be obtained by not adhering too closely to any fixed type. In order to be guided safely it is necessary to rely upon the scale and the Babcock test, with their use we can deviate from the rigid type when results will support us in the change. There is nothing about the dairy form that the dairy breeders worship; but we want a type that will yield us the greatest amount of milk and butter fat for the food consumed. This should be the prime object of the breeder, but there are only a few of them that are keeping a yearly record of their herds, so they can know the cow that is actually doing the best work. It is to be regretted that more breeders do not see the importance of being guided by records made by the animal, than to rely entirely upon their judgments in the selection of the best producers.

Functions of the Dairy Cow.

The functions of the dairy cow is to make milk, not the juicy steak. She is an individual that is kept to take the grains and roughage of the field and convert them into milk. To do this successfully she does not need the wide back or heavy hind and fore quarters. They are a burden to her, for these parts would call upon the digestive organs for food and she needs her whole energy and vitality to carry on the labor that she is supposed to perform. In view of the special labor that she has to do her type is entirely opposite to that of the beef animal, and she is, what she is, because, of the four active systems that are engaged in making milk. It is through use that she has developed such a large capacity for digesting, assimilating large quantities of food and then transforming them again into human food.

Conformation.

The conformation is not an absolute measure of utility, but the merits and defects of an animal can be measured to a remarkable degree. Professor Soule says: "It is necessary that the successful feeder and breeder be a careful student of conformation. He should acquire a true appreciation of the value of details in conformation, and he should become so intensely interested in the subject and study it so thoroughly as to become an expert in reading the language of points often regarded as unimportant. The study of the points of the animal and their relation to one another gives the student an idea of the importance of correlation, symmetry, animal mechanism, and quality, a knowledge of whose fundamental principles is an invaluable aid to the feeder and breeder. The man who realizes that all the organs of the body are harmonized and proportional according to certain laws sees at once that animal mechanism and symmetry are qualities to be given the most careful consideration. He also realizes that a defect in one organ will influence all the

others in that animal in proportion to its importance. He appreciates that only where perfect harmony prevails and where every organ performs its functions with the least friction can the greatest endurance and stamina be found." The general form of the dairy animal should be spare and angular. It does not necessarily follow that all good dairy cows conform to this type, but as a rule the best producing animals are of this form. The general appearance should indicate looseness, that is, joints loose, vertebrae and ribs far apart. There is no objection when a cow is dry that she should lay on a reasonable amount of fat, in fact, I believe it is an indication of a strong constitution. But, when the animal is laboring she should tend toward the lean type rather than to fleshy. The conformation of the dairy cow should be symmetrical, the four active systems, the nervous, circulatory, digestive, and milk secreting, should bare proper relationship and be in proportion, all of which reveal a strong constitution.

Head, Eyes, Face, Muzzle and Jaws.

The head should be feminine, yet strong, which shows constitution. The forehead wide between the eyes, which shows intelligence and nerve force. The eyes full and prominent, not too quick or too open, but calm and bright. The face should be medium length and slightly dishing, also free from flesh. Muzzle broad, which indicates a good feeder, the nostrils large and open so that the lungs may be abundantly supplied with air. It has been said that the head is a mirror reflecting all that goes to make up the animal.

Neck.

The neck should be thin and carrying the head not too high or too low. The head if carried too high indicates an excitable disposition, as Professor Haecker says, "Somewhat inclined to be rattle-headed and easily confused"; if carried too low it

indicates stubborn, restive, pugnacious disposition. The neck of the dairy cow should be quite opposite to that of the beef animal, whose neck is thick, full and heavy. The neck should not be too long or too thin, in other words not out of proportion with the rest of the animal's body. The manner in which the neck is attached to the head, by blending gracefully, indicates good breeding.

Body.

The body should be long, deep and wide, for a large body indicates a large digestive tract which is an important factor of milk production. The body should also be large to give ample space for the lungs to perform their functions, which is to purify the blood. The amount of room occupied by the lungs is noted by the depth and width of the thorax, fullness of the heart girth, and thickness of abdominal wall. The back bone should be nearly straight, prominent and strong, for through it and under it run two important systems of the body, the nervous and circulatory. The ribs should be long, strong and wide apart, which give ample storage capacity for food. A good distance from hip bones to first ribs also indicates a good feeder.

Front and Hind Quarters.

The front and hind quarters of the animal should be sparingly covered with flesh, light in the shin and withers. The pelvic arch should be prominent. From the hip points to the tail head there should be a hollow due from the absence of flesh. This is especially true among heavy milkers when they are well along in the period of lactation.

Hip and Pin Bones.

The hip bones should be prominent, sharp and wide apart, which gives plenty of room for the reproductive organs. The pin bones should be prominent, sharp and far enough apart to permit the calf to pass through with ease at the time of birth.

Thighs.

The thighs should be light, incurving and free from fleshiness, the thighs of a dairy cow is sometimes spoken of as being "cat-hammed." There is no reason why the thighs should be heavy, and the lighter they are the less body tissue there is to be supported. We should never lose sight of the fact that the dairy cow is not made for making beef, but it is her plain duty to make milk.

Escutcheon.

It was Guenon who first called attention to the hair, immediately above the udder, running in opposite directions from which the hair does on other parts of the body. This is supposed to be due to the artery which passes this part to the udder. It is supposed by some that this is the only point by which Guenon judged a dairy cow, but it is only one of the ten. The escutcheon is an index to the amount of blood that is supplied to the udder. Professor Craig in his book on judging dairy cattle states: "In 1878 a commission was appointed by the Governor of Pennsylvania to inquire into the reliability of this point, and they reported in its favor. It is unnecessary to go into details of the various classes of escutcheons, as Guenon enumerates eight classes and eight orders, or, in other words, eight different shapes and eight different sizes. He claimed that the shape was indicative of the quantity and the size was an index of duration of the milk flow. The broader it extends over the thigh and the greater the length of it the better the escutcheon is considered to be. Guenon believed that the thigh escutcheon indicated the quantity of milk the cow gave, while the upper portion or verticle escutcheon the length of time she would milk and with these he considered the feel of the skin, the character of the hair, and the color of the skin as indicative of the quality of the milk. With these features he also associated the "thigh

ovals on the udder just above the hind teats, for in his view an escutcheon was not considered of a high order without them."

Skin.

The skin should be soft and fine and comparatively thin. It is possible to find animals whose skin is too thin, which denotes lack of constitution. The skin should be oily to the touch and have a glossy appearance. These things indicate health. A healthy skin shows that the different organs of the body are properly performing their functions, and that the animal is in vigorous condition. The skin should be yellow in color, especially in the ear, on the udder and on the thighs, next to the udder.

Hair.

The hair of the body should be soft, fine, short, and silky, especially on the udder. Long and coarse hairs in the region of the udder indicates poor breeding and often a poor milker. It surely does not indicate a highly developed animal.

Bone and Legs.

The bones should be fine rather than coarse, however, strong enough to maintain the body. It is true that the dairy cow has a loose appearance, but there should be no indication of weakness due to fineness of bone. The legs should be short, straight and strong enough to support the animal.

Udder, Teats.

The udder should be medium sized, not too large, but in proportion to the cow. The large pendulent udder is very objectionable, because it is more likely to become injured and out of condition, and does not indicate a large producer. The large fleshy udder should also be avoided for the same reason. The

ideal udder is one that extends well up between the animal's hind legs, and is square and full, the front quarters also square and extending well forward. When empty the udder should lay in folds and be soft, plastic and very much smaller than when it is filled with milk.

The teats should be long and large enough to fill the hand and evenly placed. The distance between them should be far enough to prevent rubbing of fingers when she is being milked. The very large, cone shaped, slim, hard milking teats should be avoided.

Milk Veins and Milk Wells.

The milk veins should be long, tortuous, branched, and enter the body well forward. This indicates the amount of blood that has been supplied to the udder. The milk wells should be large and one or more on either side of the body; these also indicate the blood supply to the udder.

Constitution.

There is not much to say specifically about this all important thing, constitution. It is revealed, or not, from every part of the animal. Constitution is shown quite as plain in the head and eye, as it is from the depth, width and fullness of the chest. It is also indicated from the general appearance of the animal, by the condition of the skin and hair. A large naval or umbilical cord is indicative of a strong constitution, the theory being that the animal was nourished properly during its foetal period. A lack of correlation of parts of the animal should be associated with weakness, for example, as neck that's too long, too thin, and lacks in depth, so as not to be in proportion with the rest of the animal's body would be considered an indication of a weak constitution.

Points Observed in Judging Dairy Cattle.

The Department of Agriculture has recently published a bulletin giving the standards of excellence adopted by each of

the several cattle breeding associations. The following diagram shows the different points that are considered in judging a dairy cow :

1. Head.	23. Shoulder.
2. Muzzle.	24. Elbow.
3. Nostril.	25. Forearm.
4. Face.	26. Knee.
5. Eye.	27. Ankle.
6. Forehead.	28. Hoof.
7. Horn.	29. Heart Girth.
8. Ear.	30. Side, or Barrel.
9. Cheek.	31. Belly.
10. Throat.	32. Flank.
11. Neck.	33. Milk Vein.
12. Withers.	34. Fore Udder.
13. Back.	35. Hind Udder.
14. Loins.	36. Teats.
15. Hip Bone.	37. Upper Thigh.
16. Pelvic Arch.	38. Stifle.
17. Rump.	39. Twist.
18. Tail.	40. Leg, or Gaskin.
19. Switch.	41. Hock.
20. Chest.	42. Shank.
21. Brisket.	43. Dew Claw.
22. Dewlap.	

Scale of Points for Dairy Cattle—Cow.

General Appearance:

Form—Inclined to be wedge shaped	6
Quality—Hair fine, soft; skin, mellow, loose, medium thickness; secretion yellow, bone clean, fine	6
Temperament—Nervous, indicated by lean appearance when in milk	6

Head and Neck:

Muzzle—Clean cut, mouth large, nostrils large	1
Eyes—Large, bright, full, mild	1
Face—Lean, long, quiet expression	1
Forehead—Broad	1
Ears—Medium size, yellow inside, fine texture	1
Horns—Fine texture, waxy	1
Neck—Fine, medium length, throat clean, light dewlap	1

Fore Quarters:

Withers—Lean, thin	1
Shoulders—Light, oblique	2
Legs—Straight, short; shank fine	2

Body:

Chest—Deep, low, girth large with full fore flank	10
Barrel—Ribs broad, long, wide apart; large stomach	10
Back—Lean, straight, open jointed	2
Loin—Broad	2
Navel—Large	2

Hind Quarters:

Hips—Far apart, level	2
Rump—Long, wide	2
Pin Bones or Thurls—High, wide apart	1
Tail—Long, slim; fine hair in switch	1
Thighs—Thin, long	4
Escutcheon—Spreading over thighs, extending high and wide; large high ovals	2
and full, flexible; quarterd full behind, extending far in front	
Udder—Long, attached high and even and free from fleshiness....	20
Teats—Large, evenly placed.....	5
Mammary Veins—Large, long, tortuous, branched with double ex- tension; large and numerous milk wells	5
Legs—Straight; shank fine.....	2
Total	100

DISCUSSION.

Mr. Gurler:—I don't know as I have very much to add, but if I could say a word that would drive home the importance of this point just made I would be glad to do it. It seems to me it is hard to over estimate the value of this work. When you stop to think of what Mr. Hart told us this morning—that they found one cow that could produce three times as much, or at one-third of the cost, which is practically the same thing—produced three times as much from the same feed, it shows you have got to test the cows. You have to become acquainted with them. It seems so foolish to go through life fooling around with cows that are running us in debt; I don't see any sense in it. No busi-

ness can stand that kind of treatment. What would become of our manufacturers if they did that kind of work? They would have to shut down their business. If your experiment station down there can wake us up, if we can drive home that thought that one cow made three times as much as the other from the same kind of feed, we will be doing a world of good.

Mr. Cobb:—I have here on the platform a milk sheet showing the record which was taken last January, a year ago, and also the same record of the herd as I bought them five years ago. They increased 50 per cent in the yield in five years and 1 per cent in fat yield.

Mr. Gurler:—I will tell you one thing I did in my herd. I did it without starting in to do it. When I started in the certified milk work my milk tested 3.7 or 3.8. In applying this individual test to the herd and weeding out unprofitable cows, without any thought as to the percentage of fat in the milk but as to the profit of the cow, I bought the standard of the milk up to 4 per cent. That is my standard, and there is a little meat in that nut. When I weed out the unprofitable cows it seemed to weed out some of the low testing cows also.

Mr. Spies:—I would like to ask a question with regard to the production of milk; it is a large question with us in the southern part of the state and it is hard to get those farmers to see it. Prof. Glover is up there close to Prof. Haecker, and I believe Prof. Haecker said some years ago that he produced milk one year at 60 cents per hundred weight, and subsequently at 40 cents per hundred weight. Has the professor any knowledge of any subsequent trials in this line?

Prof. Glover:—I know Prof. Haecker carried on those experiments and I know he produced milk at 60 cents per hundred weight, and as low as 40 cents, but I do not think he has been keeping account of what it has been costing him in latter years. He is working on a new subject and I am certain he has not published any results along this line.

In the work we have done in the field we find cows are charging all the way from 30 cents up, and some as high as one

dollar and some cents to make 100 pounds of milk. One cow produced butter fat as cheap as $6\frac{1}{2}$ cents, and one cow charged 58 cents to make a pound of butterfat. Mr. Gurler has had cows in his herd make milk for less than 40 cents. The best cow in his herd charges $7\frac{1}{2}$ cents. I think on the average it was about $12\frac{1}{2}$ cents in Mr. Gurler's herd the year I tested it—the feed cost. We did not take into consideration of the case the calf or fertilizer the animals return to our lands. We calculated the calf pays for the cow's care, while the manure will pay for the labor of taking care of and milking her.

Mr. Lea:—In testing those herds the third year they gained more than in the second year. A dairyman asks me, since they got all the feed they wanted to eat the second year, where did the feed go when it did not go into butterfat the second year? That is on dairy herds, special dairy breeds.

Mr. Glover:—I do not just get the meaning of the question.

Mr. Lea:—A cow eating a certain amount of feed one year and another year eating a certain amount, why would she give more butter the second year than the first?

Mr. Glover:—Perhaps for two reasons. In the second year those cows had not quite recovered from their first year's feeding so they did not respond quite as quickly to feed the second winter as the third. Moreover, some of those recorded the second year were not taken into consideration the third; some of the cows dropped out were low producing animals. To illustrate the point I might say, those cows that Prof. Haecker has upon the one ration do not respond to grass ration when they are turned out so quickly as those fed on proper amount of feeding. Another thing, I might go a little further in the third year's work, perhaps the cows were in a little better physical condition. I might go still further and add that I never yet have had a herd that will produce exactly the same amount of butter per cow. I expect in this herd about which I have read, as increasing from 227 lbs. to 337 lbs. of butter, this year will not exceed 337 lbs. per cow. I look for a decrease rather than an increase.

Mr. Lea:—Another thing should be taken into consideration, in this year's work I believe they have eight or ten heifers with their first calves.

Mr. Glover:—That must be taken into consideration, but the years that I tested them the heifers were about the same in each case. Perhaps the average of the herd is a little older in the third year.

Member:—What is the best way of sampling the milk?

Mr. Glover:—In doing this work we do it every seventh week for fourteen consecutive milkings. Mix the milk thoroughly, take out a sample and put in a jug in which has been placed a corrosive sublimate tablet. That tablet will keep the milk sweet a month. Take that and take daily records and multiply by her average test and that will give the amount of butter-fat that she produced each week, and from those results you can estimate what the cow has done for three weeks back and three weeks following, then go on in the regular work for six weeks and then sample again for fourteen consecutive milkings, test and multiply by six. You will probably have your record within 5 per cent.

Mr. Lea:—Two cows standing side by side, eating the same amount of feed, when the feed one cow ate did not produce the butter the feed given the other cow did; where did the feed go to?

Member:—Sometimes on their backs.

Mr. Lea:—In this case there was no gain.

Mr. Gurler:—It may have been a nervous individual, or it might have gone out through excretion. There were no digestive samples made of the two cows so we do not know where it went to.

Mr. Hunt:—The gentleman said one of the cows gave so much more than the other; now do you know what became of the feed the cow ate and did not digest and put into milk and butter? Those cows were supposed to put it into milk; one cow gave so much butter and the other did not give the butter. Now, as

dairymen, we want to know what became of that food—whether she digested it or whether by being made irritable she was thrown into a high fever and threw it off? Do you people know where it went to?

Mr. Glover:—In the first place, I would say I cannot tell you positively where it did go to because we are unable to make any analysis, but she did not gain much in flesh. I do not think she was of nervous temperament. She was probably not capable of digesting and assimilating that feed. She threw it out on the manure pile undigested, but it did not go into milk.

Mr. Gurler:—I have been intensely interested in this subject and a few months ago I was talking with a gentleman connected with the agricultural college, who had done some of this kind of work and brought out this kind of result. I asked him if it was in the digestion. He replied, "We have done some work that shows it is not in the digestion. It seems to be the ability of the cow to assimilate the food after it is digested with reference to milk." I would like to know the reason for this, but I am not going to struggle over it. Let the professors dig it out for us a little later on.

Prof. Hayden:—I would simply say that in the testing experiments we made, one cow apparently digested the feed as well as the other, but she did not use it; neither was she a nervous cow, not as nervous as the cow that made more milk.

The President:—We will then answer Mr. Hunt that we do not know.

Now, gentlemen, I will appoint the nomination committee, which will report at the proper time.

Nominating Committee.

E. L. Wilson, Elgin.

L. N. Wiggins, Springfield.

H. H. Hopkins, Hinckley.

The President:—I will also call a meeting of the directors and experiment station committee for 1 o'clock this afternoon

at the Nelson House, and I would like to meet Mr. Hunt, the superintendent at the St. Louis fair, and the gentlemen who worked with him sometime this afternoon before they leave.

Machinery hall is open on the third floor of the Mead Block. We will take the butter there some time this afternoon and our session tomorrow will be held in that hall.

We have Professor Smith on the program for this afternoon and he will give us a talk. Do not miss it because he has come a long ways to tell us what he knows—and he knows a whole lot.

We will now adjourn. Those who would like to may go with Prof. Glover to the dairy stable and have a few minutes instructions on the individual cow.

Wednesday Afternoon Session

Meeting called to order at 2 o'clock p. m. by the president.

The President:—The first on the program this afternoon is Professor Smith, of Michigan Agricultural College.

ADDRESS.

Prof. Smith, Michigan Agricultural College.

Emphasis ought to be laid on two points at this stage of our dairy discussion, the cow and cleanliness. Without interfering at all with what Mr. Glover has to say about cow selec-

tion, I want to point out a few salient features about the dairy cow. Her form does indicate something of her capacity as a milk producer. If it be wedge shape and conforms in all respects to the ideal pointed out by Mr. Glover, it means that the cow produces a large quantity of milk. Unfortunately I know of no sign whereby the richness of the milk can be even guessed at. I remember when I used to suppose that the yellow color of the skin gave some indication of rich milk, but the test has shown us that cows with white and papery skins sometimes give very rich milk. Then we had a time when the amount of oily secretions from the hide was used as a guide, but the Babcock test has disabused our minds of this idea. I do not know, therefore, how to select a cow to give rich milk. I have no other guide than the form. Some observations made at the Michigan station in regard to the changes in the richness of milk may be of interest.

It was noted that the milk of the heifer was approximately as rich as the milk of the mature cow. In other words, a careful examination of the milk with the first calf will give a pretty clear indication of what the quality of the milk may be expected to be when the same heifer is older. Some cows, like College Pogis III did seem to make radical changes in the richness of the milk from one period to another. She jumped up from 3.5 per cent to 4.5 per cent for reasons which I cannot find, the quantity of milk remaining about the same in the two succeeding periods. On the other hand some of our other cows dropped in the per cent of fat in succeeding periods. It is understood, of course, that by the per cent of fat used in this expression, I mean the per cent obtained by dividing the whole fat yield of the year by the amount of milk given in the year. I think it is safe to say that a cow is set to give milk of a certain richness and the quality of the milk is not materially changed by her age nor by her feed.

This latter statement will, of course, be questioned, as it always is, but it is still true that there are few changes in the per cent of fat in the milk that can be ascribed to changes in the feed. Even such fundamental changes as turning cows out

to pasture do not usually result in a change in the per cent of fat in the milk. Here we have cows going from a dry feed to a very succulent ration, yet an examination of the records at our butter factories shows that the per cent of fat tends to go up rather than down, when the cows go to pasture. The question has arisen as to how we are going to increase the richness of the milk of our dairy cows, what system of breeding and care will result in furnishing to our children cows that give richer milk than those that we are handling. Naturally the sole possibility is to select the cows that give the richest milk and keep their calves. Breed them to bulls whose dams and grand-dams were noted for rich milk. Scrupulously reject the descendents of such breeding which do not give rich milk. Remember that in breeding two and two do not make four, it sometimes makes three and sometimes six. Do not expect, therefore, that all of the calves will be as rich in milk as their dams. On this point I must confess to almost complete failure in following out my own advice. Where such a cow as Dame LeBrocq, a cow which gave milk 8 or 9 per cent fat, was bred regularly to a son of a cow which gave very rich milk, I have to report that none of her calves approached her dam in high per cent of fat. So our experiments at the Michigan College do not show immediate results. On the other hand immediate results are not to be expected. We must look for evolution and not for revolution in this matter. I know of no rule which insures a farmer the production of cows which will give rich milk. Naturally he will not select Holsteins for this purpose, but will take Jerseys or Guernseys. I have recommended to the Holstein breeders this practice of selection and breeding and I think the breed will gradually develop a better quality of milk if this plan is pursued, but no one farmer can expect to reap the benefit at once.

In concluding this part of the subject it is well to remember that the cow is an animal whose valuable characteristics are bred into her and are not natural. A cow gives milk for the support of her offspring, man has changed her nature until she gives more milk and more butter fat than half a dozen calves actually

require. Few dairymen realize that concurrently with this increase in the milk of the cow there has gone on a development of her digestive powers. I had occasion a few years ago to look up this matter and found that one cow at the Michigan Agricultural College was eating and digesting more food than some four or five steers could be expected to take, and besides that was yielding in her milk more dry matter than five steers in the state was laying on their carcasses in the same length of time. Not only was the cow doing more actual digestive business than the five steers, but she was doing it more economically. In other words the cow returns in her milk more dry matter per hundred pounds of dry matter in her food than does any steer, no matter how well bred or how excellent in form. Again, the cow was yielding in her milk much more protein than a dozen steers would be putting on their carcasses in the same length of time. The steer adds fat and water and a little protein, the cow cannot give milk unless it contains fully 3 per cent of protein. Naturally she gives more protein per day and more protein per hundred pounds of feed consumed than the steer lays on his carcass in the same time or from the same quantity of feed.

As a result of her large digestive capacity the cow necessarily has a larger abdomen than the steer. This in connection with the large udder gives the wedge shape and explains the reasonableness of the dairy form.

Turning now to the question of cleanliness, I want to repeat with somewhat greater emphasis, statements made in my former paper. I maintain that where milk has once been inoculated with such germs as naturally come into it from a dirty udder and filthy stable or dirty vessels, and is allowed to remain unpasteurized for several hours, it is impossible to cure the evils in that milk by subsequent pasteurization. Nature warms the milk consumer by the formation of lactic acid when the danger point is approaching. Lactic acid is formed from the milk sugar in the milk by the action of certain well known germs. Now note that these lactic acid forming germs are the ones which are first killed and most easily killed by pasteurization. Pasteurization kills

the germs which form the lactic acid but does not kill the germs that produce either the ptomaines or the other poisons, deleterious if not fatal. Milk to be used for children must be kept pure from the outset. The causes of chronic or temporary diarrhœa in children are to be found usually in the milk supply. They do not exist in the milk if infection is carefully and persistently excluded from the outset, but if the spore forming germs are allowed access to the milk and are allowed to multiply there for three or four hours they produce substances from their own activity which are injurious and the injuries are neither cured or excluded by pasteurization. The recent work in New York on a question of this kind is intensely interesting on this point. It was shown by those young doctors that the care of the child had more to do with its health than the quality of the milk supply. The number of cases of summer diarrhœa fell off as soon as pure milk was given in place of a defective article. Pasteurization to be effective must be repeated for at least three days to kill the germs which germinate between the treatments and to make the milk safe must be done for the first time very soon after the milking. I repeat the statement that milk 24 to 36 hours old is an unsafe article of diet for children, unless it was kept scrupulously clean from the outset. Let us remember that because milk does not sour it is not proven that the milk is fit food for children.

One further point and I am done. We have heard something at this convention about the necessity of keeping the udders of the cow clean. Some recent experiments at the Cornell University go to show that if a cow has to drag her udder through mire and filth on her way to the stable and is then allowed to stand until the material dries on the udder, the milk duct becomes infected with bad germs which may even work their way to the milk cistern, there to propogate and to infect the milk of an indefinite number of messes in the future. Too much care cannot be exercised therefore in keeping the environs of the stable thoroughly clean.

DISCUSSION.

Prof. Glover:—If you wanted to increase the percentage of butter fat in the milk, wouldn't you select from the cows giving the richest milk?

Prof. Smith:—Certainly.

Question:—Do I understand the reason they pasteurize their milk in Northern Illinois is because it is held so long that lactic acid gets started?

Prof. Smith:—This much is true, that when milk as normally produced is so old that it sours, it is unfit to use when pasteurized.

Member:—You made a statement yesterday that milk should not be used over twenty-four hours old?

Prof. Smith:—Milked in a dirty stable, milk is hardly safe for infants after thirty-six hours old.

The President:—The situation in Northern Illinois is that we have a great many four and five cow dairymen, who have taken up the hand separator proposition. They undoubtedly believe it is the wisest thing for them to do; they cannot afford to hitch up a team and bring a few cans of cream, so they keep it two or three days; it is sweet when delivered. We find by pasteurizing that cream we can make better butter than we can by not pasteurizing it. I cannot see the force of your argument about pasteurization.

Prof. Smith:—Instead of meeting these men on the level of two or three cows, get them to increase their herds and obviate the necessity of the hand separator.

The President:—What will you do in the meantime, close up?

Prof. Smith:—No, do the same as we have to, do without. Mr. Chairman, I maintain that the ambition of the northern part of Illinois should rise above the power of the hand separator.

You have them now and, like the poor, you will have them a good deal longer than you will wish you had.

Mr. Spies:—For the southern part of the state, I will say that in order to get good milk for the St. Louis market we educate our milk receiver so he will know what kind of milk he is receiving. We only get clean honest milk; if not, it goes back to the farmer. He is instructed how to handle that milk and how to take care of it in the future, and I believe the creamery-men in the northern part of the state are doing much the same way. Pasteurization has helped the southern part of the state a long way, but the milk must be sweet and clean before you start because you cannot save a rotten egg after it has once started to spoil.

The Chairman:—The next on the program is a paper by G. H. Gurler, of DeKalb, who will tell us of creamery needs from a manager's standpoint.

OUR CREAMERIES NEEDS FROM A MANAGER'S STANDPOINT.

G. H. Gurler, DeKalb, Ill.

Most creameries needs are numerous; in the first place a creamery needs to be located in a territory where there can be enough cows pledged to furnish milk or cream enough to make a volume of business that will warrant the proprietor or manager a profit on his investment.

As a rule when a proprietor has a business large enough to make him a profit he can pay his patrons a price for their product that will be satisfactory to them, and an inducement to them to increase their herd of cows.

In order to handle their products to get the best results a creamery needs a good building well arranged, the most modern machinery, such as separators, cream ripeners, starter cans, etc.

And don't forget that the creamery needs a good supply of pure cold water and good sewerage, and it needs to be managed in the most economical manner and every possible effort made to benefit the creamery's patrons.

A creamery needs a buttermaker who is posted on all matters pertaining to the dairy and creamery business.

A man who can get close to his patrons, for on his patrons depends the success or failure of the creamery. There are many patrons who are not educated in dairying. They don't take time to read dairy literature if they take any. And I am sorry to say there are many farmers at the present time who do not take a dairy paper of any kind, cheap as they are. That is a mistake on their part in my opinion. No farmer can afford to be without one or more dairy papers and he should take time to read them.

The creamery needs a man, either manager or buttermaker, who can instruct those people how to select feed and care for their cows and to get the best results from them, how to care for their milk or cream so it will reach the creamery in good condition. So the buttermaker could make butter that will grade as extra from it.

In my judgment it would be a great benefit to the creamery manager and patron if the creamery patron could be convinced of the need of the creamery manager getting a better quality of milk or cream in many instances, and money, in the patron's pocket.

The most pressing need the creamery manager has at the present time is a buttermaker who can make extra butter out of over-ripe cream. Cream in some instances that is six days old, decidedly sour, and having other faults too numerous to mention. Why this faulty cream? Because it didn't have proper care at the time when it was produced in a majority of cases. Is there

not some way of getting the patrons who don't give their milk and cream the care they should, to do it? There are many creamery managers and buttermakers working faithfully all their spare time trying to devise some way of counteracting the acid in cream, to put it back into condition to make extra butter, that is cream which has been neglected by the patron who produces it.

The dairy schools are turning out buttermakers by the hundreds, but I haven't learned that they have them educated up to a high enough standard to handle the kind of cream referred to to the satisfaction of the creamery managers at all times and under all conditions. There is no question but that the dairy schools and experiment stations in this country have done an unlimited amount of good to the creamery and dairy interests. What the creameries need is more of this knowledge instilled into the brains of the dairymen and buttermakers of this glorious country.

Dairy schools are to buttermakers what the normal schools are to the school teachers. They need the kind of training to make them proficient in their work.

The time may come when a buttermaker may be required to have a dairy school training, the same as a school teacher is required to have a normal school training at the present time.

The creameries need more field workers at the present time throughout the state, men who work among dairies, testing the cows regularly during the season. They are able to get close to the dairymen and do them an unlimited amount of good. They issue bulletins containing their year's work and distribute them among the dairymen. Life is too short for the average dairyman to work out all the knotty problems in his line of business.

The experiment station and field workers are paid by the state to do the work and distribute their knowledge to those who may seek it. I sometimes think creamery managers need to get together and draw some lines or make such arrangements as will benefit their patrons and themselves.

In some sections the creamery managers seem to be ready to knife one another whenever an opportunity offers. That policy may be beneficial to the creamery interests, but I do not see it in that light in all instances.

I think it would be better to follow the golden rule, do unto others as you would that they should do unto you; and both the creamery manager and his patrons would be better served. A better feeling exist between them and more money be realized by the patrons.

DISCUSSION.

Mr. Glover:—I would like to ask Mr. Gurler if he thinks the time will ever come when the dairy schools will turn out men capable of making good butter from an inferior article of cream?

H. B. Gurler:—I don't think it will. My brother and I have discussed this matter. I have talked with my brother several times in regard to it. I am not in that business myself and I am handling hand farm separator cream, but had a little experience years ago with gravity cream. I take this position, that it is as possible to make as fine butter from gathered cream as from any cream, but you cannot do it when one creameryman will take the cream if the other fellow will not. By your methods and competition you are bidding for a lack of care. You must overcome that.

Mr. Mann:—Is not that true of the milk?

H. B. Gurler:—Yes sir, it was with the introduction of the separator. It was not when we had to cool milk forty-eight hours and then have it sweet to make skim cheese out of it. I have had an experience in the last couple of years in trying to train some of our patrons to cool their milk so it was fit to bottle. They say they cannot do it. I told them "Twenty years ago you used to bring milk to the creamery and if it came warmer than 62 degrees it went home." Now they think that an impossibil-

ity, but I tell you so long as that condition exists you are going to have trouble. It seems to me if we could only stand by the same rules and compel the fellows producing cream to take care of it you would be all right, and I don't see any other way.

Mr. Cobb:—From the patrons' standpoint I can answer that question. If I had to go back to the old method of hauling milk to the creamery and letting it come home at 2 or 3 o'clock in the afternoon, through the heat of summer and frost of winter, I would not bring it to the creamery. I put a value on my skim milk of 50 cents per cwt. to feed high class calves and pigs, and I believe the hand separator is the solution of the problem of better stock on the farms.

Mr. Glover:—There is a point Mr. Gurler brought out which I think is a good position to take; it has been a common thing in the northern part here for dairymen to practice taking milk and cream that the other fellow had refused, so it really forced the man who was to stay in the business to take everything that came to him, and a farmer soon learns that he does not have to pay much of any attention to caring for his milk and cream in order to sell it at a first-class price. It is about time that those things were changed, time to get action. Put men into the field to stop it. We have been talking ever since I can remember about getting better milk and cream to our factories, and don't you think it is time we had more men in the field to force this condition that we have been talking on for so many years?

The President:—We will take up the next paper, because these papers following as they do I think the general discussion at last will save a good deal of time. We will hear from Mr. Mann on the creamery needs from a buttermaker's standpoint.

OUR CREAMERY NEEDS FROM A BUTTERMAKER'S STANDPOINT.

W. E. Mann, Pecatonica, Ill.

One of the most important needs of the average creamery of today is a better grade of milk—milk delivered at a much higher standard. Our butter markets are gradually raising the standard for fancy butter and demanding not only a better grade but a more uniform article.

It is hard for the buttermaker to make something out of nothing, even though he has the best of facilities with which to work. The patron should meet his share of the demands with as much care as the buttermaker tries to meet his, in order to get fancy prices for their product. That he may get top-most prices for grain, beef, or pork a farmer knows it must be of the best quality. Then why should he not take as much interest and care in delivering good milk?

I do not believe there is a buttermaker here who will not bear me out in saying that milk is, or has been received at the factory in a most frightful condition—unsanitary in every respect. But there seems to be a feeling on the part of many patrons that the straining and separating process to which the milk is subjected at the creamery removes all traces of this foreign matter, and so it is not necessary that he be particular in caring for it.

But the question whether a buttermaker can demand a better grade of milk or not, presents itself. Perhaps some may say, "Reject such milk." Very well. The theory is excellent, but practice would put many creameries out of business. Suppose you do it; what will be the result in a short time? The milk you receive will be of excellent quality, but in very many cases the quantity will not be enough to support the plant, for

rather than take the extra pains quite a per cent of these patrons will take their milk to neighboring factories; or, if so much care is demanded by the buttermaker, the milk will be sent to condensing plants, which are becoming quite numerous in Northern Illinois.

This briefly explains one great need of the creamery from a buttermaker's standpoint. It involves considerable thought and study to meet it, and it sets forth the fact that it not only requires good judgment on the part of the buttermaker but the co-operation of the manager, wise counsel of the entire board of directors, and higher ideals for farming communities.

Another creamery need is facilities to do with. It should be the duty of the manager to provide all that is necessary for the manufacture of good butter. There are many creameries where the buttermaker is compelled to work at a great disadvantage because of the lack of some improvements. He can oftentimes largely overcome unfavorable conditions and improve the quality of butter by having for his use the best equipment for a plant. Of needs in this line, probably a starter is the most important. A much better grade of butter can be made by having facilities for making a good starter.

Some time ago when inspecting and soliciting for a butter firm, I saw all manner of ways for making a starter, both home-made and commercial, and during all my travels in two year's time I failed to find with but very few exceptions, where the buttermaker had anywhere near the facilities he should have for making "good starters," and the manufacture of good butter.

Was this the fault of the buttermaker or of the company for which he worked? I remember a few instances where it was said the company could not afford to buy and make necessary improvements. Of course under such conditions they should be contented with lower prices, and if they wish fancy prices they should be willing to make the necessary expenditures.

One instance, in particular, that came to my notice was where the milk was separated into a large vat used for making

dry curd. After separation the vat of milk was heated to a temperature of about 160 degrees by using steam direct, and then a ten or fifteen gallon jar was filled with the milk and set away in a corner of this room—in which the odor of cheese was very perceptible—to coagulate and use as a starter. Others used pails, setters or milk cans—only a few creameries having a good starter can.

In view of these facts you can readily see where the average buttermaker of today is working at a disadvantage. It is a question of good milk on the one side, and facilities on the other. Yet we are expected to make good butter regardless of the difficulties that confront us on every hand.

Let the patrons and the creamery management in general do their part toward the fulfilling of creamery needs, and, I dare say, the buttermaker can raise the quality of butter to a high standard, commanding the very best prices.

There are probably many needs of a creamery other than what I have mentioned, but these I consider the most essential of all and they should be considered from every standpoint. I trust you will all take hold of this subject and give it a lively discussion. There are many points of interest to be brought out.

The President:—We will give the buttermakers and patrons here a little while to digest the facts set forth in the papers just read and, as we have Pure Food Commissioner Jones with us this afternoon, I will call on him to make a few remarks.

REMARKS.

Alfred H. Jones, State Food Commissioner.

Mr. Chairman and Gentlemen:

I assure you it is a great pleasure for me to be with you this afternoon and address your organization in regard to food products and the State Food Commission, especially that part in

connection with and pertaining to the dairy interests of our state. It is only through and by organization that any great cause can succeed. As State Food Commissioner, it is my duty to look after all the food products of the state and as our legislature is now in session, and the State Food Department is asking for two inspectors whose duty it shall be to look after the dairy interests of the state, and who shall be experts in dairy products, I thought it proper that through and by the assistance of the State Dairy Association we could so impress the legislature with the importance of these additional inspectors that we might have no difficulty in securing the same to protect and look after the dairy interests of the state.

As State Food Commissioner, I have also prepared a bill to revise and modify the state food laws as we have never had a revision of the state food laws and the different acts as passed by the legislature extend back to 1845. In 1899 was passed the law known as the State Food Commission and since the passage of the law there has been a contention that all the laws passed prior to that time were repealed by implication, then, if this contention is true, all the laws, or substantially all the laws pertaining to the dairy were repealed by that act, as the act embraced nothing but foods proper. As the dairy laws had been passed prior to that time, what our department is trying to do is to secure a revision of this law so that these objections may be obviated and Illinois may have the best dairy law, as well as food law generally, of any state in the union. Illinois is one of the best states in the union for the dairy business. Our soil and climate are the best; our agricultural and dairy school in connection with the State University of Illinois at Champaign, is doing the best work of any similar institution in the Union and is turning out students who are experts in the line of farming and dairy interests.

As was stated, our state is the fountain head of agriculture and foremost of all the states in the union in the products of the dairy, and according to the last census, Illinois already has over one million cows and with her 700 creameries and 10,000

dairies, we see how necessary it is that these industries should be safely guarded and this has been largely brought about by organization and co-operation among the different sections of the state, and that is what brings you here. If I understand it rightly, you come that you may, side by side, compare experiences; that you may exchange views upon the methods—the best methods—in this great interest which you represent.

As food products, there are none that excel in importance those represented through this association—represented through the interests which you are here to promote by your discussions and co-operation.

I am glad that the general assembly has said we will give \$1,500 per year to assist the dairy association in Illinois; it ought to be \$15,000.

True, we have farmers' institutes (and they are splendid educational agencies) and many other similar organizations that indirectly tend to assist you in your great work, but after reviewing them all, I want to say here that I do not know of anything that has grown to the perfection in Illinois that this has; that to my mind, has done and will do more for the people at large—the common people—than these annual meetings that are encouraged and fostered by the state and by appropriations.

We have six inspectors in the State Food Department that must cover all lines of foods and up to the present time, we have had no requirements as to qualifications or experience in this especial line of work, and when we send our inspectors out to secure samples of food products and look after the dairies and creameries of the state, very frequently they are not experts along this line of work. What we are trying to do now is to get our legislature to give us two inspectors who will have this necessary qualification and who can go out and secure dairy statistics and report upon the dairy, creamery and other dairy products of the state so that the people of the country may be fully informed in regard to the work and progress of the dairy and what Illinois is doing in that line of work.

What we want is expert dairy inspectors appointed to look after the dairy products of Illinois, then when her butter goes into other states it will be so marked that there will be no question about it; when it passes the inspector that it goes just as our products go over in the foreign countries at the present time, through the able efforts of Secretary Wilson, of the National Agricultural Department.

If we work together and co-operate together we will have no trouble along that line. I have devoted more time to dairy matters in my report than ever before, for that reason. In our last annual report we devoted little space to the dairy, from the fact that two years previous we had given it considerable attention. In the last report we have taken up over five hundred creameries in the state. We have given much information about the creameries in the northern, central and southern part of the state for the benefit of those who would like to go into the business, and to show what the industry is doing. We are trying every way to help you, because what we want is better co-operation.

Now, gentlemen, I am not going to take up any more of your valuable time. As I said, I am pleased to meet you here. I assure you that you are doing a great work. It may seem simple to you, but when you look back over the thirty-one years of your existence and see what has been accomplished in this state, and if you went up and down this great state as I do and saw what has been accomplished by the dairy industry, it would be plain to you that you have every reason to be encouraged, for Illinois is forging to the front, especially up north here where you have the creamery and the dairy and the silo. One creamery firm has built over twenty-six creameries in Southern and Central Illinois in the past year, and the work is still going on.

Do not be discouraged, gentlemen: it may seem to you that you are getting along slowly, but all great movements go along slowly and take time. Our agricultural and dairy school is turning out young men with wonderful ability. The trouble

in the past has been that we have educated our sons for lawyers, doctors and bankers, but have not educated them to be farmers and creamerymen, and it is just as necessary to know how to take care of the product of the dairy as to practice law, or to preach, or do anything else.

Mr. Chairman and gentlemen, I thank you.

The President:—I want to thank Commissioner Jones for his presence here today. He has sent his assistants to other meetings and they have treated us very nicely, both in their talks and work. The dairymen have no fault to find with the work of the commissioner; the only fault we have ever found is, while the law distinctly asked that the dairymen have one of the places, we did not get a dairyman, but we do not know that the commissioner is to blame for that; possible that goes beyond him.

I believe he will work with us if we work with him. Possibly we have the right man in the right place. I am not saying anything, nor do I wish to say anything, in regard to his assistant, Mr. Patterson. He is trying to do his work as well as he knows how. He was appointed politically, of course, and he is doing his work to the best of his ability.

Mr. Long:—I move that a committee of three be appointed by the chairman to go to Springfield, as the commissioner has suggested, and co-operate with his department along the lines suggested.

The President:—At whose expense, did you say?

Motion seconded by Mr. Gurler.

Mr. Thurston:—May I ask Commissioner Jones this question? If this committee goes down and asks for dairy inspectors, what certainty has the association that dairymen will be appointed? If the state law is ignored in one case, why would it not be ignored in another? The state law says plainly the assistant of the state pure food commissioner, other than the chemist, shall be a dairy expert. This law was entirely set aside and ignored in the appointment of Mr. Patterson, whom no one



A. H. JONES
State Food Commissioner

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claims to be a dairy expert. There are enough dairy experts in the state, and I want to inform Mr. Jones that that is a sore point to the dairymen all over the state. I do not see the good of asking for the appointment of two dairymen if the law we have is not observed.

Mr. Jones:—With your permission, I would like to say that is the reason I propose to draft a law in the manner I referred to. It is left optional with the governor. You understand, of course, gentlemen, that the state food commissioner does not make these appointments as a general thing. It is done by the governor, and the state food commissioner appoints the men he suggests. When Governor Tanner was elected we had Mr. Monrad. I knew the governor quite well, we had grown up together. He appointed me and said: "Go ahead and select those you want." But Governor Yates did not know me quite so well as Governor Tanner, and when he was elected he had a few whom he wanted appointed. As your worthy president has said, Mr. Patterson is an efficient man, but if this law is drafted as it is in the state pharmacists' law, that their names be suggested by you at your convention, or by a committee appointed for that purpose, then the Governor will appoint the inspectors from the names you submit, as you will see by reading the pharmacist act.

That is how I propose to obviate this error. I have talked with a number of your dairymen as to how it could be done, especially with Mr. Willson, of Elgin, the editor of one of your papers, how it could be arranged so there would be no question but an expert dairyman would be appointed. Do not leave it optional with the Governor or Commissioner, but put it into a law: make it plain that the names of the inspectors shall be selected by your department and that the Governor shall take the names from the list selected.

The President:—Does that not take the appointing power away from the Governor?

Mr. Jones:—No, I was going to fix the number at ten.

He has a range of ten, and out of the ten he could certainly find two that would be satisfactory.

Mr. Glover:—I can see great good coming out of capable inspectors going into the field, but I cannot see any good out of inspectors sent out in the field who are filling offices that have been given them for political services they have given their party. I do not believe the dairymen want or will permit any more inspectors to be appointed in that capacity unless they are capable of going out and instructing. I served in the dairy department of Minnesota for two years and a half, and we had enough influence to stir things to the bottom and disposed of about half, because they had rendered political service. She has good inspectors now and look at Minnesota today and the grade of men she is producing. I was talking with Governor Johnson, in Minnesota, and he told me he had appointed six of the best buttermakers he could get in Minnesota. A Democratic governor, and he said to me "I think I have all Republicans, but they are all good buttermakers." Let the dairymen say, "We want good men or the next time you run for governor we will defeat you." Every buttermaker in Minnesota is a politician when he goes out and works with his patrons. Why they gave Roosevelt 140,000 and elected a Democratic governor by 8,000. Don't you think buttermakers have some power when they get to work?

I would say to the dairymen of this state that they have the power in their own hands to have as good a commissioner and as efficient one as they want; but don't leave it to the appointing power of the governor. Make him feel that we are a power in the state. It is from the common people of the state that the power of the state was made, and the common people are larger and bigger than all of our state officials if they will only exert that power; will get sentiment spread; demand inspectors that are capable and you will have them.

Mr. Jones:—I want to say to the gentleman, that if he thinks the dairymen of Illinois are not in the political swim he is mistaken. When I read what has been enacted in national

legislation it makes me feel as I do about it; if he thinks the dairymen are a cipher in Illinois he is mistaken. I know a man who would like to have been governor, but could not because the dairymen said that he could not.

If the dairymen ask this to be done, if they send a committee down there, Governor Deneen will make the appointments. Now remember what I say, if it does not happen you may pronounce me a false prophet. The dairymen are a power in Illinois.

The President:—As dairymen, we do not talk for publication, but we do a little work where it is effective.

Any further discussion on the subject. Mr. Long will you kindly make that motion again?

Mr. Long:—Mr. Chairman, my idea is to have a committee from this association go to Springfield and act with the pure food commissioner. If this association appoints a committee to go down there and act with him, it seems to me we ought to be able to get some kind of a bill that would be satisfactory to the association. That is my idea.

Motion, having been made and seconded, was carried.

The President:—I think I had better take a little time before deciding on the members for this committee.

We have heard from the manufacturer and buttermaker and now we have the most important paper of them all. We want to hear from the patrons' standpoint. This will be given to us by Mr. Wilson, of Woodstock, one of our younger men.

OUR CREAMERY NEEDS FROM A PATRON'S STANDPOINT.

By Mr. L. D. Wilson, Woodstock, Ill.

As this is the first time I have ever been with you I can't very well say, as most of your speakers have said, that I am glad

to meet with you once again, but I can sincerely say that I am glad to meet with you, for the first time.

Perhaps you have heard of the man that went into a restaurant in search of something to eat. The waiter brought on the first course usually served by most restaurants. The man eyed it closely for a moment and then asked the waiter what it was.

"Sir," said the waiter, "that's bean soup."

"No matter what its been," says the man, "the question is, what is it now?"

That's the way with our creameries. It matters not so much what they have been, the all important question is what are they now? Can they be improved? Is there a chance for improvement? or, in other words, what are our needs of the creamery today?

Why, our creameries are the most needy things I know of. I think I could keep on mentioning the needs of our creameries until the crack of doom, but as you have more experienced speakers who can entertain you much better than I, I am just going to mention what I think are the most important needs of our creameries. If we can only get the important ones, the smaller ones will surely come afterwards. Now I am speaking of the co-operative creamery, mind you, as I have never had any experience with any other kind. I am one of those who believe that the farmers' and dairymen's salvation lies in the co-operative creamery; but from the appearance of things they, as a rule, don't see it that way. About all some dairymen can see in the co-operative creamery is a place where they can unload their dirty, filthy milk, load up with sweet and sour milk, and then go home. When they have done this they think they have done their duty. The rest they leave to the buttermaker and the manager.

The buttermaker must make good butter from that milk and the manager must sell that butter; and if a batch of butter is so poor that it can't be sold, the fault is generally laid at the buttermaker's door. The best buttermaker in the state cannot make

good butter unless he has pure, wholesome milk and pure wholesome milk is a scarce article at our co-operative creameries today. Of course, I am not saying that all patrons bring unwholesome milk; but most every creamery has more or less patrons who will be careless with their milk. Most every creamery has patrons who will not milk clean; who will not cleanse their dairy utensils thoroughly; who will not cool their milk before they bring it to the creamery. Undoubtedly those patrons leave their milk in the barn over night, in the winter time, to keep it from freezing. They never seem to think that their milk pails, strainer, etc., would be much better off if they would rinse them out with hot or cold water and set them out in the night air to purify; but they just leave them setting around in their barns. They do not seem to think that milk and butter are foods. Why, actually to see some dairymen's care for their milk you would think it was intended for the swill barrel and the hogs and not for the creamery and human consumption.

We will suppose the case that a creamery has fifty patrons and forty bring good, clean milk and ten bring unwholesome milk. Will not that unwholesome milk brought by those ten patrons contaminate that brought by the forty? It will every-time. To the patron who brings clean milk this is not right or is it just. It would benefit both, and is high time that our clean patrons demanded cleaner milk of our dirty ones, and when our dirty patrons are educated to bring cleaner milk to our creameries, then we should all try and improve upon that. I don't know how it looks to you, but it looks to me as though cleaner, more wholesome milk is one of our creameries' greatest needs.

A prominent authority has said, "If the death angel should sweep over the state and in one night destroy the poorest third of all the cows in Illinois the dairymen would awake the next morning financially better off." But if the dairymen would only realize it we have something much better than the death angel in the Babcock test and a pair of scales.

The dairy departments of our agricultural colleges and prominent dairy papers have proven that many dairymen are

keeping some of their cows at an actual loss. Frequently one-third and sometimes one-half of the cows in a herd are unprofitable ones. And it isn't an uncommon thing to find a whole herd that way.

The dairyman, in his ignorance, not only keeps those cows, but gives them as good feed and care as his best ones, and instead of those cows putting money in his pocket as they should, he puts his hand in his pocket and puts the money in them in the shape of grain, hay, etc. Many patrons seem to think that the profits must come from the creamery instead of the farm, whereas, if they would look a little closer home for the trouble and cull out those unprofitable cows, there would be less fault found with the manufacturing cost of butter as well as the price received per pound.

Every patron should keep an annual record of each cow in his herd. He should also have a profitable standard and all mature cows (notice that word mature) that do not come up to that standard should be disposed of. Caution, however, should be used in disposing of these unprofitable cows. A cow should never be sold on a one year's record. We all know that cows have their "off years." If a cow does not make a good record the first year do not sell her, as it might be her off year and you would be selling one of your best cows. Of course, it will depend to some extent upon the cow's ancestry as well as her dairy form whether she should have a two or a three years' trial.

And right here in improving our dairies lies the remedy for so much of the unwholesome milk brought to our creameries. You will ask how is that? If all unprofitable cows should be disposed of the balance will make as much profit, if not more than the whole herd formerly did, and the time wasted in caring for those unprofitable cows could profitably be spent in improving the quality of the milk. For a number of years the state has been keeping the records of the cows in a number of herds, but it would be impossible for the state to keep the record of each cow in Illinois. It lies then with the creameries or the patron to take up this work.

I think it would be a good plan for each creamery to hire an up-to-date dairyman whose duty it would be to figure out and keep the records of each patron's cows. But if this isn't practical, each patron should, by all means, take up the work for himself. Keeping individual records that the patron may know what each cow is annually producing for him, that he may dispose of all cows that do not come up to his standard, is our co-operative creamery's greatest needs. The improvement will not only be noticed in the dairy but in the dairy barns and other farm buildings, on the farm, in the creamery and the milk brought to our creameries and even in the patron himself. The improvement will not only be confined to the dairy but will be general.

And if the patron is going to improve his herd, if he is going to have those cows that will produce 300 or 400 pounds of butter a year, he must increase his knowledge concerning the care and feed those kind of cows will require. A cow giving 300 or 400 pounds of butter a year will require much better care than the average cow receives today. Therefore, the patrons should turn our creameries into dairy schools. The patrons should meet once a month or once in two months and discuss and talk over matters pertaining to the dairy. If the patrons hire a man to keep the records of their cows, he should prepare a paper for these meetings and should keep posted on all dairy subjects that he may answer all questions the patrons might want to ask.

It would seem then, that the most important need of our creameries are: Not more cows but cows that are more profitable; and cleaner, more wholesome milk. And then, using Mr. Hoard's words, "Every creamery should be a dairy school where the patrons may take advantage of their co-operation together to increase their knowledge."

**THE NEEDS OF THE CREAMERY FROM THE INSTRUCTOR'S
STANDPOINT.**

By Mr. Carl E. Lee, of Freeport, Ill.

Ladies and Gentlemen of This Convention:

It gives me great pleasure to meet with you this, the second time. When we met a year ago, Illinois and Illinois creamery conditions and their needs were practically new to me. I hoped to report at this time that all the creameries in Northern Illinois had been visited, but time has not permitted me to call on more than 211. There are probably not over fifty creameries that have not been visited. These would have been had I not visited thirty-two creameries a second time by request and spent considerable time in working on a problem of how to overcome the excessive loss in the buttermilk from pasteurized sour hand separator cream.

(The President:—You understand that our university has sent out another instructor in the person of Mr. C. E. Lea, and I believe it will be the best thing the university has ever done. And I would say, and I wish Mr. Jones would notice this, that in this new law to be drafted, I hope that in some way it will incorporate a section providing that inspectors going out from our university, or educators, shall be clothed with police power the same as the state food inspectors have, but of course have their pay from the university. I think that will be a great help, and probably save an inspector or two.)

It is rather a difficult matter to enumerate the needs and suggest how they might be improved and do it in such a way that no one will take offense. The same thing is true when at the creamery talking over the creamery work. It may be the butter

that is off flavor, patrons who are dissatisfied, or some misunderstanding. Hard feelings have resulted from asking the butter-makers to take better care of their churns and milk pipes, to be more careful in testing milk or to take better care of their cream. In one case the buttermaker has said that I would not be allowed inside of his creamery again because my report of his factory pointed out wherein he had failed to do his duty as a creamery operator. Three or four others have been in this same frame of mind at the close of the first visit, but after giving the subject more careful consideration they have carried out my suggestions and are now very appreciative that some one called their attention to the weak places which they were neglecting and showed them how their faults could be remedied. I expect soon to call on the gentleman first mentioned and have him see the need of operating a sanitary creamery.

In order to best handle the needs of the creamery from the instructor's view point, let us first consider the creamery and its owners. A creamery is a place where food is manufactured and for this reason it should be so constructed that it may be kept in a sanitary condition. There are a number of creameries in this state which have kept this object in view, but I am sorry to say that there are a few others that have not. One thing a number of creameries need is paint, both inside and out, and it would be well if others would follow the example set by a number during the past season. There is nothing that adds so much to the appearance of a place as the free use of the paint brush.

The creamery owners should not forget the needs of the buttermakers and the material they must have in order to do good work. If the owner or company does not take an interest in what the buttermaker is doing, he will not do his best. There should be more harmony among owners of creameries. Is there any reason for hard feelings? If there is only a certain amount of milk in a neighborhood to be divided between two or more creameries and that milk cannot be handled in an honest friendly way, it would be better to compromise. In a community where two creameries are now located it might be that one creamery would

mean more to both owners and patrons. There are places in this state where creameries are too numerous. A certain amount of milk must be received in order to pay expenses and whatever is received above this amount means more to all concerned.

The interests of the farmers must not be forgotten. The farmer cannot get along without the creamery and vice versa. I do not believe it adds to the creamery interest of this state or any other to solicit the farmers' product, whether it be milk or cream, in what would seem to be a dishonest way. I know of a case where a creamery sent a man out to get what cream he could. The man had a hand tester with him and he would stop at the different farms and test the cream. Invariably the cream tested higher than I found it to test at the creamery they were patronizing.

Creameries that handle hand separator cream should be very careful how they gather or collect it. I am not in favor of the system of employing a man regardless of his knowledge of cream to be the judge. This is frequently the case when cream is gathered from farms. The poor and the good are mixed together in large cans and brought to the creamery. In that case the buttermaker cannot tell where the poor cream originated. This system is liable to give uncalled variations in tests of cream. The creameries cannot be too careful in locating the trouble and putting the blame where it belongs.

The creameries should combine in getting a better grade of goods delivered, but as long as one will take what another will not and ought not to take, conditions will remain the same. Why should the farmer expect or ask a creamery to take what he knows is an inferior product and expect the best prices for it? He does not expect it with corn or stock. Sometimes I think it is an injustice to the farmer that produces good, clean, wholesome cream to receive less for his product than the farmer does who brings in cream that will not make extra butter even though it tests higher. It is well enough to get cream testing in the neighborhood of 33 per cent, but I believe it is far better to grade cream on the basis of quality. If the farmer knows that

cream which has not been properly cared for will not bring the highest price he will see to it that his cream is up to the standard the next time it is delivered.

Another thing the creamery needs to do is to help educate the farmer. This can be done in more ways than one. Through visitation, literature, and the personal influence of the butter-maker. There is a creamery in this state that has spent considerable time in helping the farmers fix places where they may keep their product and this has been found to be a great help in the business.

During the past season my attention has been called to a few cases where the creamery has not received fair treatment from the railroad companies. The butter was delivered at the depot in first-class condition but was cut a cent a pound by the purchaser because the butter arrived in a soft condition.

I have probably dwelt at length upon the owners' side of this question. A few of the things mentioned might well be applied to the buttermakers. I believe that the work done by the creameries and by the men in charge of them compares favorably with the work done in other states. A number of our creameries are older and are equipped with old style machinery. But that does not detract from the work that is being done by the average Illinois creamery. The buttermaker's position is one of constant work and devotion to duty. He may be a little idle today but not so tomorrow. It can be said of the good butter-maker that his work is never done.

One of the most important needs of our creamery butter-makers is the more universal use of starters. A number of boys are using them and others would use them if they were familiar with their propagation and use. I have been told by a few that no starter was needed, that a stopper is needed, if anything. Even if it does need a stopper a good starter will do the cream good. The making and handling of a starter means a little extra work, but it will repay all the trouble.

The tub of butter that scored highest yesterday was made by a man who two months ago asked me to come to his place.

and make a commercial starter. He sent butter to St. Louis to the contest and Mr. Keiffer criticised it and said, "You need a commercial starter in your creamery." We were in competition with two other states in this butter contest.

Another need of a few is the accurate and fair work of sampling and testing milk or cream. The satisfaction of the patron depends upon this work. The laws of our state do not say that we must use a scale in weighing cream for testing, but I am more than pleased that so many of them are in use in our creameries. If a farmer is not satisfied take time to show him that your work is fair, that it is simple and accurate and that the cream that tests 25 per cent today will not test 23 tomorrow.

The creamery buttermakers in this state should organize and hold meetings during the season that they are not busy. We do meet here this week and discuss the phases of creamery work, but this is not enough. If we can arrange to meet at some creamery centrally located, have a tub of butter, a sample of your starter, and if necessary samples of cream brought along for inspection and testing, we could then compare work and profit by each others mistake. We could devote part of the time to demonstration work and part to discussion. Farmers would be welcome and some subject treated that would be of interest to them. These meetings would do much toward better goods and harmony between creamery operators. I believe at this time it might be well to mention that a few of the buttermakers need to be more careful in finishing the butter for market.

A good deal of the success of the creamery depends upon the finished product, how it appears when ready for the consumer. I have gone to the grocery stores in this state and bought a pound of butter at different times, and sometimes one brick, supposed to be a pound, would weight 15 ounces, another 16½, and so on, and improperly wrapped.

DISCUSSION.

President:—We have now heard from all sides, from the

manufacturer clear down to the educator, and we are now ready for discussion.

H. B. Gurler:—Mr. President, I would like to ask Mr. Wilson if it is not possible for co-operative creamery managers to be able to induce or in some way get their patrons to take good care of their milk, and bring it to the creamery in good condition?

Mr. Wilson:—I don't know about that. I think, perhaps, that clean patrons and managers together might have some effect on the dirty ones. Of course it is as much to the clean patrons' interest to have clean milk as it is to the manager's.

Member:—Is it a common practice for patrons to leave their milk in barns over night?

Mr. Wilson:—I know in our community it is done quite frequently. I do not think a milk house is necessary. We generally set our milk in the tank the cows drink out of, then keep a fire in the tank heater to keep the milk from freezing. We have no milk house at all. I think unless a milk house is kept absolutely clean that it is not beneficial and is not essential.

Mr. Gurler:—We find in the individual creameries that we have great trouble in getting some of our patrons to take care of their milk. They will say, "If you will not take it this other creamery will be glad to get it," and they will take it there too. I did not know but the co-operative creameries had some string on their patrons whereby they could handle them in better shape, and if that were the case I thought perhaps we had better co-operate, and perhaps we could then get a little better milk.

Mr. Long:—I think I can answer that question for you, Mr. Gurler; simply make a rule if the buttermaker does not like the milk he can reject it.

I want to say of the co-operative creamery—every creamery is a co-operative institution. Unless the patrons co-operate and work together there is a poor chance for any of them to get along.

Mr. Glover:—I would like to ask Mr. Long what is the result if the buttermaker sends home the milk of a large, influential patron of the creamery?

Mr. Long:—There is no patron that has any more influence with ~~the~~ buttermaker than any other patron. The buttermaker is instructed that if my milk, or that of any other patron, is not pleasing to him, to send it home, and that if he makes poor butter out of poor milk we will hold him responsible for it.

Mr. Glover:—I happen to know a co-operative creamery which had a pains-taking buttermaker, who rejected all unwholesome milk as far as he could judge the same. It seems he did that to one of the members of the board of directors and at the board meeting his salary was cut from \$60 to \$50 and his milk and butter were taken away from him, and they made it so unpleasant he found it necessary to resign and a very slovenly buttermaker was put in his place, and remained there eighteen months, when the creamery saw it was going to ruin and let him out. They then employed another buttermaker and it is going on in the same way it was when the previous man had charge of it. I believe the first man was let out simply because he was a little too strenuous about the patrons bringing clean milk.

Mr. Gurler:—There seems to be a disposition on the part of some of the farmers to bring in their milk in any condition. If they can get their milk through they do not care and they will not give it any more time or attention than they have to. If I could learn of some way to handle those patrons I would like it.

Mr. Lea:—Some time ago I was asked to visit a creamery where there was a little trouble, and, by the way, it was a co-operative creamery. One patron was skimming his milk and he claimed the buttermaker was being dishonest, but I know the buttermaker was honest because I went to the creamery and found that the milk was skimmed. There is no question about it. This same farmer had tried to bring up a feeling between the buttermaker and the board of directors to get this buttermaker out because his milk tested low.

I called at the creamery and talked the matter over, and the farmer saw he was mistaken. He said he was sorry he had caused any trouble, and there is where I believe in some sort of a helper coming around even if he can do nothing else than break up these little troubles and get farmers and buttermakers to be honest with each other.

Mr. Gurler:—I would like to ask Mr. Lea if he succeeded in overcoming the loss he found in buttermilk in the thin sour cream he spoke of?

Mr. Lea:—At this time I might as well say a little about this subject. There was not enough work done last summer to get any definite results. There seems to be this idea—that when we take a sour separator cream and pasteurize it the casein in the milk upon being heated comes out in small particles of cheese. These particles of cheese contain butterfat, and there is where we get the excessive loss, because I have taken that casein and tested it several times and found it contains 20 per cent butterfat. We can overcome that by agitating the cream before it passes the pasteurizer; then cool the cream down after it is pasteurized and has been ripened, cool it down to 42 or 44 degrees, and hold it at least six hours. You can then reduce the loss to about .6 of 1 per cent, while in other cases I find the loss pretty close to 2 per cent. A simple rule to lay down is to see that the cream is agitated before passing through the pasteurizer, then properly cooled and held at a low temperature for a long enough time to gather all the butterfat, aside from what is taken up in the casein.

Mr. Hayden:—I would like to ask if it is not a better plan to have separators adjusted so as to get richer cream?

Mr. Lea:—That is what should be done, but I find it a very difficult matter to get the farmers to bring in the kind of cream we want. I don't know the reason for it. I remember last summer of spending two weeks at one creamery; talked with the farmers about this matter, but could not get them to bring in the right kind of cream. It all rests with the farmers; if they understood that if they bring in heavier cream we can do

better work in the creamery, then we would get the cream. Some bring in 40 per cent cream, but others insist on getting down to 22 to 27 per cent.

Member:—I would like to ask what result you get from cooling thin cream with a low temperature?

Mr. Lea:—It has to stand a little longer.

The President:—I would like to ask what benefit it is to the farmers having hand separators to bring this 18 and 20 per cent cream?

Mr. Lea:—It is a loss to the farmer, but he seems to think because he has the bulk that it is a gain. There is no benefit to the farmer from bringing thin cream, but there is an actual loss to him.

The President:—Are not all the separators on the market able to skim perfectly?

Mr. Lea:—All but one. There is a hand separator on the market that will not do clean skimming and skim heavy cream.

The President:—Will it score above twenty per cent?

Mr. Lea:—Yes, above twenty, but not above thirty. The majority of hand separators are all right; will skim a heavy cream and do excellent work. I have seen cream come in testing 40 to 50 per cent and leave only a small amount in the skim milk.

The President:—Has this matter been tested thoroughly by scale, so you are positive in regard to the one machine being unable to do the work?

Mr. Lea:—This is only what I have learned in connection with the work myself.

The President:—I think farmers should be protected as far as possible and if anyone knows of a machine of this kind it should be advertised.

Mr. Young:—My experience in testing cream of different degrees of acidity and percentage of fat is that testing otherwise than by weight is not much more than guess work, and it is time

we were doing something about establishing a law of that kind. Would it not be a good point for the committee to take up when they go to Springfield?

The President:—Of course you understand the reason that we have these samples is to get an accurate quality, and it is pretty hard to get thick cream out of the bottles. If they are careful in taking the samples and careful in getting them out of the bottle, I believe you will get accurate results. It has been my experience that with 20 per cent cream the pipette will give you about as accurate a test as your scale will.

Mr. Lea:—18 c. c. pipette will give about 20 per cent cream, but you do not get it accurate.

Mr. Gurler:—I think I can explain the situation about this thin cream. In some instances the gentleman who is handling the hand separators puts a machine in at A's; meantime before two days have passed there is another machine; probably in a day or two another comes along, maybe three or four of them. One will set the machine so he gets a thinner cream, and will say to A, "Here you skim tomorrow with that machine and with my machine and you will see that my machine gives the more cream." They work all sorts of schemes. The farmer will believe the separator man before he will the creamery man. In a number of instances that is where they get the thin cream. I leave a great deal of that trouble to the people selling hand separators.

The President:—Any further discussion?

Member:—I do not doubt but the creamerymen here would all like to have patrons send us heavy cream, but the only way is to weigh each man's cream by itself. Cream of about 25 per cent adheres to the can. There ought to be some way to overcome that for we all want heavy cream.

The President:—Don't they return your cans clean?

Member:—I have had some experience along that line. I stir my cream up thoroughly before I take my sample. After getting my sample, I rinse my can. I do not want to send that farmer back any butterfat, but the thicker he brings his cream

the better it will please me, I see that he does not get any back home. It makes me much more labor to take care of thinner cream than thicker and he will have more milk to feed his calves at home. If he were shipping to some centralizing plants, I think after he had paid freight on thin cream a while he would quit it.

Mr. G. H. Gurler:—I think the man who is emptying the cream out of the farmers' can into the can he transports it, that the thick cream adheres more to the can and more is left adhering to the farmer's can than there is in the case of the thin cream.

Member:—We sample our cream and weigh it. You take, for instance, cream testing 35 to 40 per cent, as we often get it, we have some trouble in emptying the cans and that is a disadvantage to the patron unless you rinse it out.

The President:—Don't your creamery rinse your cans out?

Answer:—Certainly, but there is a loss after they are rinsed. How would you overcome that?

The President:—Pour your cream from one can to another, if necessary. The better way is to do that, pour from one can to another. It does not seem to me that any buttermaker here is so ignorant but that he rinses out his heavy cream can, for we certainly want all the butter fat we can get.

Mr. Mann:—We are getting considerable hand separator cream, several patrons change off in hauling; have one route of seven, another of six. Their cream is sent to the factory in their own cans, milk cans. These cans I have weighed and have marked the weights on the can. They have two sets, one of them at the factory. I take the gross weight, but the cream is emptied after sample is taken. Before taking sample I use an agitator so the cream is thoroughly stirred. I then modify the cream and rinse the cans; wash the cans for our patrons, perhaps not too good, and they are left until the farmer comes the second day. The cream is hauled every other day. I have built a rack outside the creamery and the cans are turned bottom side up and in that way I find it very convenient. We get all the cream

and the farmer gets his just dues. The cream is thoroughly stirred before the sample is taken, and we are only too glad to wash cans for him. I do not know whether the patron covers the route in going back, as I have not asked in regard to that. We have one regular cream hauler, a man hired for the purpose of hauling cream. In that route there are twenty patrons. It is a question in my mind as to just what method is used in regard to emptying the pail or can, whatever the cream is kept in. As they sent 35 to 50 per cent cream, I don't know whether it is all emptied out of the can or what the farmers do with it. I suppose the cream is stirred by the hauler, the sample taken and the can emptied into his, but whether the cream is all gotten out of it is another question. There is a question in my mind whether there is any loss there or not, and I am asking for information.

On the other hand, at the factory we see that we get all the cream out of the cans. For rinsing we take a few quarts of water and pour from one can to another, so we are not adding very much water in the cream vat. I have requested our patrons to take good care of this cream and see that it is delivered in as good condition as they formerly delivered the milk. I have had no trouble so far, but at the present time I think my hand separator cream is even better than my factory cream, but in the route I have referred to we are using a herd the quality of whose cream is not so good. When I sent a tub of butter here I kept that load of cream out. My other cream was emptied right into the cream vat. I have eight hand separator cream patrons.

Mr. Lea:—A creamery in this state is gathering cream. They use to clean out their cans at the bottom with a piece of stiff rubber with a long handle. In that way they can scrape out all the cream. I spent two days with the cream hauler at that creamery and he did not leave cream in a single place. Got it all out by the means of this rubber. It is kept perfectly clean so there is no chance of anything getting in.

The President:—We have with us this afternoon our dairy committee which works with the experimental station, and I will ask for that report if Mr. Long has it with him.

The President:—I will appoint on the committee voted for this afternoon the president of this association, whomever you select tomorrow, Mr. C. Y. Knight, of Chicago, and Mr. L. N. Wiggins, of Springfield.

On motion duly made and seconded the report as read by Mr. Long for the committee was adopted.

Whereupon the meeting adjourned.

Wednesday Evening Session

Meeting called to order at 8 p. m. by the President.

Piano solo by Miss Hazel Kirk, of Rockford.

The President:—It is my pleasure tonight to introduce to you one from a far off state, the state which likes now to be known as the "Bread and Butter State." If you have been reading the dairy reports, you know that during the last two or three years Minnesota has carried off the highest honors at our national conventions for the highest grade of butter, so we have asked ex-President Mowbray to come from Minnesota to tell us what the dairy industry is and how we can improve it.

ADDRESS.

A. W. Mowbray, St. Charles, Minn.

Mr. Chairman, Ladies and Gentlemen:

It affords me very decided pleasure to meet with the dairy-men of the great state of Illinois, in their annual convention.

Great did I say? Yes, indeed, you are a great state. In population you occupy third place; in the production of corn you lead the states, with an acreage, in 1903, of 8,201,000; and a crop the value of which was nearly one hundred million dollars.

In the possession of institutions of learning you have every reason to be proud. Your state institutions are of a high rank, and all existing conditions are indicative of the highest type of civilization.

In the possession of high type horses, cattle and swine your breeders are in the front rank and occupy an enviable position. You possess more than a million milch cows with a value of approximately forty million dollars, nearly one and three-fourths millions other cattle with a value of about forty-two million dollars; three and three-fourths million hogs, aggregating in value twenty-five millions. All this speaks volumes in praise of the effort that has been made for the advancement and up-building of the state.

Almost every branch of industry within your borders has its organization, its rudder, so to speak, and it is eminently proper that the dairy interests should enjoy the benefits derived from union of thought and purpose. Dairying is a science and therefore demands intelligence. It is not a mere occupation of hands in which their employment is the only requisite, but one in which many scientific problems are involved, that necessitate the most earnest application of the mind. It may truthfully be said that we are in the midst of a dairy revolution, and that we are under a new dispensation of dairy theory and practice. The rude instruments and methods of the past that have been employed for generations, have been displaced within the last few years by complicated, economizing, labor-saving machinery. The constant effort in every branch of business is toward greater production at a cheaper cost. If the dairymen of today would keep pace with the march of progress they must become students of their occupation, and so master it that the improved methods employed will result as satisfactorily as have the changes in other lines of business.

A short time ago I was told by Professor Glover that the average annual production of your cows was about 180 pounds. While it is true that in certain localities the production is nearly or quite 220 pounds the entire state would not average more than the amount first mentioned. There are herds in the state that are producing 300 pounds of butter per cow and even better, and this fact proves conclusively that you also have herds that are not paying for the cost of maintenance.

Now let us compare for a moment two herds. First, if you please, the average herd of 180 pounds per cow. We will suppose the average price received for her product to be 20 cents per pound, or \$36 for the year. The cost of feeding the average cow of the state is about \$30. Then we have left as a profit \$6 per cow. The skim milk and the manure and the increase we will allow to offset the labor of caring for the animal. On the other hand let us consider the cow that produces 100 pounds more than the average or 280 pounds per year. Her produce at 20 cents per pound will sell for \$56. We will admit that the larger producer will consume a little more feed—say \$3 worth. Then her cost of keeping will be \$33, leaving a net profit of \$23, or 3 5-6 times the profit of the average cow. As in the case of the other cow we will offset the by-products with the labor involved.

Here we have a difference in net profit of \$17 per cow, and as you have something over a million in the state, it is plainly seen that if the average annual production was 100 pounds more than it is, your dairymen would receive the magnificent sum of \$17,000,000.00 more for the dairy products of the state than they do now, or almost two-fifths the value of all the cattle in the state aside from milch cows. The increase of 100 pounds per cow would add to your revenue a sum equal to nearly two-thirds of that received for beef cattle annually. Is it not a subject worthy of our best thought? Why, my friends, it would be just like getting "money from home," and it would so change our opinions of dairying that disappointment would give way to a

sense of satisfaction, and discouragement would be no longer our constant companion.

Now how are we to accomplish the desired results? I think I hear someone say, "He will advise selling off our present herd and buying special purpose dairy cows." While I am an admirer of the special purpose cow I would by no means advocate so sweeping a change; but instead do the best you can with the cows you have at the present time. Begin at once to record the weight of each cow's milk, take a composite sample one week in each month and determine by the Babcock test the per cent of butterfat it contains. Make a record of this also, and at the end of the year it will be an easy matter to determine the amount of fat produced by each cow.

But many will say, "I cannot spare the time that will be required to do all this." This is a mistake. The time spent in determining the amount of fat each cow produces in the year will be perhaps the most profitable investment the dairyman can make. When once established the practice will result in a healthy rivalry between milkers to see who can secure the most even and steady results from the cows that he milks. This alone will result in an increased production of butterfat sufficient to pay well for the trifling amount of time required.

By careful breeding and close selection the herd can be greatly improved. Great care should be exercised in choosing a sire. No matter how brilliant a pedigree a breeder can furnish with an animal, unless he can prove to you that the dams on both sides for several generations have been, without exception, good producers, don't buy. Beware of seven or thirty day tests, but be guided by year tests and you will be much more liable to be pleased with what you buy. Cull the herd every year, keeping the number up with heifers from your best cows. By adopting this course the improvement in each generation will be marked and will meet the expectation of every fair-minded man.

The manner of milking has much to do with the results obtained. It is not an uncommon circumstance to see a cow that will object strongly to one milker while with another she may

be perfectly gentle. The reason for this is not always apparent, but nevertheless the animal's likes and dislikes should be respected. The milking should be done as quickly as is consistent with absolute thoroughness and gentleness.

Regularity is of utmost importance and should be strictly adhered to in all matters pertaining to the dairy.

Kindness, absolute kindness, is no doubt one of the largest factors in successful dairying. From calfhood until the close of her days of usefulness the dairy cow more than any other animal, will appreciate and respond to kind treatment. If the calf is handled properly when she comes into the dairy, there will be no breaking process to be dreaded by the milker or endured by the heifer, but she knows he is her friend and ninety-nine times out of a hundred will in a very few days be as gentle as an old cow. Without doubt thousands of heifers have been sent to the block, as the result of improper handling, that would have proven themselves valuable in the dairy had their owners exercised a reasonable degree of common sense. One of the greatest sources of discomfort to the dairy cow is the dog. We will admit that the dog seems to be a necessity on the average farm, and with some classes of stock perhaps he is not especially objectionable; but we make the statement without fear of successful contradiction that the net profits of the dairymen of Illinois are reduced thousands of dollars annually, by dogs.

While it may not be of such imperative necessity to provide warm barns for the dairy cows in Illinois as in Minnesota, still I am inclined to believe that the protection should be nearly as great. The cow can not do her best if she is exposed to discomfort from any cause, and if confined in a barn that is not sufficiently warm her product will be less than it otherwise would. It is unreasonable to expect a cow to do even fair work if confined without opportunity for exercise, even, in a place where the owner in order to be comfortable wears overcoat and mittens while caring for her. But without doubt this condition exists on thousands of farms in your state, and until it is changed

the revenue from the dairy industry will not reach the figure it should.

The water supply should be abundant and pure. Ponds and pools are an abomination and should never be tolerated. When we realize the large percentage of water in milk we see the necessity for furnishing a pure supply to our cows. In fact if we would have pure milk we must furnish water that is of good quality. Of course it is apparent to all that during the winter season some means should be provided to warm it, because if the cow is allowed to fill herself with cold water a condition of discomfort is again present and is sure to effect the milk flow. The water supply is of great importance and receives by far too little attention.

To provide the food required by the dairy cow is a problem not easily solved. Of course the animal must be supplied with the nutrients required to support the body and enable her to manufacture a liberal flow of milk. Several items must be considered, among which are these: The health of the animal, the palatability of the several feeds entering into the ration, and their respective cost. The quality of the milk is also directly affected by the feeds used.

Where alfalfa and corn do well, the necessary food supply is easily provided, but unfortunately only a very few of us, comparatively speaking, have succeeded in growing alfalfa. Next to alfalfa probably clover is the most valuable forage crop. It not only furnishes us a very desirable food, but also helps us wonderfully in retaining soil fertility.

Until quite recently (perhaps two or three years) it was generally conceded that the Wolff standard formulated forty years ago was correct; that in order to do good work in milk production the cow must have $2\frac{1}{2}$ pounds of protein daily. By repeated and extended experiment it has been demonstrated that 60 per cent of the protein called for by Wolff is sufficient for a cow doing average work, hence it is much easier to provide a balanced ration now than when we were led by the teachings of a man who was forty years behind the age in which we

live. But it is imperative that protein be supplied if we are to get satisfactory results. This element is the expensive part of the ration, hence it is a matter of business to know it can be procured most cheaply. When oats are worth 32 cents per bushel the protein in them costs us 11 cents per pound—a prohibitory price. In corn at 40 cents a bushel the protein costs 9 cents a pound. In buckwheat middlings at \$20 per ton, the protein costs $4\frac{1}{2}$ cents a pound. In gluten meal at \$28 per ton protein costs $5\frac{1}{2}$ cents per pound. In clover hay at \$7 per ton protein costs 5.1 cents per pound. In alfalfa hay at \$7 per ton protein costs 3.2 per pound. In corn silage at \$1.50 per ton protein costs about $7\frac{1}{2}$ cents per pound, but the succulence of silage is a greater help to the cow than the protein content. It serves to keep the system in a healthy condition so that the animal derives greater benefit from the grain consumed.

There is nothing that we can add to the ration for our milch cows that will give us so great a degree of satisfaction as corn silage. It invariably increases the product of the cow and reduces the cost of the ration. Two very important results. Silage is the cheapest and best supplement to pasture that can possibly be provided. With plenty of silage at hand the cows will have all the feed they require, while if we are using a soiling crop they are quite liable to go on short rations during a few days of inclement weather or an unusual rush of farm work.

If we would improve the dairy industry we must study the value of the different feeds and use the ration that is calculated to give us the best results. It is often possible to make some changes in the ration which will give better results at less cost, and the thoughtful dairyman will not be slow in making the discovery.

What we need most of all is better dairymen. If all the men in the state who keep cows would apply to their business the same degree of "get-there-a-tive-ness" that the successful manufacturer does, dairying would soon occupy a higher plane than it does today, that coveted increase of 100 pounds per cow

would be realized, and the dairymen of Illinois would reap an annual profit at least \$15,000,000 greater than that of the present time.

DISCUSSION.

Mr. Cobb:—What is the general style of architecture in barns in your state of the progressive dairyman?

Mr. Mowbray:—Perhaps I can best answer that by telling you how our own barn is constructed.

Mr. Cobb:—You pose as a progressive dairyman?

Mr. Mowbray:—If my friends at least did not think I was somewhat progressive they would not have asked me to come to Illinois. That is the best proof of all that I am somewhat progressive.

On the inside of the studding we have tar paper and No. 3 flooring; on the outside we have sheeting, 3 inch tar paper, and drop siding. With 25 head of cattle (cows) in our barn, it never freezes.

Mr. Cobb:—How often are the windows placed along the wall?

Mr. Mowbray:—We have six windows on either side. The barn is 38x60, and we have six windows at either side and two at each end.

Mr. Cobb:—Cows face in two rows?

Mr. Mowbray:—The cows face the center in two rows; face a seven foot alley.

The President:—Any special ventilation?

Mr. Mowbray:—The King system of ventilation modified a little.

Mr. Cobb:—What is the prevailing temperature of the barn during zero weather?

Mr. Mowbray:—During zero weather with 25 head of cattle it is about 38 or 40 degrees.

Mr. Cobb:—Is that not pretty low?

Mr. Mowbray:—We get good results; it never freezes in our barn.

Mr. Cobb:—Thirty-eight is freezing point, is it not?

Mr. Mowbray:—O no. It never freezes in our barn and I think about 36 to 37 in the coldest weather is as low as I have seen it.

Mr. Cobb:—One hundred miles south of here I never allowed my barn to get below 50, and rather have it at 60 for best results.

Mr. Mowbray:—Do you get better results at 60 than at 50?

Mr. Cobb:—Yes sir.

Mr. Mowbray:—With our barn built as I have suggested, in Minnesota, and the kind of weather we have there, we do not keep it as high as 50, but still we get good results.

Question:—In cold weather does not the wind blow down the ventilators and lower the temperature in the barn?

Mr. Mowbray:—No sir. To be sure, when it is very cold or very windy, we partially close them so we do not get a surplus amount of air, and the air in our barn is always good.

The President:—Mr. Mowbray, we are interested here and have been for forty or fifty years in trying to make fine butter. We have learned of late that Minnesota is making a great deal of fine butter. I wish you would try and tell us, as far as possible, just what kind of cows you keep. What is the general run of cows in your section, and what you feed them, so we can get some information that will help us in bettering our conditions, because we want to beat Minnesota next time we go after that banner.

Mr. Mowbray:—I think we have some conditions in Minnesota which are very helpful to us. We have water, air and grasses that are hard to beat, and successful dairying and high grade butter depends very largely upon those three factors. Perhaps in the average of the three we have some advantage over the state of Illinois. Our grasses, I think, are certainly ahead of yours and, then again, I think that the extreme hot weather

hurts your pastures more than it does ours, so we get better results in that respect.

But so far as cows are concerned, I can best illustrate that by telling you a little story, a little incident which happened a few days ago. An old gentleman living a few miles away drove into my yard one day (and by the way, he was a son of the Emerald Isle), and said: "Do you want to buy a good cow? I have a good cow and I want to sell her, I have more than I need." I asked "How old is she?" "She is young; she is six years old." "What color?" "Red." "Is she a desirable cow?" "Yes, she's all right. She has been dry a good long while and she will be fresh soon." "What is she, Jersey, Shorthorn, or what?" "Well, she has just a sprinkling of Jersey and the rest is just cow." So that is the way we are fixed in Minnesota—most of them are "just cow." I regret very much that we have very few special purpose cows in the state of Minnesota. I am informed by good authority that perhaps not over five or six per cent of the cows in Minnesota are special purpose dairy cows.

The President:—We are all aware of the high scores that have been made in your state. Did the factories making those high scores make them from milk brought in or from hand separator cream?

Mr. Mowbray:—Nearly all the high scoring butter made in Minnesota is made from whole milk factories.

The President:—Don't you have hand separators up there?

Mr. Mowbray:—Unfortunately, we have a few hand separators in the state, but nothing I think as compared with the states of Illinois or Iowa.

The President:—Do you think that one reason you are able to score above other states using hand separators?

Mr. Mowbray:—These are the facts. We have few hand separators and our scorings speak for themselves. There are two points; you can put them together. To be sure, the state of Minnesota has taken a great deal of pride in her buttermakers and, as a state, has done a great deal to help them, and no doubt

some of that success may be attributed to that, but to the fact that we have comparatively few hand separators in the state I think is due largely the high scored butter we made.

Mr. Kieffer:—Is there anything about manufacturing the butter that has anything to do with this high scoring?

Mr. Mowbray:—Well, I am not a buttermaker, but no doubt there is.

The President:—Is it not a fact that your state has really become a guardian for the butter interests and dairy interests here, and will they not take a hand in this hand separator proposition if it comes to them and reduces the quality of their butter?

Mr. Mowbray:—I think if the hand separator people ever make the attempt to get their machines into our state, as many as they have in other states, there will be a very decided stand taken against them. I know there is a very strong feeling against them now by the powers-that-be in our state, and I think that their influence will tend to hold the hand separator back to some extent.

The President:—Have you, as a farmer, tried it?

Mr. Mowbray:—I have, yes sir. When I first used a separator there was not a creamery within ten miles, so of course it was somewhat excusable.

The President:—You believe it was a success?

Mr. Mowbray:—There are points where the hand separator may be of advantage to the farmer. It gives him a better quality of milk for his calves; there is no doubt about that; but, whether or not the advantage that he gains in that way offset the loss that is bound to come by their general introduction is a question.

Mr. Davis:—What is the cause of this loss.

Mr. Mowbray:—The poorer quality of butter that is made from hand separator cream compared with whole milk.

Mr. Davis:—Does that hold true in every case?

Mr. Mowbray:—Very largely, I think. It may not in every case.

Mr. Davis:—Is it not a fact that some of the highest scored butter came from hand separators?

Mr. Mowbray:—There may be some rare cases where hand separator cream butter has scored extremely high, but as a rule I believe not.

Mr. Davis:—Is it the fault of the separator if it did not?

Mr. Mowbray:—That I do not know. I do not mean to say that as good butter cannot be made from hand separator cream as from whole milk, but I do say that where the hand separator is used extensively the cream comes to the buttermaker in such a way that it is impossible for him to make butter that will compare with butter made from whole milk.

Mr. Davis:—That is not the fault of the separator.

Mr. Mowbray:—I don't say it is the fault of the separator. It is the fault of the care of the cream and of the machine. The system is all right, but the idea is the necessity, the absolute necessity of educating the farmer to take the same care and deliver the cream in as good condition to the buttermakers as he does the whole milk.

Mr. Wiggins:—How is your silo built?

Mr. Mowbray:—We are using a common stave silo, built out of 2x6s. The silo was the second one built in our county a number of years ago, about eight years ago; 16x30 are the dimensions; holds about 125 tons.

Prof. Hart:—You gave some figures on feeding different kinds of feed, ranging in case of alfalfa as low as 5 cents a pound, other feeds as high as 11 cents. How do you arrive at these figures?

Mr. Mowbray:—Protein is the important feed element. We have enough carbohydrates and bran in almost any of the foods on the farm. Protein is one thing we must consider especially in buying commercial feeds, the protein value, and to arrive at the cost we can take any feed analysis, any table, and if the price of the feed is known it is a very easy matter to arrive at the cost of protein.

Prof. Hart:—That is not allowing anything for the value of the other constituents in the feed?

Mr. Mowbray:—Protein is the only thing taken into consideration, because we get enough of carbohydrates and fats in anything. The protein is the one thing necessary.

Mr. Glover:—I would like to ask Mr. Mowbray, if he had simply alfalfa hay, bran and oats to make a ration from if he would not have some difficulty in getting enough carbohydrates?

Mr. Mowbray:—Yes, but I tell you few of us are situated in that way with alfalfa hay, bran and oats.

Mr. Glover:—I happen to hold a position now where we have just as much trouble in getting carbohydrates as protein in the ration, especially when we come to make rations for California, Oregon and Colorado, where they grow plenty of alfalfa and bran.

Mr. Mowbray:—I only had reference to Minnesota and Illinois conditions. I realize the fact that if we had alfalfa and clover abundantly and corn ensilage, it would be an easy matter to get a ration that would be perfectly satisfactory.

Mr. Gurler:—I think Mr. Cobb said a few moments ago that he never allowed his barn to go below a temperature of 50 in coldest weather. I would like to know how he can keep the barn at that temperature?

Mr. Cobb:—Mr. Newman has seen my barn, I believe, and it is nothing in the world but drop siding and a heavy grade tar paper. We have a thermometer hanging there and a clock, and we know what time it is and what temperature it is. We never have seen it below 50 when 20 below zero outside. Seventy cows and heifers and young calves in the room, 120 feet long and 32 feet wide.

The President:—I would say I was there in July and I think it was 99 in the shade.

The President:—We have with us tonight again that silver haired songster from Nebraska whom we heard last night. (Applause.) The dairymen love this gentleman and are always

willing to stop their proceedings to hear him sing. We will have the pleasure of listening to Mr. Jules Lumbard.

Vocal solo by Mr. Lumbard, "I Am a Child of the King," and responded to encores by "Rosebuds" and "Peggy in Her Low-Back Car."

Violin solo by Miss Woodward, of Rockford, accompanied by Miss Hazel Kirk.

The President:—Those who were here this afternoon heard considerable about creamery inspection, and we had a nice talk from our pure food commissioner.

Tonight we have from Wisconsin one of the state inspectors from that state, who has come to say a few words to us about creamery inspection.

CREAMERY INSPECTION.

J. G. Moore, Second Assistant Dairy and Food Commissioner, Wisconsin.

Mr. President, Ladies and Gentlemen:

Your secretary's request for me to read a paper before the Illinois Dairymen contained no intimation of the subject upon which he wanted me to address you.

I have therefore taken the liberty of presenting to you a subject that is now being agitated in Wisconsin, namely, creamery inspection.

I am not familiar with creamery conditions in Illinois, but I take it that they are as much in need of improvement as is Wisconsin, if they expect to keep up with the march of improvement, the pace of which seem to be set by our neighboring state of Minnesota.

Minnesota has carried off the prizes at the recent butter contests at the World's Fair and the outside world, ignorant of existing conditions, necessarily has the idea—and with good cause we must admit—that Minnesota is par excellence the butter state.

They do not understand the forces that have been at work in preparing for these contests and the very different conditions under which the various states labor.

I do not admit that natural conditions in Minnesota are any more favorable than they are in Wisconsin, neither do I believe you will find here in Illinois, or that the men of Minnesota are any better, but we must admit that they have used methods of inspection that have produced results. We do not begrudge Minnesota what she has done along this line; she has been following out the advice of David Harum, "To do to the other fellow what he was going to do to you, only do it first."

I understand there are no state inspectors in Illinois. Wisconsin with its 1,200 creameries and about 1,800 cheese factories has but three inspectors, with the additional help of three instructors employed by the Wisconsin Dairy Association, whose work along the line of inspection and instruction is frequently interrupted by the demands upon their time by the 6,000 groceries, 2,000 butcher shops, 1,000 mills and several hundred city milkmen. That the force of inspectors of the Minnesota Dairy and Food Commission has done as much, if not more, than any other one thing to bring about the remarkable showing of the bread and butter state is not to be doubted. They visited those factories known to be producing fine goods and at the time of making the prize butter, it was an inspector who took in the milk, none of which was rejected, but which was divided into two vats, the best going by itself and the cream from which received the careful attention of both inspector and maker until it was made into the finished product.

Creamery Inspection.

We of Wisconsin have been looking with longing eyes on

the work of inspection as carried on in Minnesota, hoping that the time would speedily come when we too would be able to employ a sufficient force of inspectors to work along similar lines. The present Dairy and Food Commissioner during his two years service has been agitating the subject of an adequate number of inspectors for Wisconsin creameries and cheese factories. The work has resulted in some increase in our force of inspectors. That force, however, is much too small, but a wholesome sentiment has been created which at the present time seems likely to result in securing at an early date a suitable number of inspectors to meet our necessary demands.

The governor of the state has in public addresses expressed his conviction that the number of inspectors in the Wisconsin Dairy and Food Commission should be increased to such an extent that all of our creameries and cheese factories may each year receive proper inspection.

The agitation which has been effected in our Wisconsin Dairymen's Association, Wisconsin Buttermakers' Association, Wisconsin Cheesemakers' Association and the dairy press and throughout dairy circles is all favorable in a high degree to the success of this movement. We expect to accomplish much in the coming session of our legislature.

The making of a first-class article of butter can not be accomplished without the use of first-class raw material. We are willing to concede that a first-class maker may by the use of up-to-date methods overcome and hide to a certain extent, faults due to lack of care and cleanliness in producing the raw material. But sooner or later the fault will show itself to the detriment of the producer. Our greatest need at the present time is a first-class raw material, and it does not seem probable that we will ever get it except by a thorough system of inspection and instruction commencing at the factory and ending, if need be at the farm of the producer.

The work of the inspector will therefore commence with the morning's delivery of milk. This should be inspected, first, to see if it appears clean, that is, has been strained. I say,

appears clean, because a can of milk may be clean in that it may not have any visible dirt floating on its surface, but a careful pouring of the milk without agitation, as far as possible, will sometimes reveal dirt of even more harmful character than that kept out by straining.

The odor should be observed and in some cases only a testing of the milk will reveal what detrimental flavors are hidden therein. The seams of the cans should be examined to see if they have been thoroughly cleaned, as it is a fact, sad but true, that many women on farms do not know how to properly clean the milk cans and other utensils that come in contact with the milk.

In drawing the patron's attention to faults in his milk or cans, the inspector should be careful to properly instruct him in the best methods of handling the same so that he can avoid them in the future. Some patrons do not take kindly to such instruction and to use a slang phrase, "They fly off the hook." In cases of this kind it is well to remember that a soft answer turneth away wrath, and that the use of his authority is not always the best way to accomplish the results sought. A difference of opinion as to whether a milk is clean or not, sweet or not, may and sometimes does arise. The mere say so of an inspector or a maker will not always convince the patron. Some means whereby he can have the evidence set before him indisputably should be used. In the Wisconsin curd test and the Farrington alkali test we have such means and their use is to be recommended by the maker as well as the inspector. These tests will reveal to the patrons sense of sight, which in most cases will have to be depended upon more than his sense of smell; the defects in the milk produced by his slovenly methods and general uncleanness. He can see for himself how different is the result of the use of this test upon the good, clean milk in comparison with the filthy or improperly cared for milk. The good, clean milk will produce a clean, smooth, velvety curd, with close texture and agreeable odor. The unclean or improperly cared

for milk will produce a curd with gas holes or pin holes, of a loose or spongy texture and bad odor.

It is believed that to reveal the presence or absence of filth this test can be relied on with as much assurance as can the Babcock test to reveal the fat content of milk. This agency can be employed to educate the patron to a full appreciation of the quality of his milk which he is offering to the creamery, and this can usually be done without giving the patron any offense. The wonder is that this test is not everywhere used in creameries and cheese factories, and also to determine the quality of city milk supplies.

Under the instruction of the present Wisconsin Dairy and Food Commissioner this test has been made use of by our inspectors in Wisconsin's creameries and cheese factories and in determining the quality of milk supplies. Wherever used the results have been most gratifying and instructive. It is not claimed that this test will reveal the pathogenic qualities of milk, but it is claimed that it reveals the lack of suitable care and the presence of filth.

Here is a potent agency which should be brought into more general use to determine the quality of milk furnished creameries. The inspector, more than any one else, can be instrumental in bringing into general use by buttermakers the valuable test.

Another good way of convincing a patron that there is filth in his milk, is to catch the last of the milk as it runs from the can, and after allowing the sediment to settle, pour off quietly the larger part of the milk, filling the bottle up with water; after repeating this process which will largely remove the casein the sediment can very readily be filtered out. The effect of showing the patron the amount of solid filth taken from his milk in this way can not be but productive of good and lead to a change in the right direction.

The alkaline test is also to be recommended for use at the weigh can; by it the patron can be convinced that milk may be soured and unfit for separation and still not be thick and loppered. Under certain conditions it is advisable that the inspector make

his inspection and instruction extend to the farm. He can then see for himself under what conditions the milk is produced and prescribe such remedial treatment as will best fit the individual case. He can by these visits get in closer touch with the women who wash the cans and explain to them the objection to the use of a dish cloth in cleaning cans, washing separators and pails. Also point out the bad effects of having an uncovered can of milk or cream in the kitchen exposed to the odors of cooking, washing, fur overcoats and felt boots.

I remember having a patron whose milk was rejected for several days in succession, bringing me a sample of his fodder, thinking perhaps that was the cause of the trouble, the milk having a bad odor. Upon questioning him as to his methods of handling his milk the fact was brought out that when through milking the cans were left outside the barn and when chores were finished, carried to the house and left in the kitchen with the covers off. The concentrated effects of the causes mentioned above produced an indescribable odor. But when the milk was left outside and thoroughly cooled and then brought in with covers on tight no harm resulted.

This summer I had a trip with a buttermaker for an afternoon gathering cream. I thus had a chance to inspect the cans, separators and places where the cream was kept and was able to tell those people when they gathered at the picnic the next day, just where their practices needed correction. The covers of the shot gun cans when taken off revealed altogether too plainly that a dish cloth had been used to clean them and the odor of these cloths could readily be detected in the butter.

The work of the inspector does not end when the milk is all in; the makers' turn comes next and his methods of handling the machinery, ripening and churning the cream is next in order. The separator should be examined to see if it is running smoothly and is up to speed. Samples of the skim milk and buttermilk should be taken to see that no unnecessary loss of fat occurs. That the vats, vat-gates and pipes through which milk or cream has to pass, churn and other necessary utensils are properly

cleaned and cared for. Too many of the above named utensils receive daily a so-called Sunday wash, and the results are soon seen in yellow-coated churns, foul smelling pipes and vat gates.

The refrigerator also needs attention; too many of them being mere boxes partitioned off from the rest of the building. But poor as some of them are, they could be kept in a cleaner condition than they are oftentimes found. The vats or receptacles for skim milk or buttermilk should be examined to see that they are not slighted because they are usually out of sight. No maker can expect to receive first-class milk where the skim milk or buttermilk returned is not clean and sanitary. The facilities on the farm are usually none too good for the perfect cleaning of the cans and the remedy is prevention rather than cure. To show how undesirable germs or ferments may be carried from day to day by the seemingly clean cans, permit me to relate an incident told me by Dr. Russell. I met him on the train one morning and he told me he was going to Milwaukee to visit a certain large milk depot where they were having trouble with their milk supply. By the use of the curd test the doctor had found 30 per cent of the milk supplied unfit for use. In regard to the cans he said that a gelatine plate exposed in a *clean* can for a few seconds developed several millions of bacteria. A plate exposed in this same can, after being steamed for three minutes, showed a development of a few thousand

A Swiss cheese factory in Green county had trouble with its cheese. Milk was apparently good and the cheese also. But some time after the cheese was found torn apart as though an explosion had taken place in its interior. A cleaning up process was ordered; a new floor and new whey vat to replace the old barrels in common use. Still no improvement; new rennet from other factories, having no trouble, was secured, without relief. Commercial rennet was used next. Sour whey from another factory was secured to sour the whey, it being an idea of the Swiss makers that the fat will rise more exhaustively if the whey is soured. None of these efforts securing the desired result, Dr. Russell was called in. After making an exhaustive

examination he discovered a yeast germ in the cans that was the cause of the trouble, amounting to over \$3,000 before it was stopped.

Pasteurization of skim milk will prevent this so far as the skim milk is concerned but the buttermilk tank is still a source of danger and should be carefully looked after. The condition of the building, floor, drain and surroundings, especially where the skim milk is loaded should also receive attention. The smells arising from milk spilled on the ground and from poor or neglected drainage cannot fail to injure a product so susceptible to odors as milk or cream.

A study of the methods employed in ripening the cream; temperature employed in churning; washing and working the butter may reveal something to the inspector whereby the quality of the finished product may be brought to a higher standard. The tester and its glassware should be most carefully inspected, as it is this part of the business that causes so much trouble between factory and patrons. The record of the tests looked over, and if need be, the testing done. A high percentage of over-run may indicate a large incorporation of water, but more often it is an evidence of the buttermaker's effort to make a better showing than some neighboring creamery. We all know that a good deal of poor work is done with the test, especially since the advent of the hand separator, and the consequent handling of cream instead of milk.

If after an inspection such as I have indicated in the foregoing a meeting of the patrons and their wives could be held for instruction by the instructor, the amount of good resulting from his visits would increase manifold. I also believe that the publication of the results of these inspections of creameries in bulletins should be approved and recommended in the interest of clean and wholesome dairy products.

When the inspection reveals conditions that are habitually unsanitary or unclean and instructions or suggestions from the inspector fails to remedy these conditions then the inspector

must not shrink from his duty under the law to prosecute the offender.

It is not only for the interest of the producer, but it is the right of the consuming public that dairy products shall be clean and wholesome.

And when it becomes necessary the right arm of the law must be used to bring about these results.

Milk and its products are par excellence food products, therefore the place where these products are produced, whether on the farm, in the barn, creamery or factory, should be kept as scrupulously clean as are the places and utensils employed in the preparation of other foods placed upon our tables. We should rest contented with nothing short of this achievement. The inspector is to be ever a potent force in securing these conditions.

* The Minnesota butter taking first prize at the St. Louis fair was made under the supervision of the state inspectors.

DISCUSSION.

The President:—I would like to ask one question in regard to a statement which has gone into our records, and that is that when Minnesota buttermen take their premiums this butter is made by the inspectors hired by the state. Is that correct?

Mr. Moore:—Yes sir. While attending the Buttermakers' and Cheesemakers' Association, at St. Anthony Park, Dec. 1 and 2, I had a conversation with Dairy and Food Commissioner McConnell, with Mr. Trow and with Mr. Taylor, the maker of the gold medal butter, and they all told me that Mr. Trow personally took in the milk at the factory and, while none of the milk was rejected, it was divided into two vats. Mr. Taylor, the buttermaker, took the medal.

Mr. Glover:—While, perhaps, it is not the best policy to divide milk and select the best, the results show what can be done if better raw material is put in our creameries; and it simply strengthens our position when we ask for more competent

inspectors to go into the field and get better raw material to be manufactured into butter and cheese.

Mr. Moore:—It was not with any feeling of jealousy that I introduced this in my paper. As I remarked it was only following David Harum's advice "To do to the other fellow what he was going to do to you, only do it first." If Wisconsin had been in the position she would have undoubtedly taken this course. It was only to bring out the object of having a larger inspection force so as to have a better supply, that I spoke of this.

Along this line, let me tell you something else, Wisconsin while not a prize winning butter state, will not take off her hat to anyone in regard to cheese. Wisconsin took two prizes for cheese, but if you will notice where the cheese was made, it was made in two sections of the state where the instructors employed by the Wisconsin Dairy Association have been at work, and it is largely through their efforts and educating cheesemakers that this success has been brought about.

Music by Mendelssohn Trio.

The President:—Our session tomorrow morning will be held in the manufacturers' room, in the Mead building, opposite the Nelson House, and we will meet here again tomorrow afternoon at 1:30 p. m.

The secretary will now read the scores.

The Secretary:—The hall will be open early in the forenoon. The judge, Mr. Kieffer, who scored the butter, and Mr. Lea, of the University of Illinois, also Mr. Smarzo, an assistant of the Iowa dairy commissioner, will be there ready to answer any questions the exhibitors may ask about their butter.

The butter exhibited scores very high and averages very high for this time of year. The scores are as follows:

Creamery.

Louis Nelson, Camp Point, Ill.94	H. H. Benthien, Sandwich.94½
S. F. Smith, Columbus.96	A. G. Winter, Waterman.93

Geo. W. Hoppensteadt, Beecher .93	P. J. Springsteen, Egan .....93
Wm. Kane, Morrison.....94½	Ernest Johnson, Hebron .....94
Mat Ludwig, Lockport.....93½	W. J. Hyne, Evansville, Wis...90
Wm. Roby, Fairfield.....92½	C. A. Anderson, Belvidere, Ill..93½
H. H. Hopkins, Hinckley (Plano creamery) .....95	John W. Rhuby, Mt. Carroll...91
C. M. Dyer, Hinckley.....94½	Samuel McCarnaghie, Leland..89
Alice M. Cooksley, Stillman Valley .....94	C. T. Bragg, Franklin .....92
Chris P. Lorenzen, Rockford...93	I. G. Machamer, Lanark.....93
W. L. McNurlen, Oregon.....93½	Ralph Nelson, Freeport.....92
F. Dewey, Capron .....93½	F. J. Dickinson, Woodbine....92½
George Bloyer, Harper.....94	F. E. Rawson, Alden .....93
W. E. Mann, Pecatonica.. .95	D. Van Patten, Plainfield.....93
H. S. Tompkins, Union.....92½	Theodore N. Marquardt, Lom- bard .....91
G. A. Cutler, Belvidere.....94	A. F. Bolander, Martintown, Wis. .... .90
J. D. Terpening, New Lenox..94	Fred E. Swayze, Pana .....90
A. D. Farnham, Thomson...92	C. L. Sorenson, Zion City....89
George E. Tatten, Garden Prai- rie .....92	H. C. Hansen, Smith's Mills, Minn. .... .95½
Peter Nelson, Creston .....92½	H. S. Betts, Wacker, Ill.....92
H. R. Duell, Sandwich .....96½	

Dairy Class.

Mrs. H. P. Purviance, Lincoln..91½	Carrie McConnell, Ridott ....90
J. E. Willard, Belvidere.....89	Eli I. Crosior, Utica .....90
Lettie L. Dresback, Lanark ..88	L. N. Wiggins, Springfield....93
Mrs. Nora Pelley, Belvidere...91	

The President:—We will now stand adjourned.

Thursday Afternoon Session

Meeting called to order by President Newman at 2 o'clock p. m.

The President:—We have had a grand program all the days we have met here. We have had some of the best men in the

United States on this program, and this Thursday afternoon we still have them. We have had Minnesota, Nebraska and Wisconsin. We have had Iowa and this afternoon we shall have more from Iowa and also from Indiana.

We have with us this afternoon the chief of the dairy department of the Purdue University, the state college of Indiana. I take pleasure in introducing Mr. H. E. Van Norman.

**A MODIFICATION OF THE ALKALI TEST FOR DETERMINATION
OF THE RIPENESS OF CREAM.**

Professor H. E. Van Norman, Purdue University, LaFayette, Indiana.

Mr. Chairman, Ladies and Gentlemen:

I feel it quite an honor to be classed with the gentlemen from the states which your president has just named. Indiana has never been ranked, I think, as a great dairy state; we do not claim that for it and we do not promise ourselves that it ever will be, but the situation and location of the state makes whatever we do in dairying of considerable importance to us, although it is only a small part of our agricultural interests.

The subject I have selected for presenting to you this afternoon is of vital importance, I believe, to the creameryman. There is probably no factor that contributes more to a successful market, after good quality, than to have a uniform quality of butter and, so far as our information goes, as yet the only means we have of measuring that quality, or measuring any of the factors which contribute to that quality, is the determination of the acidity of the cream, and the experience of all successful

buttermakers who use the alkali test is that they can get a greater uniformity by its use than when they are simply depending on their noses and tastes.

There are two tests on the market, the Mann's test (so-called) and the Farrington test. What I propose to give you this afternoon is a slight modification of these which we have found very much more convenient in our laboratory at Purdue University.

These tests, as you know, are based on the principle that a given quantity of a standard alkali neutralizes a definite quantity of acid. When cream ripens, as the buttermaker calls it, the milk sugar in the cream is changed to acid. By measuring the amount of acid developed he has a fair index of the ripeness of his cream. It is perfectly possible to have the desired degree of acidity and yet have a very undesirable quality, to have a desirable flavor and yet not have sufficient acidity, so that the acidity alone is not an absolute measure of the butter.

The handiest method of referring to acidity, or rather of expressing the acidity, is in percentage. Farrington's test is based on the use of an alkaline solution of such strength that when you use 17.6 cubic centimeters of cream, which is the amount held by the ordinary Babcock teste pipette, and neutralize that with the solution of alkali, which in terms of the chemist is fiftieth normal, then each cubic centimeter of that alkali neutralizes .01 of 1 per cent of acid. With the Farrington test, in order to get a solution of that strength, tablets are prepared of such strength that when five of them are dissolved in 97 cubic centimeters of pure water (that is water condensed from steam, or rain water) the resulting alkali will have the desired strength. The modification which I give you is the way we have used it for nearly two years in our dairy school, and is as follows.

During the ripening of cream the milk sugar in it is converted into lactic acid by bacteria. The measurement of the amount of acid developed during the ripening is the nearest approach we have to a measure of the ripeness of the cream. For this purpose Mann's acid test and Farrington's alkali test,

have been used with marked success. Where either one of these tests are regularly used, it is the almost universal experience that the quality of the butter runs more uniform, and loss of fat in the buttermilk is less than where a man depends on his nose and his taste to determine the ripeness of the cream.

We have used in the dairy school and the station laboratory at Purdue, for a year and a half past, a slight modification of the tests on the market, which has simplified the work and contributed to the accuracy of results.

The apparatus required are a 17.6 cc Babcock pipette which should be found in every creamery with the testing outfit, a 100 cc cylinder, such as is used with the Farrington test, a two quart bottle, graduated at 1,850 cc., 37 cc of normal solution or eight ounces of Phenothalen indicator (a 2 per cent alcoholic solution). The caustic soda solution must be procured from a reputable chemical or dairy supply house, which can be depended on to furnish it of standard strength accurately measured. A two quart bottle, with a long sloping neck, such as is used for mineral waters sold at the drug stores, may be graduated by measuring into it carefully with the 100 cc cylinder 1,850 cc of water and then with a fine file marking the point on the neck to which the water rises.

To prepare the solution pour into this large graduated bottle the 37 cc of normal caustic soda solution, rinse the little bottle, emptying this, rinse water into the large bottle also, then fill with water. Condensed from steam pipe, if it is free from boiler compounds and oil, should be used; if not use rain water and fill the large bottle to the mark on the neck. This makes a 50th normal solution ready for use.

To Test Cream, Milk or Starter.

With a Babcock pipette measure into a white cup, or even a common composite sample jar, 17.6 cc of the cream to be tested, which has been well stirred; rinse the pipette out with clean water, putting the rinse water into the cream sample and

add four or five drops of the phenolphthalein indicator. Having filled the cylinder to the top or 100 cc mark with the 50th normal alkali solution, begin pouring slowly into the cream sample, mixing with a rotary motion of the hand or stirring with a glass rod until there is a pink color noticeable, which does not disappear by continued stirring. Note the number of cc of the alkali solution required to bring about this result. A cream under most conditions should be churned at an acidity somewhere between .55 and .70 per cent of acid, depending on the richness of the cream and market requirements for flavor.

Cream that requires 66 cc to neutralize it is not appreciably riper than that requiring 64 cc. While in the case of the Mann test, an error of 2 cc means a very appreciable variation in the ripeness of the cream.

Since the amount of acid present in any given quantity of cream depends on the amount of milk serum, we have adopted the rule in our work of ripening cream to the point where it requires .9 as many cc's of alkali as there are pounds of serum in 100 pounds of cream, the milk serum being the portion of cream not fat. For example, a cream testing 30 per cent fat would have 70 pounds of serum. .9 of 70 would be 63; therefore in our practice a 30 per cent cream should be ripened to require 63 cc of alkali or would contain .63 of one per cent of acid. In the case of a 25 per cent cream, there would be 75 pounds of serum, .9 of which would be 67½. Therefore, that cream would be ripened to .67 or .68 per cent acidity. Each buttermaker can adopt for his own use whatever relation he finds best. Then he can prepare a little chart and paste on the bottle:

20 per cent cream requires .72 percent acidity at churning.

25 per cent cream requires .67 per cent acidity at churning.

30 per cent cream requires .63 per cent acidity at churning.

If the above is too high he may take .8 as much acidity as he has milk serum.

The advantages which we have found in the use of this method are that the small bottles of normal solution do not lose their strength as long as they are left properly corked. Several

may be ordered at a time, reducing cost of expense and danger of breakage. The bottles measured out a year ago not having perceptibly weakened. The transportation charge on these small bottles is very much less than on the Mann's solution. The strength is more uniform than in the case of the Farrington tablets. In using there is less waste of solution pouring into the larger cylinder than is usual where the burette is used. The larger amount of a weaker solution used reduces the per cent of error in the final results. The size of the bottle and the cylinder are more convenient to handle, the cost per test is less. There is no waiting for tablets to dissolve. It is ready as soon as it is shaken up.

The confusion resulting from the use of two tests for the same work reporting the results in different terms has prompted the suggestion (New York Produce Review, June 8, 1904, page 210) that a uniform standard is desirable, and suggests the use of a 50th normal solution, which is in harmony with the practice in this laboratory for the past year and a half, and further suggest that buttermakers having Mann's test have but to make up a solution with one part Mann's solution and four parts distilled water, which may be secured from the steam pipe, or rain water may be used. This solution will then be equivalent in strength to a 50th normal if the Mann's solution was right, and with a graduated cylinder such as described above or a burette will enable the buttermaker to report the results in per cent of acidity since 1 cc of this solution will measure .01 per cent of acid when the cream is measured with a Babcock pipette.

It is recommended that the acidity of cream be reported in per cent, as being better for comparison and more convenient.

To Grade Cream.

In spite of the reluctance of many creameries to receive cream from hand separators, the amount of butter made from such cream is increasing quite rapidly. The increased value

of skim milk for feeding purposes, the every other day delivery of cream, the convenience to the farmer, all combine to make him want the hand separator, rather than the delivery of his whole milk to the creamery.

If the cream has been as well handled as the whole milk, as good butter can be made. The objection is not that the cream cannot be delivered in as good shape, but that it is not. The creamery that receives hand separator cream is confronted with the problem of getting a cream of that quality which will enable it to make first-class butter.

While it is not a cure-all for the situation, it has been found a great help to grade cream, and pay less for that which falls below a certain standard, arriving sweet and free from objectionable taints.

To determine the sweetness the alkali test may be used with marked success. For pasteurizing purposes it is considered that milk must not have over .2 of 1 per cent of acidity. This same standard may be adopted in cream grading, and any cream having over that amount may be classed as second grade.

For the sake of illustration we will use 2 per cent of acid as the standard. In the weigh room on a convenient shelf, arrange an extra set of pint or half pint sample jars, as many as are needed for the number of lots of milk or cream which it is desired to test for acidity. Before the morning arrivals begin, measure into each of the jars 20 cc of the fiftieth normal alkali solution described and add three or four drops of the indicator to each. This will give an alkali solution of a bright pink color. Have near some clean distilled water, or rain water. When the first lot of cream arrives, which it is desired to test, after emptying into the weigh can and thoroughly mixing, draw a Babcock test pipette (17.6 cc) of the cream and put into the first jar. Draw some of the clean water into the pipette to rinse the cream down which has adhered to the inside of the pipette, putting this rinse water into the sample jar with the cream. Having done this give the jar a rotary motion and thoroughly mix the cream and alkali. If the contents of the

jar retain an appreciable pink color, there is not sufficient acid present to neutralize the 20 cc of alkali and the cream therefore has less than .20 per cent of acidity. If, on the other hand, the color all disappears there is more acid than .2 per cent and the cream would not be accepted as sweet.

Any standard of acidity may be adopted that the experience of the creamery dictates.

To measure the alkali into the jars the regular cylinder may be used or if the pipette is one of those with a fairly large diameter and the 17.6 mark down close to the bulb, 20 cc may be measured into it carefully and with a file it can be marked; then the alkali can be measured into the jars with the pipette and the same one will do for both; remembering that the number of cc alkali used for 17.6 cc of cream represents the per cent of acidity.

The small amount of cream required makes this an inexpensive test. Placing the question of sweet or sour on so nearly an exact basis, rather than entirely on the judgment of the man weighing in the cream, often has a very helpful influence on the mind of the patron in convincing him that there is really a difference between the cream which he is bringing, and that which is wanted.

It will usually not be necessary to test all the cream received each day, especially after it has been done regularly for some time.

DISCUSSION.

Mr. Moore:—You say your standard is nine. Is that not rather high? For Wisconsin we use eight, and I think that is high enough. It seems to me that a cream with 30 per cent fat, with an acidity of 63 to 65, as I remember you stated, would be entirely too ripe for our conditions.

Prof. Van Norman:—That may be true. A buttermaker must use his own judgment and suit his market. We are making all our butter from pasteurized cream and we find that for

our market that is not too high. I may say (if I am any judge of the quality of butter) that it gives a milk flavored butter. I know in our local market people who have been using local creamery butter do not like ours, because they say it has no taste. The creamery, of course, has a cream that is very ripe, almost rancid sometimes. On our sales to Indianapolis, the only comment is that our butter has a delicate, mild flavor, so I conclude that for our conditions that gives satisfactory results.

Mr. Moore:—I don't think you can lay too much emphasis on the importance of our getting together on the expression of acidity. Too many buttermakers call it cc acidity, and I have known buttermakers with no previous teaching to try to express it in Farrington, which threw them entirely off, and some losses have resulted.

Prof. Van Norman:—The result of this work will be published in the near future in bulletin form. I have put into that publication the recommendation that we do get together to facilitate that, and help the man who has gone past his opportunity to go to college. I shall include a table showing the relation of the two readings. For instance, the number of cc by Mann's multiplied by .018 gives you the amount of acidity. Of course I know that in the great creamery sections of Iowa and Minnesota there are whole communities of buttermakers who have been using Mann's test, and it will be a long time before those boys will ever change and it is only by giving our attention to the younger generation that we will ever get together, if we ever do.

Member:—We will say that supposing a cream tests 30 per cent, that is 30 per cent butterfat, what portoin of that is butter? How many pounds of butter would that make?

Prof. Van Norman:—That depends on the amount of over-run you can make. One hundred pounds of 30 per cent cream would have 30 pounds of fat in it; in ordinary practice that 30 pounds of fat ought to make you from 10 to 15 per cent more butter than fat, which would be three to three and one-half pounds more. So that 30 pounds of fat should make you in the

neighborhood of 33 to 34½ pounds of butter. It would depend largely upon the skill of the buttermaker in avoiding losses, and in the manipulation and incorporation of moisture, salt, etc. In other words, 100 pounds of fat ought to make from 110 to 115 pounds of butter; 100 pounds is low, but many creameries do not get above that. I know at the university it sometimes runs 115 pounds, but when over that they have to show me that they have not made a mistake somewhere.

I don't know how it is in your state, but with us we have the feeling that in spite of all the objections to the hand separator it is coming, and it is coming fast. One of our most prominent creamerymen told me yesterday that he had made complete arrangements to receive nothing but hand separator cream after the next two months. A year ago he was making inquiries about the hand separator, wondering whether it was advisable to take it up or not.

Conditions with us are changing rapidly. The fact remains that in almost every instance where the hand separator has been exclusively used, the quality of the butter has not been up to that made from the whole milk, not because it cannot be but simply because it is not. There is a great amount of educational work to be done in instructing those patrons on how to handle their cream in order to get the same results in quality, and creameries have been so reluctant to undertake that gigantic problem of educating the farmers that they have worked against it as long as they could; but I believe they will have to come to it in a great many communities.

At the university we are making all our butter from hand separator cream. We have the advantage, though, over the ordinary creamery in that our farmers sort of feel that a university expects a better quality of product. We get our deliveries three times a week, except in the coldest weather. We would like them all the time, but we are just like other folks—cannot always get what we want. I believe one of the things that is going to be important in helping to raise the standard of the hand separator cream butter is paying for the cream

according to quality, because when you touch a man's pocketbook he learns wonderfully faster, and if you show him that you honestly cannot pay for poor cream as much as you can pay for good, most of them will improve the quality of their cream very much. They may not admit it themselves, but somehow they will do it.

One of the few means of measuring the quality is determining the acidity of it when it comes to the creamery. It may come sweet and you will have all sorts of bad flavors in it, but testing the acidity of that cream as it is delivered will be a help and often a great help in convincing the farmer that there is a difference in his quality.

I went out to one of the points where our cream comes from and tested nearly every lot of cream that came in. It was almost laughable to stand there and see the looks on the faces of the different farmers as they watched the results, to see if their cream was going to be pink or not. After they went out you would hear them say, "Mine passed all right," and another man whose cream showed too much acidity, would say, "I don't believe that fellow knew anything about it." There is generally a little mystery. They do not understand it, and somehow when we do not understand a thing we have a good deal of respect for it, as a rule.

So the alkali test may be used for determining the acidity of cream when it is delivered to the factory. It does not seem necessary for me to test every lot of cream every day, so I suggest that in the weigh room the acidity of cream from different lots may be determined as follows:

(Let me add a little explanation.) We have to adopt a standard of acidity for cream. In pasteurizing milk, we generally say we will not accept for pasteurization any milk that has over .2 of 1 per cent acidity; in other words, our pipette full of milk must not use over twenty cubic centimeters of this alkaline solution in order to pass muster. If you will adopt the same plan for cream you are sure of having a sweet cream. It may have stable odors—this test will not detect or improve stable

odors. I think in our large centralizing systems in the west they accept a higher per cent of acidity than .20 per cent.)

We are not going to accept as first grade cream any that has over .20 of 1 per cent of acidity, therefore we set on our shelves a dozen, or two dozen, or as many small bottles as we want. Into each of these bottles we measure 20 cc of alkali, and have them ready before the cream arrives. Put into each five drops of indicator; the moment that indicator gets into the alkali it is going to be a bright pink. When your cream is emptied into the weigh can to be weighed, take your Babcock pipette and draw out a pipette full of cream, putting it into the first jar; draw a pipette full of water, shake pipette and put that water into the cream. You now have in the bottle a pipette of cream and 20 cc of alkali. Mix them up thoroughly; if it still stays pink that shows there is not over .2 of 1 per cent acidity and that cream will pass for sweet. If, on the other hand, the color disappears, then you know there is more than twenty per cent of acidity, and if that is your standard it would not be acceptable for first grade cream.

If you find that too sweet and you are willing to accept for your work cream with a higher degree of acidity, measure into your bottle a little more alkali, 22 or 23 cc, whatever per cent you want to adopt as a standard.

The small amount of cream required for this test makes it inexpensive, and the amount of alkali is small. We have used the test in our work, to check up and as an educational factor with our farmers. We find the effects of doing that occasionally is very wholesome, and they are more careful. We find they keep their cream at home on days when they are afraid it will not be acceptable and make it up into butter for themselves, so we receive a reasonably satisfactory quality of cream which we make up into hand-separator butter, so-called.

Mr. Gurler:—How would you arrange if you had a team in the country gathering cream; that cream is weighed and put in a can, different grades in different cans. How get a sample?

Mr. Van Norman:—How do you pay for that cream?

Mr. Gurler:—Pay for the butter fat. We take a sample and put it in a bottle. The man takes a sample of that cream before he turns it into the can.

Mr. Van Norman:—Do you expect him to exercise any judgment or know anything about cream?

Mr. Gurler:—He is supposed to, but does not always appear to do so.

Prof. Van Norman:—If he is supposed to know a little something about cream there is no reason why he should not take advantage of this test. Give him, then, a bottle of this alkali solution. You can get him a pipette which has two marks on it, one represents 17.6 cc and the other 20 cc, if that is your standard, or whatever you are willing to accept. When you give him his bottle of alkali in the morning, you can put into that alkali enough indicator to make it a bright pink and it will save him carrying a separate indicator, but that indicator will only be all right for a day or two. He comes up to Mrs. Smith's house; he has weighed the cream and suspects it is not what it ought to be. He takes out his pipette, measures into a clean cup or sample jar 20 cc of alkali; with the same pipette he measures in the 17.6 cc of cream; the house will have to furnish a little water with which to rinse the pipette out so as to get all the thick cream into the test jar. If the color disappears there is more than 20 per cent of acidity in it. So all the additional equipment would be a pipette with two graduations on it, and a little bottle of alkali.

The President:—Who is to do this testing?

Prof. Van Norman:—That is for the driver, and how, the driver would determine. That is one method. Another method would be to test at the creamery the sample that the driver brings in of each man's cream.

Mr. Gurler:—They generally bring a small sample. There is a difference where you use the Babcock test of two or three ounces.

Prof. Van Norman:—You will usually have enough cream so the man at the factory can determine the acidity, but if you

leave it until you get it to the factory the sample has increased in acidity. If you want your driver to discriminate, the testing must be done at the farm right then and there. If he goes along morning after morning he will not have to test many. It is only now and then he will find a bad case that it is necessary to test, and it is a question for you as a manager whether the advantage will justify the little extra time it will take. I am inclined to think the explanation makes it seem more work than it is.

Mr. Gurler:—They have time to do the work, but will they satisfy all the patrons. If he rejects their cream they will say, "Here, there will be a man along here and he will get the cream," and he does.

Prof. Van Norman:—You are up against a problem I have no solution for, and I know of no man that has.

Mr. Gurler:—The idea is all right, but whether it is practical in the country in some sections, is another question.

Prof. Van Norman:—I cannot of course advocate or prescribe it in every case. Is it true that the buttermaker running a creamery has all kinds of difficulties to encounter when the milk and cream is brought by his patrons to the door, and he has to use his good sense and judgment to solve them, and let the hauler use his tact and judgment in the same way in determining the acidity. In the west where they have big creameries, they are using this test and using it with a reasonable degree of satisfaction. In a community where there are a large number of competing creameries these problems have to be handled more tactfully, and often creameries have to suffer because we have to take what we don't want. Only last week I had a letter from a woman who ships us a nice lot of cream, stating that the December test was too low and that she must have a better test next month or she would not send. I wrote her that our test is only a device for measuring and like a pair of scales, and if we were wicked we would cheat on the scales. The only difference is that she understood the scales a little better than the test. You can get a Babcock tester for \$5.00.

I think that always makes a pretty good recommendation to the kicker who questions the accuracy of your test, to advise him to own a tester and check up. I believe you are conducting a straight, square business in this section, 90 per cent of the creameries are, and will stand investigation on the part of the patrons; and if you have a reputation among your patrons it is only a question of a little further pains to show that the alkali test is honest. If we did not have those troubles to contend with everybody would want to go into the creamery business. But I believe under certain conditions this alkali test may be a help. We have found it so.

There is one point that I lay a great deal of emphasis on in our work with the dairymen, the dairy farmer, in feeding any and everything else. The great mass of people are trying to get a groove into which they can shove their individual wants. As a teacher, the hardest thing I have to do is to make my statements in such a way that everyone will not try to get into a groove. There is hardly a bit of advice in our papers, or at our meetings, that will not get someone into trouble if taken too literally and without the exercise of judgment. On the other hand, if it is measured by a little thought and care, some of it will be found useful in at least a part of many a man's business. The same is true of this alkali test—it is not a cure-all for all evils. There are places where it is a help.

The President:—The most important subject at this time to this association, and especially to the dairymen of the country generally, is legislation on dairy matters, which is under the control of our National Dairy Union. You who heard my paper on Tuesday know just how I feel in regard to this matter, and I shall now call on Mr. S. B. Shilling, president of the National Dairy Union of the United States, which is our legislative body working in conjunction with our several state associations.

REMARKS.

S. B. Shilling, President National Dairy Union.

Mr. Chairman, Ladies and Gentlemen:

You will notice, perhaps, on the program, that I took the place of an Iowa man, but I want to say to you that we have a kind of queer way of doing things out in Iowa, anyway; we all belong to one happy family. The Iowa dairy commissioner's office, the state dairy school and the state dairy association all work together, and therefore it does not make much difference which gets before the people first.

I represent two lines of business, one of them is dairy farming and the other is begging. Now I don't want anybody to get up and go out with the idea that I am going to work very hard on either this afternoon, because I am not; but, as the president has paved the way for me, I think probably I had better cut the rest of it out entirely.

The fact is, I have had a pretty bad dose on my mind for sometime in regard to dairy farming business, and I don't know whether I can settle it and get rid of it without telling you about it. I have labored under the impression for sometime that I was a dairy farmer, but inside of the last year or two I have about made up my mind that I am not, that I am only a sort of make-believe, and if any of you who are familiar with the dairy type of cows would look at my cows today you would make up your mind where "I am at." The fact is, while I thought I was breeding dairy cows and have been trying along that line, I recently found that I knew very little about it and that my herd is inclined towards the beef type. And I will say this, that if God will forgive me for the injury I have done to the dairy indus-

try by breeding and sending out beef cattle for dairy cows, I will turn over a new leaf and not do it any more.

I met a man down street a while ago and he asked me how I liked my silo. I suppose you have had the subject of the silo at your meeting here, but if you have not you missed an important subject, and I think I will tell you the same as I did him, that I feel that I ought to hire a kicking machine and make a public exhibition of myself for not building it long ago, as a warning to the rest of the dairy farmers. A year ago I paid out between six and seven hundred dollars for feeding on my farm, and it kept me awake nights to know where I would get money to pay for it. I built a silo last spring, and I have so much feed now it keeps me awake nights to know what to do with it.

Now I am going to tell you what my silo cost. I built a silo that holds what the silo people said was 150 tons, according to silo measurement; but I got in 176 loads and we weighed twelve loads and they weighed 2200 pounds each, and there was very little difference in any of the loads. I built that silo for \$178, but I got bit in the building a little. I can replace it today for \$160. I filled that silo without a dollar of expense—I am not out a dollar to fill that silo. That may be a statement you cannot see through, but any of you can do the same thing. Three of us in the place had silos—two built our silos at the same time, the other had one. I admit that I bought the cutter, another man had the engine, and the other man furnished the binder and team. We filled the three silos in nine and a half days by changing work, and are not out a dollar for filling them except for the gasoline, and I have the best lot of feed I ever had or could have. It is possible for you to do this. We have no advantage over you and we accomplished those results, we three neighbors in Iowa. It took five teams and eight men.

Mr. Van Horn:—Those were regular laborers, were they?

Mr. Shilling:—The men on my farm and the other two farms.

Question:—What was the capacity of the three silos?

Mr. Shilling:—The capacity of mine was 160 tons, the other 100 and the other over 200 tons.

Now I must leave this subject because I have only a limited amount of time to talk to you about the National Dairy Union, and, as the President stated when he paved the way for me, I am glad the situation has been told you by other than myself. The fact is I consider that the legislative part, the protection being offered the dairymen today, is really the most serious question confronting us as dairymen. It does not seem necessary for me to give you any history of this National Dairy Union; it seems to me that must be generally known to you. I am only going to make a few statements in regard to what has been accomplished.

This organization was formed six years ago, the object being to curtail the output of a substitute on the market which was taking the place of butter. When I tell you that this product had grown to the enormous amount of 126,000,000 pounds, which at that time was equal to one quarter of the output of butter in the United States, you must know the situation was serious, and had nothing been done to curb the output of this product I do not believe there would have been a dairy association in Iowa or Illinois. I believe were it not for the work of this organization, which has been backed by you dairymen and to you the credit is due, we would all be out of the business. When you take into consideration that the material from which they manufacture this unlawful product is of unlimited quantity and can be produced at 7 cents per pound at a profit, you can see where the dairymen would be if nothing had been done to stop the sale.

The National Dairy Union secured a law which placed the sale of this article under the supervision of the Internal Revenue Department. I want to say to you that we have not now and never have had any quarrel with the legitimate manufacture and dealer in oleomargarine. I will go further than that, I will go so far as to say that their business is just as legitimate and honorable as ours, so long as they conduct it so, but we do say they

have no right to manufacture their product and sell it for ours. That has been our contention from the start.

As I told you, we succeeded in securing the passage of this law. At first the tax on colored oleomargarine was 2 cents a pound, but we found it wholly inadequate. We afterwards secured an amendment to that law, taxing the colored article 10 cents, and reducing the tax on the uncolored to $\frac{1}{4}$ of a cent per pound. It seems to me that this ought to be known to you and I am simply taking up your valuable time when I dwell upon any details as to how this fight has been carried on or conducted. So far as the result of the law is concerned, one statement would be satisfactory to you, when I tell you that we reduced the output of oleomargarine from 126 million pounds to less than fifty million pounds, so the law has been everything we hoped for and even more.

I had the pleasure of standing before your organization in Southern Illinois a year ago. At that time we had some important cases before the Supreme court of the United States. The decisions were withheld until sometime in July when we got one and the last one, the one effecting us most seriously, was not decided until November, but every decision has been in our favor. There is no longer any question about the constitutionality of our law. We have everything on our side, and so far as a question of that kind it has been entirely stricken out, but we are confronted at the present time by another proposition.

You must understand and realize that the profit in the manufacture of oleomargarine is immense. You can see the incentive, and there is a huge amount of money back of this proposition contributed by the combination that is trying to get control of the dairy product the same as it has control of our beef products today, trying to break down that law or get another.

I want to say to you that I believe the only industry that the farmers have in this country that is protected is dairying. That may be a broad assertion, it may be something that perhaps I could not sustain in an argument, but I am satisfied in my mind

that the only product that is sold on our farms today where the price is regulated by supply and demand is the dairy product. Another thing I will say, and I say it without fear of contradiction, that were it not for the work of the National Dairy Union you would not be receiving the price today for your dairy products; you would be out of the dairy business.

We are confronted by another proposition. You are aware that at the opening of the present session of our national legislature there was talk of a repeal of this law. The rumor first came to us as a repeal, but after we investigated the matter we found it was not a repeal; it was asking for a modification of our law. They asked for a reduction of the tax from 10 cents a pound to 4 cents. Mr. Knight, the secretary of the organization, the man who has been at the front in this fight from the beginning, went to Washington, and reported on investigation that there was probably no question about this law being prepared; he found out that this bill, with the provisions it carried with it, if it went through as prepared, would nullify our law of today.

But when they first commenced to prepare this bill they did not take into consideration the splendid organization the dairymen have (and I do not believe there is an industry in the United States today that has as perfect an organization as the dairymen) and when in less than thirty days the protests and resolutions from the dairymen commenced to pour into Washington they found they had made a mistake. They found they could not push a measure through without powerful opposition, and since that time we are in this position—we do not know what they are doing. We have information direct from one of the senators to the effect that the fact of the dairymen rising up as they did has taught their opponents that if they do anything they cannot have a brass band and announce it. Another thing is owing to the crowded condition of the work in the legislature, some of their friends have warned them against further attempts at this time.

The matter is up to you now. There is no question but we will have to fight this thing again sometime or other, whether

we do it now or in the future is simply a matter of time. We are up against a proposition. They are determined to make an effort to secure the repeal of this law and their success or failure will depend upon the amount of backing the National Dairy Union gets at the hands of you dairymen. The whole thing lies with you; we are instruments in the hands of the people. If you furnish the backing as well as you have been doing we feel we are justified in giving to you this assurance, that it will be years before they can do anything; but if we cannot have your financial and moral support, because one is worthless without the other, we cannot do anything. If we have that we are perfectly easy and feel that we can combat anything they may undertake.

I shall not undertake to tell you the amount of money that has been expended in this work, but it has run into the thousands and tens of thousands. This money has been furnished by the dairymen. I am glad to say that of late we have received liberal contributions from Illinois, but at the same time I must say that the great bulk of our support today is coming from Iowa and Minnesota, but do not think it is in a spirit of fault-finding I am telling you this. It is due to the fact that in those two states we have organizations. I don't know how many in the state of Minnesota, but in Iowa we are well organized, and so far as dairying in our state is concerned, the grandest and best work we have ever undertaken is in these organizations. They are doing more for Iowa than anything we have undertaken.

You cannot get the average farmers of the country to attend the state dairy association meetings. If you expect that in Illinois you will find you are going to be mistaken, just as we have been in Iowa, and we have to take the doctrine of good dairying to the farmers. In the first place, a man who will come clear across the state to attend a dairy convention does not need the instructions. It is the man on the farm we have to go after, and you can only get after him by going straight to his home. But I am getting away from my subject, and I am going to quit that.

In conclusion, I want to say that the National Dairy Union is your organization, it belongs to you dairymen of the United States. We are, as I said before, simply instruments to carry out your wishes, and we not only want your financial support but we want your moral support as well, and I want to ask you to do this—take this question home with you, explain it to your people; tell them what the National Dairy Union is doing for them, that it is protecting your industry from the grasp of a combination (and I don't believe it is a mistake to say that it is the same combination that controls the value of your beef) and that today we represent the only organization that ever grappled with a trust of this kind and have been successful in every particular.

I thank you.

The President:—One thing I have noted in Brother Shilling's remarks, and I have noticed the same thing in the remarks of nearly every speaker that has come before us, that is the importance of this field work. Illinois started it two years ago. You must take this knowledge right to the farmer. We cannot gather them together in one immense body, even if we are the state organization. They cannot afford to all come here from Southern Illinois. We must get this bill through our legislature this year so we can increase this field work. We should have six or seven men in the field if possible, the more the better.

The next on the program is an address by Mr. Irvin Nowlan, of Toulon, after which we will have the election of officers.

REMARKS.

Mr. Irvin Nowlan, of Toulon.

Mr. President, Ladies and Gentlemen:

I received a hint when I was at the hotel this noon from a gentleman, who asked me why I did not get here sooner. I



PROF. E. H. FARRINGTON
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told him it was impossible as business would not let me get away from home, and then he said, "When you get up there this afternoon don't tell them you have come unprepared, and then reach in your pocket and pull out a thousand, more or less, sheets of paper." So I brought two with me and if I get through with what is there I will consider myself lucky and you will probably feel yourselves more fortunate.

I do not feel much like talking as I left home yesterday at 4 o'clock and have been on the road all the time until I reached here at nearly 12 o'clock today.

Mr. Caven took it upon himself to ask me to come here and say a few words, but he has yet failed to give me an explanation of why it was me he wished to come unless it was like the boy who took his mother to the railway station. Bye and bye he whispered to his mother. His mother went up to the railway agent and said, "Please, sir, when does the 4:10 train go?" "Ten minutes past four." She went back and sat down. In a few minutes the boy whispered to her again and she went up to the agent and said, "Please, sir, when does the 4:10 train go?" Again the answer, "Ten minutes past four." She repeated this several times and finally the agent, becoming exasperated, said, "Why do you ask me this all the time?" "Please, sir, don't feel bad about it, but my little boy likes to see you wag your jaw." Perhaps that is the case with Mr. Caven.

I do not expect to agree with a great many here and I am going to take just one section of dairying, just so far as handling the cow is concerned. I am not going into details of handling the product or anything else. I will take the animal, feed her and produce milk as cheaply as possible. In the cow I have found that we have the power, the machinery and everything for converting that feed into milk without any additional work upon the part of the farmer.

We started out sometime ago giving our cows prepared feed, prepared, you might say, all but the digesting for the cows, and we used up considerable capital finding out that the cows could do that just as well as machinery.

It is not all in the handling of feed either. We keep the cows in a warm place, don't let them out at all, to speak of, unless the day is very nice. We do not dry any of our feed and we do not buy any feed. We feed all we can raise to the cows in almost the same condition as the feed is harvested. And, by the way, I want to say right here, while I admit that the question about ensilage has come up, I have not been able to use it, as we are making butter to some extent, but part of our milk has been used for filling physicians' perscriptions, and they object to the use of ensilage—so I cannot say anything on the ensilage subject.

We have cut our fodder in the fall or early in the winter; stack it the same as you would wheat or oats, cover it sometimes with straw and sometimes no covering at all, and we did shred that fodder, but we cannot find any advantage in that. We have been cutting it until this year, but now we are feeding it whole, not even taking the corn off—feeding the corn fodder entire as it comes from the field. We find so far that we have just as good results as when we ground our feed, put it in and gave the cow every inducement possible to eat. She eats it and she seems to be just as hungry for it and I know, so far as my bank book is concerned, that she is just as productive and we are at a great deal less expense.

Now you will say "There is a waste in feeding cattle in this manner." I say there is no waste. We have about one hundred hogs that follow the cattle, the same as the beef man allows his hogs to follow his cattle. We ship the hogs out and we figure that what we save there is clear gain to us. Having arrived at this conclusion, I could speak only on this one particular point today, the feeding of the cow. My time is limited; I have not had time to prepare anything, but as this was uppermost in my mind, it was impossible for me to speak on anything else.

There is a man in the audience who has had a great deal of experience along that line and I have made arrangements with him to help me out a little along this line, as I believe more can be gained by discussion of any question than can be learned by

a man talking all day, and I am therefore going to call on Mr. Mason.

DISCUSSION.

Mr. Mason:—In feeding those cows that way did you ever test to see if it did not take more grain to produce the same milk?

Mr. Nowlan:—I cannot say that it does. We feed a great deal heavier than most people, give sixteen to eighteen pounds of feed to the cow.

Mr. Mason:—When you were grinding the feed?

Mr. Nowlan:—Yes sir.

The President:—Why do you grind it?

Mr. Nowlan:—We do not grind it now. We feed them sixteen, eighteen and sometimes twenty pounds.

Mr. Mason:—What kind of feed when you ground it?

Mr. Nowlan:—Ground corn, ground fine as you could get it; oil meal and bran. We used eleven to twelve pounds of ground corn cob, about four pounds of oil meal, and balance in bran, making up sixteen to twenty pounds.

Mr. Mason:—What are you feeding now besides corn?

Mr. Nowlan:—We feed corn fodder; we feed it in racks; the racks are about two feet high, four feet wide, eighteen feet long; solid bottom, so they cannot waste any. The bran and oil meal we feed in the barn; we cannot get along without feeding some bran.

Mr. Mason:—Do your cows milk as well as usual?

Mr. Nowlan:—Yes sir, on the average, but I would not want to lay it altogether to the feed so far this winter, because it is very marked. We average two pounds more so far than we did last year, but whether this is due to feeding or weather conditions I cannot say, the weather conditions are quite different.

Mr. Young:—About what per day does the cost average?

Mr. Nowlan:—You can figure it out. On a year's basis, it would average about \$32 per month.

Mr. Young:—Feeding at this time of year?

Mr. Nowlan:—It would cost us about that, between \$30 and \$32 at the present time, the way we are feeding now, counting time and interest on money.

Mr. Mason:—What breed of cows have you?

Mr. Nowlan:—It is pretty hard to tell; some Holsteins, some Jerseys, some Shorthorns. We have some full blood Jerseys and Holsteins and some grades of the two, but the dominating breed would be about half-blood Holsteins, quarter Jerseys and quarter Shorthorns. That would be about the average

Mr. Young:—What is the limit of age of your cows? Will young cows masticate this better?

Mr. Nowlan:—Yes, the younger cows are the better results you get in feeding like this, but we figure now on getting rid of our cows when they are between five and eight years old. It depends on how they stand feed and production.

Mr. Mason:—Did you ever have any experience in your dairy business in trying to make milk on a small ration of about six or seven or eight pounds.

Mr. Nowlan:—I was brought up on that and it took me a long time to find out differently. If a person had just a few cows, three or four or a half dozen, a good place to keep them; wanted to spend plenty of time in taking care of them and preparing the feed, etc., that might work very well, but we could not do it. I do not believe we got any better results for the amount of time, expense, etc., of preparing the corn, when we fed it that way, than we do now. I know the yearly production of milk is greater with heavier feeding.

Mr. Van Norman:—Might I ask you again to sum up the day's feed for your cows under present methods, kinds of feeds?

Mr. Nowlan:—We husked out a few bundles of fodder so as to get an idea of the average amount of grain that each bundle

would contain, and then we fed about so many bundles to so many cows. That is the way we figured it out, that corn will average now from one and one-half to two pounds more than when it was ground, and $13\frac{1}{2}$ to 14 pounds in whole corn will equal 11 to 12 pounds where ground. Then we feed from $2\frac{1}{2}$ to 4 pounds of oil meal, and then bran in proportion to the productive capacity of the cow. We do not cut the fodder at all, and the cows are all fed fodder, fed outside. The difference in the feeding we make in the oil meal and bran, because they are fed there in the barn while being milked, and we only keep our cows tied while milking them.

Mr. Glover:—How much butterfat are your cows producing on an average?

Mr. Nowlan:—It is running now just a little under 4 per cent.

Mr. Van Norman:—What is your average yield of milk in the year?

Mr. Nowlan:—You see we have not fed this hay ration a year. I have not the figures to give you on the whole grain ration.

Mr. Glover:—How much butterfat are you producing per cow on that ration?

Mr. Nowlan:—The cows are producing at the rate of 302 pounds of butter per year. That is at the rate they produced this last thirty days.

Mr. Glover:—What per week? Are your cows making a pound of butter per day, or two pounds, on that ration?

Mr. Nowlan:—The cows are making about a pound and a fraction. I cannot get down to fractional figures. A little over one pound, I think.

Mr. Glover:—You are feeding about 12 pounds of corn?

Mr. Nowlan:—We are feeding about 16 or 18 pounds, all told.

Mr. Glover:—Figure what that ration costs you to get a pound of butterfat. Your oil meal costs a cent and a half a pound at the present time, and that is six cents for oil meal.

Mr. Nowlan:—I could not tell just exactly at this time what that ration costs. The ration on ground corn costs us for a set of five cows that produced on an average of 337 pounds of butter last year, \$40.70.

Mr. Glover:—Is it not safe to figure that your ration of grain alone is costing you 16 cents per day, plus whatever your roughage is?

Mr. Nowlan:—Certainly, but by having the hogs running after the cows we are having practically no waste.

Mr. Glover:—I wish I could agree with you in your system of feeding, but I cannot.

Member:—How much oil meal do you feed on the average?

Mr. Nowlan:—On the average, I do not suppose we feed over $1\frac{1}{2}$ or perhaps 2 pounds.

Mr. Van Norman:—Do your cows gain in weight on that ration?

Mr. Nowlan:—Yes sir; we can sell those cows. Those with a preponderance of beef blood are usually in a good shipping condition by the time they are dry.

Mr. Glover:—There is a man here with a herd of cows that is producing on an average of 300 pounds of butter a year. I want him to state the amount of grain he is giving those cows. Mr. Young has been testing his cows and I want him to give his experience.

Mr. Young:—For the past two years we have been feeding about thirty pounds of ensilage, or a trifle over, one hundred pounds to three head; about five or six pounds of Manhattan gluten meal, and probably seven pounds of clover hay and shredded corn fodder, whatever they want, the amount was not curtailed at all. That has been their ration for most of the time; at times, when short of gluten feed, I have fed bran.

Question:—May I ask what condition that ensilage was in; that is in regard to the quantity of corn in it?

Mr. Young:—There was not a good deal of cured corn. It was this old Virginia ensilage last year and the year before not mature corn. The ears were quite large but they were not fully out.

Question:—There is considerable corn in it; that is in the ensilage?

Mr. Young:—Yes sir, the stalks run so large that the portion of corn was not as great as in ear corn.

The President:—We must hurry on this subject, but I just want to say this much about it—if you will refer back probably six years in our records, you will find this same thing brought out in a paper by Mr. Judd given us down at Dixon. I do not think we should waste our valuable time in threshing over old straw. If you will look over your records you will find this just the same.

Mr. Judd believed in feeding grains of all kinds. He had figures he scared us all on; he had a blackboard and showed us where his feed scarcely cost him anything. It is not always the kind of feed we give the cows, but the man behind this stuff.

Mr. Van Norman:—The intimation was made that they are feeding a lot of cows and therefore they had to feed fodder in that way, that they could not afford to feed them carefully and study closely. I know one herd where there are three hundred cows. One hundred and fifty are fed every pound of feed that they get; they are fed to exceed not eight pounds of corn apiece; they want that grain so light that four quarts of it will weigh as near $2\frac{1}{2}$ pounds as they can get. They claim they can reduce the productiveness of those cows by over-feeding them roughage. These people are weighing the milk every day of those cows and have an average of over six hundred pounds per cow per year, and they believe it pays to feed a good grain ration and feed them light. In the case I refer to, the owner of those cows knows every individual cow in that herd and

he knows whether a half pound more feed will produce more milk or cause her to fall off.

Question:—Do you believe in feeding bulky ration and let her take all she will eat?

Mr. Van Norman:—No. The point I make is that they have gone further than that and say you can feed her not only too much grain, which many people admit, but that you can also feed her too much roughage.

The President:—We have quite an important subject left and I shall call on the nomination committee now if they are ready to report.

REPORT OF NOMINATING COMMITTEE.

On account of action taken yesterday by this convention, the nomination committee has not sent in names for members of the advisory committee acting with the department of dairy husbandry of the University of Illinois, in the expenditure of money appropriated by the legislature for dairy purposes. We recommend that the appointment of such members be left to the president, if it is decided later to continue the committee.

Your committee would respectfully submit the following names for directors for the ensuing year:

Joseph Newman, Elgin, Ill.

M. Long, Woodstock, Ill.

G. H. Gurler, DeKalb, Ill.

L. N. Wiggins, Springfield, Ill.

J. R. Biddulph, Providence, Ill.

W. R. Kimzey, Tamarora, Ill.

L. A. Spies, St. Jacob, Ill.

For President—Joseph Newman.

For Vice President—L. A. Spies.

E. L. Wilson,
Lewis N. Wiggins,
H. H. Hopkins,
Committee.

On motion, duly made and seconded, report was adopted as read and on further motion, duly seconded, the secretary was instructed to cast the ballot of the convention for the officers nominated.

Mr. Newman:—May I be permitted to say one word? I came to Rockford fully determined that this should be my last year in this office. I have talked with a great many of the dairymen here and they seem to think it the part of wisdom for this year that I should accept the position if offered. I did not like to but I am going to agree with them this time, but I want it to go in the records that this is the last year I will accept the office, and next year you must look up some other person to fill this office.

RESOLUTIONS.

Resolved, That the thanks of this Association are due to the citizens of Rockford for their support of this meeting; to the local committee of the Business Men's Association for the arrangements for holding the sessions and displaying machinery and supplies, and especially to Mr. Ben Bollman, of the Forest City Creamery Company, for his labor in behalf of this convention.

Resolved, That we thank the newspapers of Rockford for their efforts to make the convention a success by printing notices of the meeting and lengthy reports of the sessions. To the newspapers, and especially the general farm and dairy papers, we owe to a large degree not only the success of this meeting, but our success as an association.

Resolved, That we thank the speakers who have had places on the program and addressed this convention. They are men whose efforts are to build up dairying and extend the industry, and whose willingness to attend our dairy meeting makes such excellent programs as we have had here possible.

Resolved, That we thank Mr. Jules Lombard and the Star Union line which he represents. A dairy convention in Illinois could not be complete without Mr. Lombard and his songs, and it seems to us he has never been in better voice than at this meeting.

Resolved, That we thank the Elgin Board of Trade for the handsome gold medal offered as the only special premium this association recognizes. The medal adds greatly to the interest each year in the butter exhibit.

Resolved, That we express our sorrow at the death recently of Major H. E. Alvord, who was chief of the dairy bureau, U. S. Department of Agriculture. Major Alvord's whole heart was in the work of the department and he labored faithfully to make his bureau fulfill the purpose of its organization.

Whereas, There is an urgent need for a more thorough inspection of dairy products, creameries, cheese factories, and means of transporting dairy products; therefore, be it

Resolved, That it is the sense of this meeting that the state pure food law be so amended that effective inspection by men with practical dairy knowledge will be assured.

Resolved, That we believe the work of dairy inspection will be facilitated by the state clothing the dairy instructors of the University of Illinois with police power, and we request that this matter be considered in the revising of the state pure food law.

Whereas, The oleomargarine interests of the country have organized to secure the repeal by Congress of the 10 cent tax on oleomargarine when colored in imitation of butter, or to get the tax reduced from 10 cents to 4 cents a pound;

Whereas, We can see in this move, made under the guise of securing additional revenue for the government, an attempt to restore old conditions when colored oleomargarine was sold to consumers who called for butter;

Whereas, In making this effort the oleomargarine interest confesses that their product will not sell when consumers know its character and they wish to be in a position to deceive consumers as formerly, in order to make a market;

Resolved, That we ask every dairyman and creameryman to support the National Dairy Union, the organization that secured the 10 cent tax law and is fighting the battle of dairymen of the country to uphold it; and that we ask the dairymen in the state to write to their congressmen, senators and representatives, protesting against repeal of the 10 cent tax law, or any lowering of the amount of tax on oleomargarine when colored in imitation of butter.

Resolved, That we recognize the importance of dairy field work in the state as done by the dairy department of Illinois, and hope to see it extended. We favor the appropriation, in accord with the recommendation of the advisory committee presented and adopted at this meeting, of \$15,000 for this work, which is the same as the amount appropriated by the state legislature two years ago.

Report of committee on resolutions read by the secretary. On motion, duly made and seconded, resolutions were adopted as read.

The President:—Your action today will leave the committee to act with the pure food commissioner and his office with our legislature, to amend the pure food bill, as follows:

Mr. Joseph Newman, the President of your association,
Mr. C. Y. Knight, of Chicago, and
Mr. L. N. Wiggins, of Springfield.

The President:—We will now listen to Mr. P. H. Kieffer, assistant dairy commissioner of Iowa, who will address us on the subject of "Starters."

STARTERS.

P. H. Kieffer, Manchester, Ia.

Mr. President, Ladies and Gentlemen:

I assure you I am glad that I am able to be with you. Before I came here to attend your convention I felt that we buttermakers and creamerymen in the United States had only one state to compete against, and that was our sister state, Minnesota, but since I have come here and heard the speakers yesterday from Wisconsin and from this state, I feel that I ought to be at home at this time at work. I think you are on the right track, this state and Wisconsin, in putting out your inspectors and working among the creameries and patrons.

The making of butter is somewhat different now than it was several years ago. At that time cream was allowed to ripen naturally without any assistance by the addition of a starter to influence the ripening or souring process or in any way to control the flavor. Whatever bacteria had possession of the milk controlled the ripening of the cream and the butter had the flavor which that bacteria would produce. If the milk or cream had been exposed to any undesirable bacteria the butter was usually of the same kind of flavor; but nowadays it is different.

The buttermaker of today must familiarize himself with up-to-date methods in buttermaking. It is necessary that he familiarize himself with the making and the handling of the starter and the effect it has upon the flavor of the butter. According to the scorings that have been conducted the last few years the butter that was made with a good commercial starter will average at least two points higher than the butter that was made without the help of a good commercial starter.

The culture was introduced about twelve years ago and was somewhat pushed by Orin Douglass, of Boston. A large creamery company in Iowa at that time adopted the use of the starter, and reported good results, so much so that it created quite an interest. At that time I was located in Minnesota, and personally visited the creamery company, at Decorah, Iowa, where the butter was being made and cream ripened by the use of the culture. I took some culture home with me to experiment with. It, at that time, was in a jelly form. I used the culture more or less a little over a year, at times I thought I could see a great improvement in the flavor of the butter, then again I would think there was nothing in it and that it only happened that the butter was good at times and that the culture had no effect. I discontinued its use for about a year, but was not satisfied because I was not making a high uniform grade of butter every day. I again turned to the culture and the more that I studied the question and the more I read about the experiments conducted in the dairy schools and also the experiments of butter-makers that were using the culture, I came to the conclusion that if good results could be had with the use of culture at times it was possible to have good results all the time. Along about that time, the acid test came out, by which one could determine the acidity of starter and cream, and then it became generally known that the butter fat was to be deducted from the cream as that did not indicate any acidity, and that the cream was to be ripened according to the per cent of milk serum in the cream. After these facts became generally known it was a very easy matter for one to ripen his starter until it became thick or contained about 40 per cent acidity, Mann's acid test, and also ripen the cream to the degree of acidity that would produce a mild acid flavor. The degree of acidity depending upon the amount of milk serum there was in the cream.

In looking back I can now very easily see where my mistake was made in handling the culture. I expected too much from the culture, and this is the greatest trouble of a great many of the buttermakers of today. The commercial culture which we

buy now for preparation of the starter, is pure and, if it is given a chance in pure milk the bacteria in the culture will predominate, and bring about the flavor that is desired in butter. On the other hand, if the milk is not perfectly pure the bacteria in the culture will not have the desired effect, but the unfavorable bacteria that was in the milk will predominate and influence the butter. Upon this vital point depends the success of the starter, as the purer the milk and the cream the easier it can be inoculated with a particular kind of bacteria and have this kind of bacteria predominate. The poorer the milk or cream the lesser the effect of the bacteria with which it was inoculated.

It is my opinion that the best starter to use for cream ripening is the commercial starter, although sometimes one may have good success with a home-made starter. The home-made starter is prepared by the buttermaker catching a few pint jars of good milk from different patrons and holding the same at a temperature of 70 degrees until it gets thick. This gives the buttermaker an opportunity to select the one that is free from pin holes and has a nice clean acid flavor. This is then called the mother starter. This mother starter is then ready to be used in the pasturized milk which was previously prepared. Now the bacteria which caused the souring of the pint jar will cause the ripening of the pasturized milk, and if the right kind of bacteria is in the jar and care taken all the way along with the starter and the ripening of the cream, the butter will have the flavor that such bacteria produces.

The skim milk starter or raw milk starter which is made by simply holding milk at a warm enough temperature so that it will sour by the next morning is not considered a safe starter, owing to the fact that the milk will possess the flavor according to the kind of bacteria that happened to gain control of the souring process and these bacteria are just as liable to be unfavorable as favorable for producing good flavor in butter and one is very apt to make an uneven grade of butter, as the flavor depends wholly upon circumstances, and the buttermaker is simply trusting to luck.

The buttermilk starter, like the skim milk starter, hastens the souring of the cream and is unreliable as far as flavor is concerned.

The commercial culture has the right kind of bacteria to produce a good flavor in butter, provided you have good raw material to work with. In preparing this culture it is very essential that one's clothing and hands are clean and that the jar or pail in which this culture will be propagated should be sterilized and then a quart of good fresh milk pasturized to 180 or 200 degrees and held there for twenty minutes and then cooled down by setting it in cold water, and when it is down to 90 degrees, add one-half ounce of the commercial culture, holding the bottle close to the milk so in case that there is any obnoxious bacteria around it will not have a chance to inoculate the culture. Stir it in well and cool the milk to about 75 degrees and hold it at this temperature until thick, which will usually require about 18 hours. After this mother starter becomes thick it is ready for use to inoculate the pasturized milk which is to be used for cream ripening. Use about a pint and a half of this mother starter to about 30 gallons of milk. Stir it in well and hold it at about 75 degrees this time of the year. In summer time it should be cooled down to about 65 degrees. The temperature and the amount of mother starter should be regulated so that starter will be thick by the time you wish to use it.

In carrying over the starter to every other days run it is best to carry a quart of the mother starter along by renewing it daily. Pasturize the milk in the starter can as usual and cool the same as cold as water will cool, allow it to stand until the next morning with a good tight cover on it and then repasturize and cool and when down to 90 degrees add the proper amount of mother starter which you have in quart jar and cool the milk to 75 degrees.

In order to derive the benefit of the starter in which you have grown the desired bacteria which is sought after in butter one must always hold the reins in hand and never allowed to be side-tracked by undesirable bacteria that are of great number

and stronger than what have been cultivated in the starter can; therefore it is necessary to have a good quality of cream if it is expected that the starter is to control the same, otherwise the guilt edges will be taken off from the starter. One should work for a heavy cream, that is, a cream high in per cent of butter fat, more so this time of year as milk contains a much larger per cent of unfavorable bacteria than it does in the summer season. I would advise a 50 per cent cream and if the milk is of very poor quality a heavier cream is still better, as the heavier the cream the less milk serum to control. This will enable the bacteria in the starter to control the small per cent of milk serum left in cream and the better the quality of the cream the greater the effect of the starter.

With the aid of the acid test one can determine the acidity of the starter. Then by using the Babcock test upon the cream it can be determined the amount of milk serum there is in the cream. Subtract the butterfat from 100 and the remainder is the amount of milk serum. Multiply the remainder by .50 and the product is the degree of acidity that cream should be ripened to according to Mann's acid test.

By ripening the cream daily to the same degree of acidity and the same is controlled by the lactic acid bacteria one is sure of a good flavored butter providing the same is not injured in the manufacture, and you can rest assured that the butter will be of a uniform quality if made and controlled in this manner each day.

To allow the natural conditions and surroundings to control the flavor of the butter is a thing of the past and up-to-date scientific methods along with cleanliness must be pursued in order to make the best.

I will add one word and, that is that I heartily endorse Professor Van Norman's idea in regard to the acid test that should be used. I think if we could all agree upon the one acid test that it would help us, and we would not have to name over the per cent and degree of acidity on so many of them.

DISCUSSION.

The President:—Would you care to recommend any particular test?

Mr. Kieffer:—I think the one outlined by Professor Van Norman is pretty good.

Mr. Moore:—I think any one of the tests is all right. It is only a question of use. I was called to a creamery a short time ago where they had been cut on their butter. The butter-maker, not familiar with the use of the acid test, had read in the papers of some Minnesota buttermakers ripening their cream to 34 cc. He got a Farrington outfit and had opened his cream up to that amount, as expressed on cylinder, which would practically be little more than sweet cream, and there was no doubt in my mind but the trouble was that the butter was soft and had no character and no taste, and when I showed him how it was and that he ought to have from 5 to 5½ acidity on this test, the difficulty was explained. Too many buttermakers use this c. c. to express acidity, which it is not.

The reason I prefer Farrington's is the amount of acidity it expressed in number of c. c. You use in it 100 c. c. cylinder, whereas with Mann's you have to go through calculations which a number of buttermakers do not know how to, and therefore do not use it.

Mr. Mann:—I would like to ask Mr. Kieffer what per cent of acidity he recommends for 1½ pints of mother starter?

Mr. Kieffer:—Forty per cent of Mann's acid test, or about .70 to .72 degrees per cent of Farrington's test.

Mr. Mann:—For milk held at about 75 degrees, do you think that is about right to ripen the next morning?

Mr. Kieffer:—This time of year it is hard to regulate the temperature. In a number of creameries the temperature lowers during the evening, so the ripening does not go on the same as if the temperature was the same. I have found it to go down to 58 degrees in the morning.

Mr. Mann:—It seems to me a pint and a half of that acidity is too much to add to milk of 75 degrees, thirty gallons, but if the temperature lowers it would be necessary.

Mr. Kieffer:—I think the only way is draw your pasteurized milk off the starter can and put it in the Cherry can or something of that sort; keeps out heat in summer and cold in winter, and holds at more even temperature than any other way.

Mr. Mann:—What per cent of starter do you advocate to put in the cream?

Mr. Keiffer:—I would not advise anything less than 20 per cent.

Mr. Mann:—You think that is best?

Mr. Kieffer:—I think it is best to use that much.

Mr. Mann:—Would it not be better to lower the temperature of the pasteurized skim milk somewhat, and use a lower percentage of mother starter to inoculate it with?

Mr. Kieffer:—No sir.

Mr. Mann:—The reason I advance this idea is that you pasteurize skim milk from 180 to 200 degrees. When held for a half hour you kill all bacteria, but you have not killed the spores. When you bring the temperature up again you make the temperature favorable for reproduction of these spores in the bacteria, and unless you have a sufficient number of bacteria from your culture to entirely kill them out, they will have an effect which will be more or less quickly shown in the starter and will deteriorate it sooner or later. For that reason I advocated a lower temperature.

Mr. Kieffer:—In my paper when I spoke of 75 degrees, I was referring to conditions as I find them in the creameries. If anyone were able to hold the temperature to 75 degrees and add that amount of mother starter it would hasten the ripening very rapidly in the milk, but I get my idea from general conditions as I find them in the creameries in Iowa, and they are possibly the same in this state. The temperature lowers during the night

and the average temperature of the starter will not be over 62 to 65 degrees during the night. If I could hold that right through, 75 degrees is rather high. In the summer it does not lack for heat, because you have warmer nights, and 65 degrees will do it.

Another thing Mr. Mann referred to, and that was taking the starter out of the starter can and then putting it in a jacketed can to hold the temperature more even. We have starter cans in Iowa now that are jacketed. They hold the temperature just as good as any jacketed can I know of, and you do not have to draw your starter out, but you can keep it there and it will hold its temperature good.

Mr. Mann:—My idea in speaking of that was that a good many of the boys use the starter can and ripen the starter in that can. Perhaps some morning it is not ready and they have to let it stand and in that way, of course, they have nothing to pasteurize their skim milk, which would be better early in the morning than later in the day. That is why I thought it best to draw the milk from the starter can and have a jacketed can to use for the purpose. That gives you your starter can to use at any time.

DIFFICULTIES OF CHEESEMAKING.

J. R. Biddulph, Providence, Ill.

I think the "Difficulties of a Cheesemaker" is a subject that it would take some time to discuss.

I will begin my paper by saying at the present day boys are looking for light work and big pay, and think they will find

it in a cheese factory; but after they have worked there two or three months they find out that there is considerable work in a cheese factory, if they do the work as it should be done.

I think the first thing that a young man wants to find out when he starts out to be a cheesemaker is to see if he likes the business, for, if he doesn't, he will never make a successful cheesemaker, for I think there are some men that could work in a factory all their lives and then not make a successful cheesemaker. Some will ask, "Why?" I will say because they are not adapted to that kind of business and they had better try something that is more suited to them.

The next thing for a cheesemaker to look after is a factory where there is good drainage, for there are some of his patrons who will not take their share of whey and then it is left in the whey-tank to get sour. Then the tank will get full and it is very apt to run back to the factory, and he will soon have a bad mess of it; then the patrons will say, "What a bad smell there is around the factory," but they are the ones to blame for it, and they should not blame the cheesemaker, but take their whey home as it belongs to them, even if they have to pour it on the ground after they get home.

The cheesemaker should keep his factory in good, clean condition at all times, so that the patrons and their ladies may come in at any time and not have to hold their noses and want to get out of there as soon as possible.

Now I want to say a few words about the taking in of the milk. The cheesemaker must be very particular about it, and then he will get in some that is not just right, for I claim that a cheesemaker can take in milk that is affected and he cannot detect it until he gets it heated up the last time, and then it begins to show what it is and he has to do the best he can with it. He will find that he has some gassy milk, and he is expected to make good cheese out of it because he took it in.

A great many patrons think that if a cheesemaker takes in his milk that it is all right, when he knows that he has not done

his part to have it in good condition to make good cheese; and if the cheesemaker says, "Mr. Johnson, your milk has not had proper care, it is a little sour this morning," he will tell you that Mr. B or Mr. C. doesn't take care of his milk; they don't even strain it or set the cans in water. That is the way it is continually thrown at the cheesemaker. Now there is not much use for the cheesemaker to say much. My idea is that these patrons, instead of following some other man's example, should say to him, "Now, Mr. C., we want to have good cheese made down at our factory and we must take care of our milk." I think it is the duty of the patron to look after such men and it would have more effect upon them than it would for the cheesemaker to talk to them, as I think some men would talk two hours instead of spending ten minutes' time taking care of their milk.

I think that if every patron would look after his own milk and take care of it as it should be taken care of, and if he found a neighbor not doing right to talk to him, we would get better milk, and the cheesemaker could make a great deal better cheese. A great many people think that any kind of milk will make cheese, but they think they must take very good care of their milk to make butter. There is where they make a great mistake. They should take better care of their milk to make a good cheese. At the creamery the buttermaker takes in the milk and runs it through a separator soon after he takes it in, so that he has only three to four pounds to contend with out of a hundred pounds of milk; while the cheesemaker has the whole hundred pounds to contend with for three or four hours. Therefore the patrons should take better care of their milk if they expect the cheesemaker to make good cheese. I will not tire you longer.

The President:—Is there any other business to come before this meeting? If not, I will declare the thirty-first annual convention of the Illinois Dairymen's Association adjourned sine die.

DIRECTORS' MEETING

The directors of Illinois Dairymen's Association met at Joliet February 23 in Hotel Monroe, during the State Farmers' Institute. Directors Joseph Newman, G. H. Gurler, L. A. Spies, L. N. Wiggins, and W. R. Kimzey and Treasurer Coolidge and Secretary Caven were present. The minutes of the previous meeting were read and approved.

The annual reports of the Secretary and Treasurer were read and on motion the President appointed Directors Gurler and Long to audit the reports and approve them if found correct. (Later the two Directors met in Elgin and received, examined and approved the reports.)

President Newman brought up the matter of the January, 1906, convention and on motion duly made and seconded, the President was directed to appoint a committee of three, himself being one member, to decide on a location for the annual meeting and fix the dates. The other two members of the committee were L. A. Spies and Secretary Geo. Caven.

(This committee later decided on January 16, 17, 18, 1906, as the dates, and Effingham as the place for holding the convention.)

On motion duly made and seconded the directors approved the action of the officers in providing two medals in the dairy cow test at the Illinois state fair of 1904 and authorized the giving of two similar medals at the 1905 state fair.

The election of a Secretary and a Treasurer was taken up. On motion duly made and seconded the President cast the ballot of the directors for Geo. Caven as Secretary for the ensuing year. On motion duly made and seconded the President cast

the ballot of the directors for John Coolidge as Treasurer for the ensuing year.

The following resolution was presented by Director L. A. Spies:

Whereas, Many successful dealers are selling to the dairymen and stockmen of this state, feed stuffs adulterated with non-nutritious and harmful substances, and

Whereas, This practice of adulteration has reached such a stage as to demand legislation to rectify the evil; therefore be it

Resolved, That the bulletins showing the result of the tests of the various feeds be prepared semi-annually, and be printed at state expense for general distribution among the dairymen and feeders of the state, and

Resolved, That we, the dairymen of the state of Illinois, do earnestly pray the present legislature to pass such needed legislation as will require the printing on the bag, bucket or package of the digestible constituents of all chopped, ground or mill feeds and of all so-called stock and poultry foods which may be offered for sale in the state of Illinois; and

Resolved, That all uncut hays, straw and fodder in their natural condition, and that all whole grains, such as corn, oats, barley, etc., shall be exempt from the provisions of the act, and be it further

Resolved, That the President is hereby instructed to appoint a committee of three whose duty it shall be to investigate the laws of other states and conditions in our own state; arrange a bill to cover our needs and present same to the present legislature and urge its passage.

On motion duly seconded, the resolution was adopted and the President appointed as the committee called for: L. A. Spies, of St. Jacob; W. R. Kimzey, of Tamaroa, and L. N. Wiggins, of Springfield.

There being no other business to come before the directors the meeting was duly adjourned.

To the Directors of the Illinois Dairymen's Association:

I have the honor to submit my report of the business of the association for the year 1904-05, to the present time, including all the receipts and expenses for the convention at Rockford, January 10-12.

As a preliminary to the report I wish to say that in making preparations for the convention I had printed 1,000 programs, 1,000 entry blanks, 800 poster announcements of the meeting and numerous articles and circulars. Of the programs 875 were mailed to creameries and dairymen of the state. All the posters were sent out with the request that they be conspicuously placed and the articles at various times were run off on a proof press and copies mailed to newspapers. Besides 250 of our annual reports were sent out by mail, the cost being 11 cents each.

The items of money paid out and receipts follows:

RECEIVED.

Membership	\$ 126.00
By check	50.00
By check	50.00
City of Rockford	200.00
Creamery Package Manufacturing Co.....	50.00
DeLaval Separator Co.....	35.00
Wisconsin Dairy Supply Co.....	5.00
The Nelson	12.50
Sturges & Burn Mfg. Co.....	5.00
Lisbon Insurance Co.....	10.00
Diamond Crystal Salt Co.....	10.00
The Sharpless Separator Co.....	20.00
Francis D. Moulton & Co.....	10.00

C. M. Waite (sales of butter)	127.50
Worcester Salt Co.....	10.00
A. H. Barber Creamery Supply Co.....	10.00
Blanke & Hauke, St. Louis.....	10.00
Elgin Butter Tub Co.....	10.00
J. B. Ford Co.	20.00
Wells & Richardson Co.....	25.00
M. H. Fairchild & Bro.....	10.00
Heller & Merz	20.00
D. H. Burrell & Co.....	10.00
	<hr/>
	\$ 836.00
Check from Treasurer.....	119.67
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Empire Cream Separator Co.....	\$ 955.67
Empire Cream Separator Co.....	10.00
Vermont Farm Machine Co.....	20.00
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Total	\$ 985.67

EXPENSES.

Register and exchange	\$ 68.00
Stamps	59.99
Postal cards20
Express, freight, cartage, etc.....	10.15
Envelopes	10.70
Traveling expenses	25.50
Telephone and Telegraph	4.00
Folding and Mailing	3.00
Printing	10.25
Circulars	2.00
C. F. Smith, expense	20.00
Sign	3.75
Programs and score cards.....	7.55
E. N. Cobb, expense	15.50

Labor	1.00
Electric light	9.55
Miss McGoorty, expense	5.00
Hotel Nelson	75.90
Miscellaneous	4.95
	<hr/>
	\$ 269.67

TO TREASURER.

Paid Treasurer Coolidge Jan. 2, 1905.....	\$ 20.00
Paid Treasurer Coolidge Jan. 27, 1905.....	277.50
Paid Treasurer Coolidge Feb. 1, 1905.....	187.50
Paid Treasurer Coolidge Feb. 15, 1905.....	65.00
Paid Treasurer Coolidge Feb. 21, 1905.....	146.00
Paid Treasurer Coolidge Feb. 23, 1905.....	20.00
	<hr/>
Expenses forward	269.67
	<hr/>
Total	\$ 985.67

GEORGE CAVEN, Secretary

To the President and Board of Directors of the Illinois State Dairymen's Association:

I have the pleasure of submitting the following statement:

RECEIPTS.

June 18, '04, from H. H. Hopkins, former Treasurer..	\$ 196.31
Aug. 9, '04, from President, annual appropriation....	1,500.00
Jan. 3, '05, from Secretary.....	20.00
Jan. 3, '05, from Secretary.....	277.50
Feb. 2, '05, from Secretary.....	187.50
Feb. 16, '05, from Secretary.....	65.00

Feb. 22, '05, from Secretary.....	146.00
Feb. 24, '05, from Secretary.....	20.00
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Total receipts	\$2,412.31
Expenditures	2,200.50
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Balance on hand Feb. 23, '05.....	\$ 211.81

EXPENDITURE.

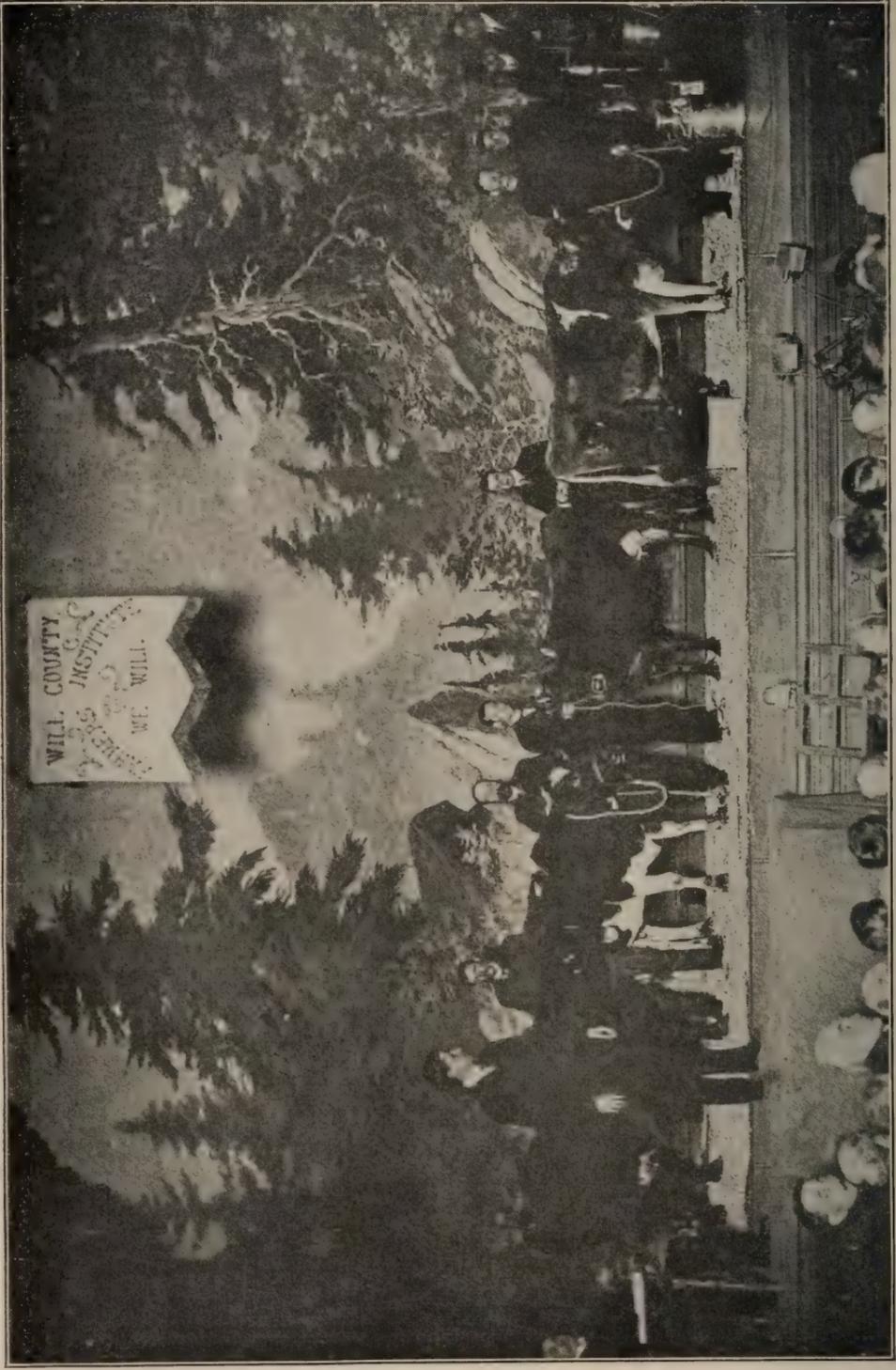
Aug. 19, '04, Order No. 797.....	\$ 50.00
Aug. 26, '04, Order No. 766	9.00
Nov. 3, '04, Order No. 798.....	10.00
Nov. 16, '04, Order No. 801.....	21.80
Nov. 17, '04, Order No. 799.....	24.85
Nov. 17, '04, Order No. 800.....	14.55
Dec. 12, '04, Order No. 804.....	100.00
Dec. 12, '04, Order No. 796.....	7.00
Dec. 12, '04, Order No. 803.....	10.00
Dec. 26, '04, Order No. 802.....	18.00
Jan. 7, '05, Order No. 805.....	746.66
Jan. 7, '05, Order No. 806.....	55.50
Jan. 9, '05, Order No. 808.....	50.00
Feb. 7, '05, Order No. 875.....	21.31
Feb. 7, '05, Order No. 820.....	10.60
Feb. 8, '05, Order No. 829.....	21.30
Feb. 8, '05, Order No. 826.....	7.90
Feb. 8, '05, Order No. 838.....	3.60
Feb. 8, '05, Order No. 871.....	5.00
Feb. 8, '05, Order No. 818.....	7.20
Feb. 9, '05, Order No. 817.....	11.25
Feb. 9, '05, Order No. 819.....	8.10
Feb. 9, '05, Order No. 837.....	8.10
Feb. 9, '05, Order No. 833.....	11.95
Feb. 9, '05, Order No. 870.....	25.00
Feb. 10, '05, Order No. 811.....	7.20

Feb. 10, '05, Order No. 847.....	1.80
Feb. 11, '05, Order No. 835.....	9.00
Feb. 11, '05, Order No. 854.....	3.00
Feb. 11, '05, Order No. 832.....	9.50
Feb. 11, '05, Order No. 813.....	13.00
Feb. 11, '05, Order No. 809.....	14.00
Feb. 11, '05, Order No. 814.....	13.80
Feb. 11, '05, Order No. 839.....	7.90
Feb. 11, '05, Order No. 876.....	6.13
Feb. 11, '05, Order No. 860.....	20.70
Feb. 11, '05, Order No. 863.....	30.07
Feb. 11, '05, Order No. 845.....	11.10
Feb. 11, '05, Order No. 815.....	10.80
Feb. 11, '05, Order No. 816.....	9.90
Feb. 11, '05, Order No. 859.....	20.00
Feb. 14, '05, Order No. 823.....	6.30
Feb. 14, '05, Order No. 849.....	9.50
Feb. 14, '05, Order No. 843.....	17.70
Feb. 14, '05, Order No. 867.....	16.63
Feb. 15, '05, Order No. 836.....	6.80
Feb. 15, '05, Order No. 840.....	7.20
Feb. 15, '05, Order No. 842.....	11.30
Feb. 15, '05, Order No. 869.....	4.72
Feb. 16, '05, Order No. 824.....	11.25
Feb. 16, '05, Order No. 855.....	6.25
Feb. 17, '05, Order No. 844.....	14.70
Feb. 18, '05, Order No. 872.....	17.15
Feb. 18, '05, Order No. 851.....	9.00
Feb. 18, '05, Order No. 812.....	9.90
Feb. 18, '05, Order No. 873.....	70.00
Feb. 20, '05, Order No. 827.....	5.40
Feb. 21, '05, Order No. 862.....	7.63
Feb. 21, '05, Order No. 810.....	20.10
Feb. 21, '05, Order No. 877.....	30.00
Feb. 21, '05, Order No. 861.....	24.00
Feb. 21, '05, Order No. 841.....	5.40

Feb. 21, '05, Order No. 834.....	12.20
Feb. 23, '05, Order No. 821.....	9.00
Feb. 23, '05, Order No. 831.....	10.00
Feb. 23, '05, Order No. 878.....	11.00
Feb. 24, '05, Order No. 879.....	119.62
Feb. 24, '05, Order No. 874.....	100.00
Feb. 25, '05, Order No. 825.....	11.50
Feb. 25, '05, Order No. 848.....	5.40
Feb. 25, '05, Order No. 850.....	7.65
March 2, '05, Order No. 830.....	20.00
March 3, '05, Order No. 853.....	1.80
March 4, '05, Order No. 881.....	5.00
March 7, '05, Order No. 858.....	2.40
March 8, '05, Order No. 882.....	20.00
March 8, '05, Order No. 852.....	3.60
March 8, '05, Order No. 880.....	19.05
April 14, '05, Order No. 883.....	11.50
April 15, '05, Order No. 884.....	4.40
April 19, '05, Order No. 885.....	7.56
April 15, '05, Order No. 886.....	4.60
April 24, '05, Order No. 857.....	1.20
April 24, '05, Order No. 887.....	54.52

Total expenditures\$2,200.50

JOHN COOLIDGE, Treasurer



DAIRYMEN'S PART
STATE FARMER'S INSTITUTE
JOLIET, ILL., FEBRUARY, 1905.

A. J. Glover conducted the dairymen's part of the program in the state convention at Joliet the last week of February, 1905, and the following is a report of the proceedings, including a lecture by Mr. Glover in which he used live cows as models.

Mr. Glover:—I will try to tell you something of the milk fever cure. It is a very simple one. A few years ago it was discovered that by injecting oxygen into the udder of the cow, after it is entirely emptied of milk, and then massaging it, that nearly every case of milk fever was cured. Another man who did not have oxygen handy, took a bicycle pump and injected air into the udder, and massaged it, and the cow stricken with milk fever became well. We have had reports from a great many dairymen stating the good results that they have had in using this method. The air is injected into the udder in the following manner: Insert a milk tube which has already been fastened with a small rubber hose to a bicycle pump, into the teat, and proceed to inflate the udder the same as you would a bicycle tire. Inflate each quarter in the same way, until you have the udder filled full of air.

If you find that the air is oozing out too rapidly, you can put rubber bands around the teats to prevent its escape till you are through massaging the udder. If the cow is not up within an hour, repeat the treatment. But I have never seen only one or two cases where the treatment had to be repeated. Inside of an hour after this treatment has been administered, the cow

is usually up, and able to walk and apparently in normal condition.

I caution you, if you have a case of milk fever, don't try to give the cow medicine, because she is paralyzed and cannot swallow. The medicine will go into her lungs and it will strangle her. If a bicycle pump is used it should be thoroughly sterilized in boiling water before it is used. There are companies that are manufacturing instruments for injecting air into the udder that sterilize the air as it passes through the pump into the udder. Air may be injected into the udder for garget and when it is caked. If the udder is very feverish, of course it will not cure it immediately. Antiphlogistine, which comes in cans, and can be purchased at drug stores, is a good thing to rub on the udder. For instance, at the World's Fair this year, there was a Jersey cow being led out for exercise, and she became scared by a man flinging a pail of water out, and she crossed her legs and threw herself, and her udder came between the ground and her body, and being a large udder it was severely injured. She was in the test, and they were very anxious to have her proceed, and not shrink in milk, and they injected air into the udder, and they also applied antiphlogistine. I heard Mr. Graves say that they did not notice any change in her milk flow, and it was only a few days till her udder was in good condition. Antiphlogistine is used for human mothers a great deal.

If there are no other questions I shall turn this discussion over to Mr. Cobb, better known to the people as "Buff Jersey."

Mr. Cobb:—The first thing I would like to say is, why have milk fever at all? I never have had a case in my cow herd, or a herd that I have managed. And I lay my exemption from it to the cure I give the cow before she is fresh. I never give a cow that is to be freshened any grain whatever. I take all the grain ration away from her, except perhaps the corn in the ensilage.

A Delegate:—For how long a time?

Mr. Cobb:—I never force a cow dry. If I have a cow that will give me milk right up to freshening I let her do it. I have a cousin in Wisconsin that has been a dairyman for forty-five years there. He was down at my place two years ago, and at night he saw one of my cows milked. She gave eight pounds of milk—and the next morning she had a calf. I milk a cow just as long as she will give milk. And whenever I have undertaken to force a cow dry from any cause, I have had a great deal of trouble in keeping their udders in good condition.

A Delegate:—Will she give as good a flow of milk after having that calf as before?

Mr. Cobb:—Not for the first thirty days. But for the year's work I find that the results are as good in one case as the other. But for the first thirty days she will not do so well. If I was going to make a special test of a cow for sixty days, or ninety days, then I would desire to force that cow dry, perhaps two months. But for the working herd, the herd that we are feeding and keeping for profit, I find my method best. I am speaking of dairy cows we keep for profit on products.

Mr. Glover:—Don't you find that sometimes, if you let your cows milk the year round, that their milk gets strong?

Mr. Cobb:—We do have that, and in the last two or three weeks the milk is not used to make butter or cream. We use it in connection with some of our other feeding work.

A Delegate:—How many pounds of milk do you get out of these cows?

Mr. Cobb:—The last month's record of my herd was $20\frac{3}{4}$ pounds per cow, for thirty-five head, and the test was 5.5. I sold my herd last February—a year ago this month. But that was the last month's record of our cows.

A Delegate:—How many pounds for the entire year, generally?

Mr. Cobb:—They run from 5,000 up to 9,500 pounds.

A Delegate:—What percentage milk?

Mr. Cobb:—The herd averaged 5.5.

A Delegate:—I would like to ask a question in connection with milk fever. If your cow is thin, and you want to get her up in flesh the coming season, how can you get her there, without feeding her some grain?

Mr. Cobb:—I never have thin cows. I feed to keep every cow in good flesh.

A Delegate:—We will find a great many people losing cows that are running on grass.

Mr. Cobb:—I know that, and I am surprised at my immunity from it. I don't understand why it is. I am satisfied that my way of feeding during the winter months is the proper way. But why I should be immune in the summer time, I do not know. Because I have seen herd after herd where people have lost cows every year, with the milk fever.

A Delegate:—Don't you think that this simple treatment of having a bicycle pump or a syringe there, is a very simple thing?

Mr. Cobb:—I think so; for I was down in Connecticut this winter. Prof Pearson was there from Cornell University. He placed special stress upon one thing; that is, getting germs into the cows' udders in this haphazard bicycle pump and syringe idea. He advocates getting a—I don't know what they call it, but it is one of these soda fountain tanks, and having it stored with oxygen, and having it either at your own place or some neighbor's; and it is good as long as it is kept sealed, and use that in place of the common air. He says, then you are not going to take any chances at all, providing, of course, that the tubes you use have been sterilized properly.

A Delegate:—How would you sterilize the tubes?

Mr. Cobb:—I use a two or three per cent solution of creolin or carbolic acid. Boiling is all right, if the appliances will stand boiling.

A Delegate:—I have used a tube a number of times, and lost a teat every time.

Mr. Cobb:—It was through infection from the tube, no doubt. I have been in barns where they have used a milking tube on account of some soreness of the teat and that tube was taken from the teat and put up in a box, and may be it would be six weeks or two months before it was used again, and may be it was borrowed by a neighbor, and it was not even washed. And it would of course aggravate a case, instead of helping it.

We have heard a great deal about feeding, and you all know that I am a silo crank. I think there is no feed on a farm, in Illinois especially, as cheap as our corn crop. When we ride over this state, and do not see a single field of corn all cut and put into the silo, it seems as though we ought to give special attention to this matter, which is of such great importance. Bulletin 155 of the Ohio station is right along this line. It is an experiment conducted there this last year, to see how much of the dry matter of the cow's daily ration could be gotten out of the silo and cheap forage, and the results have been very marked in that direction. Prof. Haecker cautioned about jumping at conclusions. That is a good thing. We have jumped at a good many conclusions, and have been in error. The five months' experiment of this Ohio station shows that eighty-two per cent of the cow's daily ration was taken from the silo and the hay mow. They only fed six pounds of clover hay, and four pounds of grain, and the balance was ensilage. The ensilage cattle produced milk at 68 cents a hundred, and butter at 13 cents a pound; and the grain cattle that got fifty to sixty per cent of their feed from grain, gave milk that cost a dollar a hundred, and the butter cost 22 cents a pound, and a month's feed over five dollars. The silage fed cows were fed at a cost of \$2.50 per month. If we can draw conclusions from a five months' test, that looks to me as though the farmers of this country should pay more attention to the great waste of the corn fields of this state.

I am satisfied that this experiment is correct, because I have practiced this for three years. Three years ago, I told my boys that it seemed to me as though we were feeding too much grain. We had to feed our best cows twelve pounds of grain, and from that down to six. And with our little Jerseys, we commenced to see what we could do in the way of reducing this expensive grain feed. Our cows only got 35 to 45 pounds of ensilage, as we found they would eat but that much clean. If we gave them a little too much, we would go to the manger and find the stubs of the corn stalks and the cobs there; so that we commenced by feeding about 12 pounds in the morning, and 12 to 15 pounds at noon, or 18, as the case might be, and 15 or 18 pounds at night. And in that way, we induced the cows to clean up their mangers. And by doing that, we did not reduce the grain ration as much as the Ohio people did, because we did not have the clover hay, but we reduced the average of the best cows down to 8 pounds of grain, and from that on down to 4 pounds.

A Delegate:—How many pounds of clover hay would you give a cow?

Mr. Cobb:—Six pounds, at night, the last thing.

A Delegate:—Did you ever fill a silo with corn stover?

Mr. Cobb:—No, but I know people that have, with entire success. Of course it is not as palatable, and it is not as good as silage with the ear chopped, but it is very good food. Another thing I would like to caution you about. Prof. Haecker made a statement in regard to planting corn thick. That is all right, provided you have ideal corn weather, and an ideal section of the country. But I lived in Wisconsin when a boy, and my father had that thick corn idea in his head, and about two years out of five we would have a drought strike that corn field with an immense crop started, and it would be stunted, and the consequence would be that we would get an immature, unpalatable, unprofitable crop from that field. In my experience in planting corn for silage, for twenty years, I have found that in this section of the country, the best results we can get, for tonnage



A. J. GLOVER

and altogether, is to plant about a bushel to five acres. And that will make you the best feed. Up there on my farm in Warren county, we planted sorghum that made 22 tons to the acre, and it was so heavy and ground thick people declared as they went through the field in the daytime they saw fireflies between the rows. The chemical analysis of sorghum is lower in protein, and higher in carbohydrates, and as to practical results, I am not in a position to say that one is better than the other. There is no danger in feeding, but I know that corn and sorghum, cut half and half and put in a silo, is more palatable and cows eat it more freely than clear corghum. If a cow likes anything, it is pretty good proof that it is good for her.

A Delegate:—Can we safely go entirely by the chemical analysis in regard to foods?

Mr. Cobb:—No, we cannot; because we find some things that analyze all right, but are not palatable.

A Delegate:—Take this southern corn we used to plant here for ensilage, that grew 14 and 16 feet high. Don't you get more tons to the acre with that?

Mr. Cobb:—We get a great amount of watery stuff, with a very little nutriment in it. Down in the east I found a great many people planting that corn, and they were dissatisfied with ensilage, but they didn't know why. I explained the matter to them. The ensilage was very sour, and it lacked palatability, and it lacked nutrition. But the tillable land is limited there, and they wanted to produce the greatest tonnage, and they were doing it that way. I was in Wisconsin this fall, and they were doing that same thing there, trying to raise tons to the acre. And I never believed it before in my life, although I have been told so, but actually they had drains in the bottoms of the silos, to drain off the excess of sap. That is a new feature, but that is just exactly what some of those silos were fitted with.

Mr. Glover:—Mr. Young has had some experience with that. What do you think about it, Mr. Young?

Mr. Young:—Of course I never analyzed. I put it in for the bulk of it. I knew I was getting a very large yield per acre. And there was no souring or extra fermenting of it, as sometimes is claimed. But I let it get ears on; great big ears, too. I cut it and let it wilt a little.

Mr. Glover:—The point to make is that if that is developed to the same point that our common corn is, it makes splendid fodder, and lots of it to the acre; and it makes more dry matter to the acre. But if we are looking after grain in our corn, we don't want to plant it.

Mr. Cobb:—Take that southern corn around here, and we have got to take the risk of getting it to mature properly. If we do have to cut our ensilage a little immature, then to make a good grade of ensilage, it ought to be cut a day or two days ahead of the teams, and let it get rid of a part of its surplus moisture.

A Delegate:—Let me ask, if it is planted as thickly as Mr. Haecker spoke of, so that there are no ears, would that fodder or not be pretty well matured before it was put in?

Mr. Cobb:—Oh, yes, it ought to be allowed to ripen right up to the limit of moisture.

Mr. Glover:—He determines that by investigating the condition of the lower leaves. When they begin to dry, then he puts it in.

A Delegate:—I have another subject. I don't know that I am exactly safe in bringing this up. It is a question I never heard discussed, and if nobody here has ever had a cow lose a calf, perhaps you are not interested. But it is the question of abortion in herds. It is perhaps something none of you have ever had, but I have, and I would like to hear what the different dairymen here have to say on the way they handle it.

Mr. Cobb:—I have been called to a good many herds in the last three years, to start the right conditions to stamp out this disease. I was in Missouri three years ago, and went through the state with the state veterinarian, and he was talking of this

matter, and said if people had abortion in their herds, to get rid of the herds, because it was an incurable disease. We have all found that it was not an incurable disease. It can be stamped out. But the ordinary help on the farm is not going to stamp it out.

The greatest cause of its getting into your herd is through your bull. The farming out of your bull to your neighbors is one of the greatest sources. And using the bull without disinfecting from one animal to another is the way it strikes through the herd, as a general rule. And the only thing we can do is to thoroughly disinfect the cow before service, and the bull as well, and thoroughly disinfecting the barn as much as once a week, anyway. In cases where I have taken charge of these herds, I have used a compressed air spraying machine, a gallon spray or three gallons, as the case may be, and use carbolic acid or creolin. I like creolin the best. And spray those animals, at least once a week, thoroughly. And usually continue it as long as there is any danger. It is a good thing to do that all the time; that is, make a practice of doing that not less than once a month; and spray your barn, and stalls, and cows.

A Delegate:—How would you go about it, with a cow? Would you inject her?

Mr. Cobb:—Yes, sir, we do. Take about a two per cent solution of creolin. That is not as irritating as carbolic acid. And there are a good many people that are feeding carbolic acid. I have never done that, because I never had occasion to, because I have always checked the disease by these protective methods.

Mr. Glover:—I might supplement what he has said in regard to abortion. When you have abortion in your herd, you have a serious matter to contend with. But I might say there are three kinds of abortion. The first is contagious abortion, which undoubtedly is caused by a germ getting into the herd. Second, we call sympathetic abortion. One animal sees another cow abort, and she goes and does likewise. Apparently there is something to that. And then cows abort by becoming hurt

in some way; hooked, or bunted. Of course the latter is not anything very serious.

But in any case, the first thing to do, when you have a case of abortion, is to remove this animal from the rest of the cows, to a stable by herself. There will be a discharge from the uterus for many weeks, especially if it is contagious abortion, and her uterus and vagina should be treated, I think, with bichloride of mercury, commonly called corrosive sublimate. Carbolic acid is not as good a disinfectant, as it is generally supposed to be. The bichloride of mercury is a better disinfectant although more poisonous. Take one part of bichloride of mercury or corrosive sublimate, to five thousand parts of water. Dissolve it in water. The cow should be treated daily with this solution, using from four to five or even ten quarts of it a day. Take a syringe; a fountain syringe, if you wish; and thoroughly bath the uterus and vagina with the solution. You will have to roll up your sleeve and use your hand to get the tube into the uterus. This washing should continue until there is no discharge. And then, do not breed the animal for some time after that. Let her go a little bit longer than you wish.

Now, the bull. What are we going to do with the bull? Take the same solution, and use two to three quarts for him. Take a big syringe, and take hold of the end of his sheath, insert the syringe and inject the solution and work it along with your hand the full length of the sheath. And do it after serving every cow.

The barn where this cow has aborted should be whitewashed, and you may use considerable carbolic acid in the whitewash. You should also use plenty of air slacked lime on the floors.

If you are watching your herd, you may be able to prevent abortion, or at least, prevent it passing from one to the other. Several days before she aborts, there may be seen a discharge. We often see that clear mucous substance coming from the cow just before calving, but there is nothing dangerous about that. But the minute it turns red, look out! She switches her

tail, and infects the cows next to her, and they pass it on to the next, and so it goes through the herd. If you notice such a condition, the cow should be removed and given a chance to abort by herself. Remove all the bedding, and put whitewash all over the floor, with a considerable amount of carbolic acid in the mixture. By taking these precautions, you will perhaps, by being persistent for several years, get rid of it. But if you are slack with it, one cow is able to infect the whole herd, and your treatment will count for nought unless you are very persistent about caring out these suggestions.

A Delegate:—What about any danger in using that carbolic acid about the barn, and its affecting the milk?

Mr. Glover:—I don't think there will be any danger, if a man is reasonably careful. There seems to be good results coming from injecting a solution of carbolic acid into a cow's neck, or feeding it in the grain. You can feed her, beginning with twenty drops a day, diluted to about a two per cent solution, I should think. And then you can increase that to about fifty or sixty drops a day, and we have good reports coming to us about feeding, and we have reports, on the other hand, stating it does no good.

A Delegate:—In case a cow does not get rid of the after-birth, what is the proper method? And will this same solution that you speak of be a good cleanser?

Mr. Glover:—It would be a good cleanser. Authorities are somewhat divided on what to do with the after-birth. Some believe if it has not passed from the animal in thirty-six hours, it is better for a man to put on a rubber glove and remove it. Others claim that they lose more cows by doing that, for, in many cases, the uterus becomes infected and the cow dies from blood poisoning. Prof. Haecker does not believe much in removing the after-birth by hand. Veterinarians do it a great deal. In any case, this solution is a good disinfectant.

A Delegate:—Is there any danger of destroying the life of the semen by disinfectant?

Mr. Glover:—Undoubtedly there would be, if it should come in contact with it before it had fertilized the ovum.

A Delegate:—I thought there would be a chance of it, if you do it previous to mating.

Mr. Glover:—It must be done some time before copulation takes place. You don't want to use the bull immediately after he has been treated in this manner. And you would not want to have the cow served immediately after she had been treated. Have all discharges stopped, and everything healed up, before you serve her again. And you may have trouble, after your cows abort, getting them with calf.

A Delegate:—Don't you think it is a bad thing for the average man to go into the uterus of a cow with any old thing?

Mr. Glover:—Yes, sir, it is. It takes skill. The less you can do of that, the better. But dairymen, the owners of herds, should have a chance to go to an agricultural school, where the method of doing these things is taught. If they could go to our agricultural school for a week or two weeks, and be taught the proper methods of disinfecting an animal, it would be worth thousands of dollars to the dairymen of this state.

A Delegate:—I have had abortions in a herd of 90 to 100 cows; eight abortions in December. They started up the second week in December, and in December I had, I think, nine or ten abortions, and I started using carbolic acid and carbolized salt. I took a pound of carbolic crystals, and crushed them up with 50 pounds of salt, and put a tablespoonful of that salt in the feed, and sprayed them with a carbo-naphtholeum solution, the whole herd, twice a day. Went right along behind the cows and sprayed them all, and mixed this carbolized salt in their feed, allowing a tablespoonful to each cow. Since I have started these operations I have not had an abortion. I did the same thing last winter, and inside of three months, every sign of it had

disappeared, and I did not have any more until this December. There must be some merit in the way I have handled those cases.

Mr. Glover:—I am inclined to think there is merit in feeding carbolic acid, the way you state.

A Delegate:—The handling of a cow after she has aborted, and getting her to breed is a very delicate proposition. A good many people, I think, suggest going into a cow too much. The best way I would suggest to get at them before they abort is to get a list, in plain sight of every man that is around your barn, of the time those cows are due to calve, and from the sixth month on, look out, for it is pretty hard to tell when they are going to abort, and it is usually the middle of the month. And after they abort, if they abort before you can get hold of them to get them away from the herd, have a barrel of slacked lime handy, or any good disinfectant. Do not try to disturb that bedding or litter, but just cover it deeply with lime, and let it alone till you clean your stable. Do not go spreading that all around through your herd. Get your cow out, and inside of twelve hours or twenty-four hours get a warm solution of carbolic acid—at least that is what I have always used. I am going to try corrosive sublimate. Inject that cow every day for a week, and gradually ease off to twice a week, as long as there is any discharge. I have kept them away for sixty days, and have generally sent them away to the butcher, regardless of their condition. I think that is the surest.

Mr. Muir:—I was called to a herd last week that was affected in this way, and I inquired what had preceded it, and I found out that the man had been taking in his neighbors' cows. One of these cows happened to be infected in this way, and that is the way it was introduced in his herd. Some years ago, it broke out among a herd of 60 cows of mine, and I looked around for the cause.

Mr. Glover:—I have another question here that I want to speak of, and that is that corn stalk disease. Sometimes confounded with hemorrhagic septicemia. This disease is caused

by the cows eating too much dried corn stalks. I presume this dry stuff going into their paunch and mixing with the water therein causes it to swell up, and therefore distresses them. That is supposed to be the cause of the disease, and a great many cattle are lost annually by dairy farmers that feed only dry corn stalks to their cattle.

A Delegate:—I think that is impaction of the stomach. That is not corn disease, is it?

Mr. Glover:—I presume impaction is a better name than corn stalk disease. You feed corn stover, which is corn stalks without the corn, and invariably you will find cows having impaction; meaning that the cows have become costive, and the only way is to give them an injection of water in the rectum and a dose of epsom salts. I found cows in Illinois troubled with corn stalk disease and with impaction, and the veterinary invariably gave epsom salts. And I would suggest to the owner that he feed a little oil meal in connection with the stover. Bran would help, and water and salt.

Mr. Wiggins:—There is another side to that, that I am afraid some men are liable to get confused on. That hemorrhagic septicaemia is supposed by the best veterinaries to be entirely a germ disease.

Mr. Mason:—In Illinois, is not more money lost in the lack of proper care and feeding than there is in the breeding of the cow?

Mr. Glover:—I think there is; yes, sir.

A Delegate:—Do you mean to say that everybody in Jefferson county, Wisconsin, is weighing the product of each cow?

Mr. Glover:—Not everybody; but many of their breeders are weighing and testing each cow's milk.

A Delegate:—Do they weigh every day?

Mr. Glover:—Some of them weigh every day, and some of them test every month, and some of them weigh and sample every seventh week, and then estimate their yearly products.

A Delegate:—What would you think of weighing every tenth day?

Mr. Glover:—That would give a very good result. By weighing every day, you can watch the variations of your herd a little more closely than when you weigh every tenth day. You will note little things that may be overcome, that you would not notice if you did not weigh every day.

A Delegate:—I would like to ask you what a good ration for a dairy cow is?

Mr. Glover:—Can you tell me what feed you have on your farm?

A Delegate:—I have cow peas and crushed corn; good cow-pea hay, rich in cow peas, well cured, and crushed corn and cob. I have that on my farm. What kind of ration will it be, and how much is a ration?

Mr. Glover:—I should not want to feed just cow peas and corn to my cows, although they would make nearly a balanced ration, but it would lack variety. You should add some bran. How much milk are you cows giving?

A Delegate:—A considerable flow of milk; more than ever before.

Mr. Glover:—Are they producing on the average a pound of butter per day?

Delegate:—I am not making any test; but my wife opened the cupboard when I started and showed she had the shelves pretty well filled with butter.

Mr. Glover:—I would suggest the following ration for a cow weighing 1,000 pounds and producing a pound of butterfat a day: 4 pounds of bran, 3 pounds of corn and cob meal. I believe you have corn stover you would like to get rid of?

Delegate:—Some corn stover, but not much in the barn. I have pea hay with a little crab grass in it. Pea hay and crushed corn is what they have been eating for the last four weeks, and they have done exceedingly well.

Mr. Glover:—They will do well for a time; but I would rather add 4 pounds of bran, or 2 pounds of bran and 1 pound of Buffalo gluten feed.

Delegate:—Three or four weeks ago, I was feeding bran, and I dropped the bran out, and I cannot see very much difference.

Mr. Glover:—We cannot always notice a change immediately after a change of feed. But let me finish that ration, for a cow producing a pound of butter fat a day, weighing 1,000 pounds: 4 pounds of bran, 3 pounds of corn and cob meal, 1 pound of oil meal, and all of the pea hay and corn stover she will eat up clean. Now, coming back to the question of dropping out feed. A cow sometimes will draw upon her system for protein. As you will hear the report when Prof. Haecker comes. He has been feeding cows on a very wide ration for four years, and they seemingly got along on that wide ration just as well as the cows that were fed on a narrow one until this winter, and every one of those cows that was fed on the wide ration, which means, containing but little protein and lots of carbohydrates, is very poor; so poor that the bones show through the hides very plainly, and he says, "It makes my heart ache to continue that treatment." It has taken four years to demonstrate that a cow must have a certain amount of protein to do normal work and to keep herself in healthy condition. You must carefully nourish that cow's body, because she is growing a foetus, and that is largely protein; and the strength of the coming progeny depends somewhat upon the character of the food you give the cow now. Results will come from dropping a certain kind of food.

A Delegate:—Did you mean the corn fodder that he has should be fed with the cow peas?

Mr. Glover:—Yes, feed all the corn stover that will be consumed without waste.

A Delegate:—Wouldn't it be a very narrow ration if he left out the stover and fed only cow peas?

Mr. Glover:—It would be rather narrow. I mentioned bran for the effect that it has upon the cow's digestive organs. Oil meal will have more or less the same effect.

A Delegate:—If you have a cow that will test three per cent can you make a four per cent test from her?

Mr. Glover:—No, you cannot. She is a three per cent cow. When a man discovers a means to do that with a cow, he will be a very wealthy man, because the Holstein people are looking for a man that can make their cows, which give a large flow of milk, test equal to Jerseys. Or, in other words, they would like to have the Holstein cows, with their large flow, give Jersey milk. I will ask another question: How would you feed a Holstein cow to make a Jersey of her?

A Delegate:—What benefit is the cob meal to the dairy cow, or any other cow?

Mr. Glover:—The cob meal has but little food value. Its analysis is very low. But a cow's stomach wants bulky food; the cob meal helps to make the ration more bulky.

A Delegate:—Wouldn't chopped oat straw be more beneficial to the cow than the cob meal?

Mr. Glover:—Perhaps; but you have the corn cob, and they seem to get a little better results when the cob meal is mixed with the corn than when it is fed alone. But, to make it still better, you can chop some clover hay and mix it with the grain; or timothy hay, if you have not the clover. The corn meal should be mixed with something to lighten it and to make it more bulky. I know of men who have fed large quantities of corn, and their cows seem to be in good condition, and I could attribute this to no other thing, but that they mixed their corn meal or corn chopped with cut second growth timothy.

A Delegate:—Is cotton seed meal good feed?

Mr. Glover:—Yes, it is a good feed. It should not be fed in quantities of more than two pounds per cow.

A Delegate:—What feed has the most protein?

Mr. Glover:—Cotton seed meal, I think. If you have plenty of carbohydrates, the protein that is contained in the ration should govern largely the purchasing of your feeds.

A Delegate:—How about tankage?

Mr. Glover:—That is hardly considered a cow feed. Dried blood is given to calves in tablespoonfuls, which is very good. We feed it to ours.

A Delegate:—Gluten feed is high in protein, isn't it?

Mr. Glover:—It averages about 20 per cent digestible protein.

A Delegate:—Can you feed two pounds of cotton seed meal per day to a cow while giving milk, without any injurious effect?

Mr. Glover:—Yes. I might qualify this answer. There was an inquiry came the other day to the office, stating that a man was feeding two pounds a day of cotton seed meal, and his cows were very much constipated. I suggested that he change that to one pound of the oil meal a day, and write stating the results. I have not heard from him. It is apt to be a little "binding"; at least, it has been so reported, in a few cases; but I think you can feed it without injury in amounts of two pounds.

A Delegate:—Do you think it advisable to feed bran instead of corn meal and oats ground together?

Mr. Glover:—That would depend on the price of oats. A pound of oats is equal to a pound of bran for feeding dairy cows. If it is just as cheap and you have the oats, I would not bother to buy bran. You can always substitute one for the other, depending on their price.

A Delegate:—Isn't oats considered a balanced ration, alone?

Mr. Glover:—Yes, sir. So is clover hay.

A Delegate:—Can you feed fat into a cow's milk?

Mr. Glover:—No. Sometimes you notice an increase, when a cow has not been properly fed.

A Delegate:—Why is it, when you haul your milk to a creamery, that one week your milk will test away up, and the next week, may be, it will go down, with the same care and the same feed?

Mr. Glover:—Sometimes cows will vary considerably in per cent of fat, and we cannot account for it; sometimes mistakes are made in testing the milk.

A Delegate:—I think that a cow that is fed on good feed will give more butter fat than a cow that is fed on a sandbank.

Mr. Glover:—That is true; but she won't test higher. She will give more butter fat, because she will give more milk. I have noticed that in places where the farmers took good care of their cows, fed them well, and kept them in warm barns, the test was not as high as the ones that fed their cows, as you say, on sandbanks, but the cows gave more milk. I have seen cow-keepers who have owned 28 cows come to the creamery with two cans of milk, and I have seen dairymen who have owned 28 cows come to the creamery with fourteen cans of milk.

A Delegate:—This gentleman that you spoke of, that is not satisfied with less than 400 pounds of butter per cow, up there in your county; what particular breed has he?

Mr. Glover:—He happens to have Jerseys. And we have another man with Holsteins doing the same thing.

A Delegate:—You speak about your yearly test. What stock association has a complete yearly test?

Mr. Glover:—I think the Guernsey association. They send men once a month to the farms, not notifying the farmers when the testers are coming.

A Delegate:—What breed of cattle gives the largest amount of butter fat per week of any breed we have in the business, according to the records?

Mr. Glover:—In recent years, the Holstein men have been doing more of the weekly work than any other breeders. The Jersey association have refused to use the Babcock test, but they

are coming to it. A great many of the leading Jersey men believe in it, and the associations, I think, will begin to take the Babcock test as a means of making records.

A Delegate:—When is the best time for watering; before or after milking?

Mr. Glover:—I think after milking in the morning and before milking at night. Then give warm water; water heated to, say, 60 degrees. Water twice a day.

A Delegate:—Does the size of the animal have anything to do with the feed ration?

Mr. Glover:—Yes, sir. The larger the cow, the more feed she takes to support her body.

A Delegate:—I would like to ask what you would add to corn stover, ground corn and oats, to balance the ration, for a dairy cow.

Mr. Glover:—How much milk is she giving?

Delegate:—Oh, I don't know.

Mr. Glover:—If your cows are averaging a pound of butter fat a day, you should give about four pounds of corn in cob meal, three pounds of bran and one pound of oil meal, and all the roughage they will consume without waste, and you would have just about enough protein to make a ration for a cow weighing 1,000 pounds and giving one pound of butter fat a day.

A Delegate:—Should the oats be ground, when you put oats in place of bran?

Mr. Glover:—Yes, for a dairy cow; for calves, feed them whole.

A Delegate:—What kind of a ration would this make: Say silo feed, about 50 pounds, corn meal and hay or corn fodder?

Mr. Glover:—What kind of hay?

Delegate:—Why, timothy hay, or corn fodder and corn meal.

Mr. Glover:—The ration would materially lack in protein. You have nowhere near enough protein for a cow to give a large flow of milk. She might do well for a while on that ration. You have considerable meat making material in the way of corn, and by giving her some stover it will keep up a good flow for quite a while, but she will not hold up on that ration through her milking period. If she is a heavy milking cow, she should have some bran or gulten feed, or oil meal or cotton seed meal, to give the ration a large percentage of protein. You would not have, in that ration, over a pound and a half of protein; and that is just about enough, on the average, to make 15 pounds of four per cent milk. You may make more than that, because your cow will draw upon her system. I do not wish to be understood as saying that she will not make more than 15 pounds of milk. She may, for awhile, but she will not keep it up year after year.

The Chairman:—We will have to call this to a close, for this afternoon. It is about five o'clock. You taxpayers have to pay the bill for doing this work in Illinois. Mr. Glover has left us, and gone to Wisconsin recently. What Jefferson county, Wisconsin, has done, Illinois can do; and we will ask for appropriations each year, and demonstrate this to you at home. I believe that is more satisfactory than to do it all at the experiment station.

We have over a million cows in Illinois, according to the census of 1900. They only returned us \$29.00 a cow—about 150 pounds of butter. If we can bring them up to the Jefferson county standard we will bring into our state millions of dollars every year. That seems a stupendous lot of money, but if you figure it out, it is a fact. And it will be nearly all profit. You are now receiving \$29.00 per cow per year, and it costs nearly that to keep her.

THURSDAY AFTERNOON SESSION

Mr. Glover:—Mr. President, Ladies and Gentlemen: I presume this is the first time in the history of the Farmers' Institute of Illinois that you ever had live specimens at your meeting, to be judged and compared. You have seen pictures that have been painted, photographs, and other reproductions, but today we are here to present to you living specimens of dairy cows that have been bred for generations for dairy purposes. The question so often arises, Is there any difference between the dairy cow and the beef animal or dual purpose animal, and if so, what is that difference? In the beginning, undoubtedly all cattle were of the same stock, springing from one common ancestry. But by generations of breeding, and by milking and choosing them for that particular thing, the dairy cow has developed into a class that has a type of its own.

And what is that type? That is what we wish to discuss this afternoon. Now, we have two different breeds before us. We have on this side two Jersey cows, that have been kindly brought here by Mr. Higginbotham (or by Mr. Story, who is the manager of Mr. Higginbotham's farm) out of courtesy to the farmers of the state. On the other side is a Holstein animal, owned by Mr. Graham, who likewise has taken the trouble to load her into his wagon and bring her here this afternoon, that you may study these animals. One other variety, a Red Poll, will be here later. I am only sorry that we have not all the dairy breeds; but because the others are not here, it is not any evidence that they are of no use. But these seemed to be handiest, and these cows seemed to be trained for this occasion, and therefore we have these animals to examine here this afternoon.

You saw the pictures that were exhibited here yesterday by Mr. Grout. You noticed their long and rectangular forms, and width of back; their large fore and hind quarters. The function

of that kind of cattle is to make meat. There is a catechism that was originated by Gen. Burchard, associate editor of Hoard's Dairyman, that he called a shorter catechism for the breeder. In substance it is as follows:

Q:—How many classes of cows are there?

A:—There are three.

Q:—What are they?

A:—Dairy cows, combination cows, and beef cows.

Q:—What is a dairy cow?

A:—A dairy cow is an individual that consumes feed and then transforms it into milk, after taking out enough to support her body?

Q:—What is a beef cow?

A:—A beef cow is a cow that eats the grain of your farm, and converts it into beef. A combination cow is one that tries to take both forks of the road and never gets anywhere. (Laughter and applause.)

Q:—And what makes this difference?

A:—Heredity.

Q:—What is heredity?

A:—It is that biological law by which all living beings tend to repeat themselves in their descendants.

Now, this little catechism is neither new or peculiar, and it is not my fault that it is not. If a dairyman hears that John Smith, living in a certain township of Will county, has a certain sort of seed oats for sale that will yield ten bushels more per acre than his, straightway he will go to John Smith's place for seed oats. Is that wisdom, or foolishness? Wisdom, most certainly! Then why is it that, when he hears of a dairyman that has a certain breed of cattle that is producing more than his, that he does not seek some of that dairy blood. Why not study the art of dairying enough to know how to handle and care and feed intelligently the dairy cow?

Now, we will consider just for a moment this Jersey heifer, which we will have led out where we can see her. There is a heifer a little over three years old. You will note the conformation of that cow, as compared with the beef cattle whose pictures you saw yesterday. There is a wonderful difference. She has not that broad back. She has not that thick, heavy thigh and shoulder. She has a long body, and when she gets older, it will be a great deal deeper than it is now. Perhaps some of you will say that she lacks in depth of body. But mind you, she is a heifer yet. She has not that development that she will have as she grows older.

Let's consider, briefly, a few points about the dairy cow. If you want to select a cow, the first thing you should look at is her head. See that she has an intelligent head. And what is there about the head that shows intelligence? We want her with a broad forehead; prominent eyes, not too open; not too quick; her movements not nervous. We say we want a highly developed nervous system. We mean an animal that is full of nerves, because the nerves control all the different organs of the body. Therefore we look to the head for the intelligence, and to the eye for the nerve force and power. You cannot see that cow's eye, sitting at the distance that you are, but you see that she is not particularly nervous. I presume that it is the first time she ever appeared before an audience. I doubt whether any of you would be as contented, and as docile, and as easy before an audience for the first time, as this cow is. It shows that a cow with a highly developed nervous system is not necessarily a nervous animal, but we expect her to be intelligent.

We also look for a wide muzzle. A wide muzzle indicates that there is a big place back of it to be filled up with food; and since it is a dairy cow's function to take the feed from the farm and convert it into milk, we want that large center-piece. There is no other part of the body that has the power of digesting and their function. Now here we have that large mouth, which indicates there is a large opening to be filled. We come to the

udder. The udder is the only place in the body in which milk is secreted, and it is secreted directly from the blood. The food is taken up by the blood, and carried back to the udder through the arteries, and those arteries run back and form what is called the escutcheon. Some people, in years gone by, laid great stress upon the escutcheon. There is an animal but three years old, but I want you to note that finely developed udder, with four well developed quarters. Notice, also, how it projects behind.

A Delegate:—Was the last calf her first or second ?

Mr. Story:—Second calf.

Mr. Glover:—You can see there four good sized and conveniently placed teats, which is an important thing in selecting a cow. We want something we can get hold of to milk. For a heifer, it is a most magnificent type of udder, and she will make a very fine cow.

I happen to know her sire, and I want to speak just a moment of the prepotency of that animal. He has a head exactly like the head of that cow. It is remarkable, how he stamps his likeness upon his progeny. It shows that he is a prepotent animal. And that is a very important thing, in selecting a dairy sire, is to get one that is prepotent; one that is capable of transmitting himself to his own progeny. This heifer certainly has his head.

To hasten matters, we cannot spend too much time upon one cow, but this animal will be milked now, and then we want to note the condition of that cow's udder after she is milked. We are going to milk her, and weigh the milk, and test it, and separate it, and I don't know, if we have time, but we may make it into butter.

A Delegate:—It would be well enough to give that cow's record, if she has one.

Mr. Glover:—Mr. Story says they don't make records of their imported cows. By that, he means a weekly record, where they put them in a test and force them for a week.

Mr. Story:—I might state that at the present time this old cow is giving about 42 pounds of milk a day, and the little cow is giving about 31.

Mr. Glover:—They keep track of the milk and fat, as I understand, for a year. We have here a matured cow from the same herd. I want you to note the difference between the matured cow and the heifer. This cow is a developed animal, and a very fine specimen of a highly developed dairy cow. Whether that form is found in the common native, whether she is found in the Holstein, or Shorthorn, no matter where you get that type, invariably you will get a good performance. It is the form that counts and it is developed through years of selecting and milking, and in no other way. I presume, if you wanted to start out with that animal, and select her progeny for years for beef, that we might be able to establish a beef breed, but it could not be accomplished in your time or mine. She has been bred for generations for dairy purposes, therefore she takes on that formation. She cannot help it, because she is built that way.

She has a head that is a different shape from the other cow. She has not, perhaps, quite as typical a head, but nevertheless, it shows intelligence. She has a good eye. She has not quite as prominent an eye as the other cow. If you were up here as close as I am, you could see immediately the difference between the nervous temperament of those two cows. You can note that she has a very wide muzzle, indicating that she has large digestive organs. And notice the difference in the depth of body between this cow and the heifer, undoubtedly because she is older. You note, also, that this cow is very nearly straight on the back, showing that she has strength enough to carry that heavy middle piece. She is a little bit down, but you will find that in a great many cows. On account of the heavy load they carry, invariably they will begin to sag a little as they advance in years. That is no objection to the dairy cow. You notice that the young heifer is practically straight on the back. We want to look to that and not allow them to become too sway-

backed, but nevertheless a great many of our best dairy animals do tend to become sway-backed.

Another thing we should consider is the rib; the distance between the hip bone and the first rib should be great. There should be large spaces between the ribs. Also, the vertebrae should be wide apart, giving opportunity for the nerves to go out to the different organs of the body. The general conformation of the dairy cow is spare and angular. She tends to become that way. She tends to be loose. She is not a compact animal, as the beef cow is. She is entirely opposite in that respect.

I want you to get a rear view of this animal. Notice the well developed udder. Notice the distance it extends up between the hind legs. It is attached well up. It is not a pendant udder. It is not an udder that is getting into the mud, as do so many cows' udders, which look to be fully as large, but drop down lower. Note that she has a very large udder, showing that she is capable of handling a good deal of feed, or taking care of the feed after it has been digested and assimilated. Underneath these cows, you will find a system of veins returning from the udder, going back underneath the abdomen, and entering the body again. The size of those veins indicate that the udder has been supplied with a large amount of blood, and it is from the blood that the milk is made. Are there any questions that you would like to ask?

A Delegate:—Isn't one of those Jerseys an imported one, and the other home bred.

Mr. Glover:—No, they are both imported animals.

A Delegate:—What is the meaning of "wedge shaped?"

Mr. Glover:—If you are looking at that cow, you will notice that her sides project out and go in again. And if you look underneath, you will also find the wedge shape. We say that a dairy animal should be wedge shaped, and that is what we mean by it.

A Delegate:—When were the cows milked?

Mr. Story:—This morning, at the regular time; about half past five.

Mr. Glover:—We will now examine the Holstein cow.

A Delegate:—How long has that cow been milked?

Mr. Story:—Since the 17th day of December. And she is still giving over forty pounds a day.

Mr. Ross:—From where were those cows imported?

Mr. Story:—From the island of Jersey.

Mr. Glover:—And that island is only seven by thirteen miles, so we haven't very much land to choose from.

Mr. Story:—I might add that these animals, for the reason that they are imported, are not our best animals. They happened to be in condition to bring today, and a little bit more easy to handle on the stage. But some of the best animals we have are native cattle, born and bred here for many generations.

A Delegate:—I have heard it stated that the system of registration on the Island of Jersey was based upon performance record.

Mr. Glover:—Yes, sir; it is based upon performance, because they do not allow any other breed of cattle on the Island of Jersey, and a cow must make a certain amount of butter during the year before she is eligible for registry.

A Delegate:—Is that heifer a daughter of Flying Fox?

Mr. Story:—No; she is by King of Arden, our herd bull.

A Delegate:—Is there any place in our country where Jerseys are not allowed to be bred?

Mr. Glover:—I don't know of any.

A Delegate:—I understand in the west, where they are raising cattle for beef, that they are not allowed upon the range at all.

Mr. Glover:—It might be, as far as beef is concerned. They are not beef animals, and they ought not to be there. They have no more business in the beef class than the beef animal has to be in the dairy class.

A Delegate:—Is this oldest cow a daughter of old Golden Lad? I wish you would give the breeding of those cattle.

Mr. Story:—She is a daughter of Golden Lad, out of a daughter of Golden Lad; an inbred Golden Lad cow. She is nine years old and she is not in her prime. That is, she has passed her best days, but she happened to be in condition to bring here today, and being gentle and easy to handle, I brought her in preference to some of the younger and better cows. We think she has a decided dairy form, and, at least from the distance you are from her you probably would not pick her faults.

A Delegate:—You never tested her?

Mr. Story:—We never test our imported cows, for reasons known to all Jersey breeders.

A Delegate:—I would like to ask one question. Do you consider that the Jerseys are the best milkers and buttermakers of all the cows you know?

Mr. Glover:—No, I do not. We have four distinct dairy breeds, and you will find excellent cows in all of them, and you will find scrub cows in all of them. No, they are not the only breed. They are a good dairy breed of cattle.

Now, we will consider the Holstein. You have found out that the Jersey cow comes from the Island of Jersey, a little island off the coast of England, seven by thirteen. The Guernsey cow is born there, close to her, on the island of Guernsey. And these two breeds constitute what is sometimes called the Channel Isle breed.

Here we have before us a Holstein animal. The Holsteins come from Holland. They are called Holstein-Friesian. They are a cross between the Holland cattle and the cattle from Friesland. They are a cattle somewhat different from the Jerseys, as you will note by looking at the specimen. They are a little larger. They are a little coarser. But at the same time, you see in this cow that same conformation that you do in the Jerseys. The main difference comes in the milking qualities, and the difference between the Jerseys and the Holsteins is this: That the Jersey does not give quite as much milk as the Holstein, and

it tests richer. The Holstein cow gives considerable more, but it does not test so much. You have all undoubtedly heard of the story how to tell a Holstein and how to tell a Jersey. You buy a new pail, you put a bright silver dollar in the bottom of it, and then milk the cow, and if she fills the pail and you can still see the dollar, she is a Holstein. On the other hand, if you take this same pail and put the dollar in the bottom of it, and milk the cow, and she does not give enough to cover the dollar, she is a Jersey. (Laughter.) That little story does show up to us, in a measure, the difference between the Jersey and the Holstein cow.

You will note in that cow that spare and angular body; good length of body. She is not now, I understand, in milk. She is dry. You will note that the Holstein animal is considerably larger than the Jersey, and as a breed they are larger. And, as I have already stated, they give considerably more milk, but it is not so rich. The question is asked, which is the best breed? That I cannot tell you, any more than I can tell you what wife a man ought to select. It is as the old Indian said: "If all Indians thought alike, all Indians want my squaw."

You will notice, in the Holstein animal, that she has a somewhat different head from that of a Jersey. She does not show that highly developed nervous temperament that the Jersey cow does.

We have had one of these animals (Jerseys) milked. I want to call attention to this cow's udder, after she has been milked out. The udder should be flabby, lie in folds, as one man says, like a leather apron, and you can note that this cow's udder milks down very nicely. You see here is a lot of loose skin, so you see that the udder is entirely milked out, which shows an animal that has a very nice udder.

Mr. Story (Displaying a well filled milk pail):—Would that milk cover a dollar? (Laughter.) The heifer gave about $15\frac{1}{4}$, and this is about the same, a little more. The old cow got a little nervous getting down and did not milk as much as she does at home. She does not like to be moved around.

Mr. Glover:—We want to note the Holstein cow. She is dry, understand, but we want to note that she has a large udder. I do not suppose you can see from that distance, that cow's udder but she has four large and well placed teats. She has just started to spring a little bit now, so her udder does not show up quite as well as it would if she was just milked, because it has started to fill up. The Holsteins are not so susceptible to disturbances as the Jerseys. The Jersey is disturbed when you take her from her stall and change milkers, while the Holstein pays but little, if any, attention to who milks her or what stall she is in, so long as she gets enough to eat. And she is not easily angered. But when she is, I don't know of any other dairy breed of cattle that gets so angry as the Holstein.

We have here this afternoon, as I understand it, a dual purpose cow, that is supposed to produce heifers that are good milkers and to produce steers that are valuable for beef. She is named Davy Bell 2nd, was bred by G. W. Coleman, of Webster City, Iowa, and is owned by James Kestel, of Manhattan, Illinois. She is a Red Poll and had a calf the second of August. She is supposed, as I said, to be a representative of a dual purpose breed. You will notice, about that cow's udder, while it is a fairly good one, the teats are not quite as well placed. You will sometimes find the same thing in the dairy cows, mind you, as that. But it is an objection. We should look to getting the udder square, and having, as I said before, the teats large, and well placed. You will note that this cow carries more flesh. She is, however, more of a dairy animal than a beef animal, and I think, if she was put in the beef class to be judged that she would not rate very high, but she would be classed as a dairy cow. In some families of the Red Poll you will find them more beef. Some judges, when in the show ring, you will find, judge from the dairy standpoint, and others from the beef standpoint. And I am unable to solve the question how we are going to treat a class of cattle that will make good beef and milk in any large quantities. I do not deny but what the Red Poll will give you a great many very good cows, but we are

talking dairy cows particularly, this afternoon, and their conformation. So far no one has ever demonstrated that it is profitable to breed a dual purpose beast, and it is left to the Red Poll men to solve this question for us. But here is a very nice looking animal, and I should expect she would give very good returns for the feed consumed.

Now, we are going to test the milk, and we will have to change the subject a little, to the Babcock test. We take 17-6 cubic centimeters of milk, and put it in this little bottle, which has a graduated neck. This neck is divided into ten parts and each one of those parts into five spaces. If we have a column of fat running from the zero to 10, you will have a cow that is producing ten pounds of butter fat in every 100 pounds of milk. If it runs from 0 to 5, she tests five per cent, we say, or five pounds of butter fat in every 100 pounds of milk. If it runs from 0 to 3.2, it means that there is 3.2 pounds of butter fat in every 100 pounds of milk.

In sampling this milk, I must be careful to take it from a portion that has been thoroughly mixed, and then measure it exactly. It will be about ten minutes before we will be able to give you the results of this test.

I do not wish to take issue with anything that Prof. — said in regard to our children as being more important than cows, however, I do not want my friends to forget that the cow, in these days, is the foster mother to thousands of babies in this country. The cow is a noble mother. (Laughter and applause.)

We will test this cow's milk. I have in my left hand sulphuric acid, composed of two parts hydrogen, one part sulphur, and four parts oxygen. It makes an acid that we call sometimes the king of acids. If you put a drop upon your clothing, it would eat it up immediately, and you would be very likely to feel its effect upon the skin and flesh beneath. We take 17.5 cubic centimeters of the acid and pour it into the test bottle and mix the acid and the milk. Note that I turn the bottle as I pour the acid in; that is to rinse the milk all down from the neck of the bottle, to make the test accurate. The sulphuric acid dissolves

the milk. As I shake the bottle you will notice that the white substance soon disappears. It has dissolved the casein, and turned it into a new compound. I would like to pass that bottle around and let you note how hot it has become. A chemical change has taken place. The sulphuric acid dissolves the white substance in the milk, thereby liberating the fat. The fat now is more or less liberated in there. But in order to get it to come to the top, we put it into the machine and whirl these bottles at the rate of about a thousand revolutions a minute.

While that test is being turned, I want you to note the difference in the conformation of those two animals, simply by looking at them, and observing the difference. It is better than any word picture I could possibly paint. Note the heavy thighs of the Red Poll cow; the heavy hind quarters. They claim that she is capable of producing considerable beef, and so she is. Compare her quarters with the Jersey. The dairy cow does not need a heavy hind quarter, because she does not put any of that into milk; it just means that much more to support. But if you are going to raise beef, it is necessary to have a cow with heavy quarters. If you can notice, and I think you can, the difference in their backs, you will see the red cow has a wider back; much wider than the Jersey. You notice that her middle piece is covered with more flesh; that the Jersey is more spare, and more angular in every way. She has a deeper body. Look at that paunch on the little cow, as compared with the digestive organs of this Red Poll cow, which is supposed to perform two duties; making milk and making beef. But you can see, in the very nature of things, that that animal is handicapped in making the same amount of butter that the Jersey is, because she does have two functions to perform. It is pretty hard to talk against a machine like that (the tester), and if you have any questions to ask, I would be very pleased to answer them.

A Delegate:—How about the Guernsey cow?

Mr. Glover:—The Guernsey cow is very much like the Jersey. She is a little larger cow. She comes from the island of

Guernsey, which is not far from the island of Jersey. The two breeds together are called the Channel Island cattle.

Someone asks, are not the Guernseys stronger in constitution than the Jerseys? I cannot say that they are.

Notice now, on my left and your right, the cream separator. The skimmed milk is coming out of the large tube that you see there, immediately above the creamery can, and the liquid running into the pail is the cream. The milk has been milked before you, and now we are separating the cream almost immediately after it is milked. It shows how quickly we can "raise" the cream. The question is asked, how much milk did the red cow give, how many pounds. She gave $7\frac{3}{4}$ pounds. She dropped her calf August 2, and she was milked this morning.

Now, I want to say, on behalf of all these cows, that it is no measure of their value, the amount of milk that any of them produced at the present time. It is no measure of their capacity, because the cow might be ever so valuable, and under these circumstances might produce only a little milk. One might have been milked much later in the morning. In order to get at what a cow is doing, we must weigh and test the milk for a year; not daily, but making five or six weekly tests during the fifty-two weeks of the year.

I want to call your attention to how contented this cow is; the Jersey heifer. She is chewing her cud here at this very moment, showing that she is not disturbed very much by this audience; not concerned about what is going on about her. Mr. Story says that the old cow is off considerably in the amount of milk that she gave, but this heifer does not show any change. I mention this simply to show you the things that we should consider when we are breeding a dairy herd of cows. For the young boy, just starting out, think of the opportunities there are for him for study, since we know so little of the things that may disturb and affect our dairy animals.

We will proceed and show you the balance of the operation in the Babcock test, although we have not the facilities exactly

as we would like them. This water is not warm enough; 120 to 130 degrees is about the right temperature. If it is too cold it contracts the fat, and you do not get proper reading. Now you will notice, as I pour this hot water into the bottle, that that fat flows up into the neck of the bottle. I wish we could have water warm in order to give the cow a fair deal. Now, the bottles are placed back in the machine, and we will whirl them one minute more, and then we can tell you what the Jersey test. The first time it was turned five minutes. The question is asked, Isn't there something that comes up into the neck of the bottle, and prevents an accurate test. If the acid is too strong or too weak, in either case we cannot get an accurate reading. Now, here we have it. We have the test of these cows. The old cow tests about 5.8 per cent. It is impossible to read that accurately, I will admit, because it is too cold. It ought to be warmer. The milk from the heifer tests in the neighborhood of 5.8. Perhaps, if either of the test bottles was warmed up it would show considerable more. But either one of those cows tests in the neighborhood of six per cent.

A Delegate:—Don't you suppose those cows would test better yesterday than today, being up here on the stage?

Mr. Glover:—Undoubtedly. I would like to pass these tests among you if some of you would like to examine them.

A Delegate:—Is that about their usual test at home?

Mr. Story:—No, I think the little cow can test considerably more, under favorable circumstances. I doubt if you could get a correct test under these circumstances

Mr. Glover:—We simply did this to show you the process of the testing, and not for anything else. The Red Poll's owner tells me her test averages about 4 per cent. She has tested 3.8, 4, and 4.2. That means much more than if we would test her milk here this afternoon.

SALE OF FEED STUFFS

Directors of the Illinois Dairymen's Association, at a meeting in Joliet during the State Farmers' Institute Convention in February, 1905, brought up the matter of the necessity of an act to regulate the sale and analysis of concentrated feeding stuffs and presented a resolution calling for such act, which resolution was passed by the State Farmers' Institute.

A legislative committee of the Illinois Dairymen's Association was appointed to take the matter in charge and the result was the passing by the legislature of the measure. The new law as printed by the state food commissioner, together with letters in relation to its interpretation are here given as follows:

AN ACT to regulate the sale and analysis of concentrated feeding stuffs.

Section 1. Be it enacted by the people of the State of Illinois represented in the general assembly: Every lot or parcel of concentrated commercial feed stuffs, as defined in section two of this act, used for feeding farm livestock, sold, or offered or exposed for sale within this State, shall have affixed thereto, in a conspicuous place on the outside thereof, a plainly printed statement, clearly and truly certifying the name, brand or trade mark, under which the article is sold for feeding purposes, the name and address of the manufacturer, importer or dealer, the net weight of the package, and the minimum percentage of crude protein, reckoning one per cent of nitrogen equal to six and one-fourth per cent of protein, crude fiber, and crude fat which it contains; the several constituents to be determined by the

methods adopted by the Association of Official Agricultural Chemists of the United States. If the feed stuff is sold in bulk, or if it is put up in packages belonging to the purchaser, the agent or the dealer shall, upon the request of the purchaser, furnish him with the certified statement described in this section.

Section 2. The term "concentrated commercial stuff," as used in this act, shall include cotton seed meals, linseed meals, pea meals, bean meals, peanut meals, coconut meals, gluten meals, gluten feeds, maize feeds, starch feeds, sugar feeds, sucrose feeds, and all oil meals of all kinds, dried distillers' grains, dried brewers' grains, dried beef refuse, malt sprouts, malt refuse, hominy feeds, cereals feeds, rice meals, oat feeds, corn and oat feeds, corn, oat and barley feeds, chop feeds, corn bran, ground beef or fish scraps, meat and bone meals, mixed feeds—except as otherwise provided in section three of this act—clover and alfalfa meals, condimental stock and poultry foods, patented, proprietary or trade-marked stock and poultry foods, and all other materials of a similar nature not included in section three of this act.

Section 3. The term "concentrated commercial feed stuffs," as used in this act, 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 and broom corn. Neither shall it include wheat bran or wheat middlings not mixed with other substances but sold separately as distinct articles of commerce, nor wheat bran and wheat middlings mixed together, not mixed with any other substances, and known in the trade as "mixed feed," nor pure grains ground together unmixed with other substances.

Section 4. Any manufacturer, importer, agent or other person selling, offering or exposing for sale any concentrated feed stuffs included in section two of this act, without the printed statement required by section one of this act, or with a label stating that the said feed stuffs contains substantially a larger

percentage of either crude protein or crude fat than is actually present therein, shall be fined fifty dollars (\$50.00) for the first offense and one hundred dollars (\$100.00) for each subsequent offense.

Section 5. The State Food Commissioner is hereby authorized, in person or by deputy, to enter any premises where feed stuffs are stored and to take a sample, not exceeding two pounds in weight, from any lot or package or any commercial feed stuff used for feeding any kind of farm live stock or poultry as defined in section two or of excepted materials named in section three of this act, which may be in possession of any manufacturer, importer, agent or dealer. Any sample so taken shall be put in a suitable vessel and a label signed by the State Food Commissioner or his deputy, placed on or within the vessel, stating name or brand of the feed stuff or material sampled, the guaranty, the name of the manufacturer, importer or dealer, the name of the person, firm or corporation from whose stock the sample was taken, and the date and place of taking: Provided, however, that whenever a request to that effect is made the sample shall be taken in duplicate and carefully sealed in the presence of the person or persons in interest, or their representative, in which case one of the said duplicate samples shall be signed and retained by the person or persons whose stock was sampled. Any person who shall obstruct the State Food Commissioner or his deputy while in the discharge of his duty under this act shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be fined not less than twenty-five dollars (\$25.00) nor more than one hundred dollars (\$100.00) for each offense. The aforesaid State Food Commissioner shall cause at least one analysis of each feed stuff collected as herein provided to be made annually. Said analysis shall include the determinations of crude protein, of crude fat, of crude fiber, and of such other ingredients as it is deemed advisable at any time to determine. Said State Food Commissioner shall cause the results of the analysis of the sample to be furnished the Agricultural Experiment Station from time

to time to be published in annual bulletins or special circulars, together with such additional information concerning the character, composition and use thereof as circumstances may require.

Section 6. Any person who shall adulterate any whole or ground grain with milling or manufacturing offals, or with any foreign substance whatever, or adulterate any bran or middlings or mixtures of wheat bran or wheat middlings, known in the trade as "mixed feed," or any other standard by-product made from the several grains or seeds with any foreign 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; and any person who knowingly sells or offers for sale any whole or ground grain, bran or middlings, or mixture of wheat bran and wheat middlings known in the trade as "mixed feed," or other standard by-product, 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 on conviction, be fined not less than twenty-five dollars (\$25.00) nor more than one hundred dollars (\$100.00) for each offense, and such fines shall be paid into the treasury of the State.

Section 7. It shall be the duty of the State Food Commissioner to prosecute the persons or persons violating any provisions of this act, and for this purpose the State Food Commissioner may, if necessary, employ experts, and may further designate some person connected with his office, or some other suitable person, to make complaints in his behalf; and in making complaints for the violations of this act the persons so designated shall not be required to enter into any recognizance or to give security for the payment of costs: Provided, however, that there shall be no prosecution in relation to the quality of any unadulterated commercial feed stuff if the same shall be found to be substantially equivalent to the statement of analysis made by the manufacturers or importers.

Section 8. Each manufacturer, importer, agent or seller of any concentrated commercial feeding stuffs shall pay annually during the month of December to the treasurer of the State of Illinois a license fee of twenty-five dollars (\$25.00) for each and every brand sold or offered for sale. 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. Said treasurer shall in each case at once certify to the State Food Commissioner the payment of such license fee. Each manufacturer, importer or person who has complied with the provisions of this article shall be entitled to receive a certificate from the State Food Commissioner setting forth said facts. The license fees received by the State Treasurer pursuant to the provisions of this section shall constitute a special fund from which to defray the expenses incurred in making the inspections and the analysis required by this act, and enforcing the provisions thereof, and he shall report annually 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 one of this act and paid the license fee 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 9. This act shall not affect persons manufacturing, importing or purchasing feed stuffs for their own use and not to sell in this State.

Section 10. The term "importer" for all the purposes of this act, shall be taken to include all who procure or sell concentrated commercial feed stuffs.

Section 11. When the rendition of a judgment imposes a

fine as provided in any of the sections of this act, it shall be the duty of the justices 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 committment 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 by section 171 of "An Act to revise the law in relation to criminal jurisprudence," in force July 1, 1895, unless such fine and costs shall sooner be paid.

Section 12. All acts and parts of acts inconsistent with this act, be and they are hereby repealed.

Robinson, Ill., July 24, 1905.

Hon. William H. Stead, Attorney General, Springfield, Ill.

My Dear Mr. Stead—At the last session of our general assembly was passed a law providing for the sale of concentrated feeds (see laws of Illinois, 1905, page 393, etc.) and quite a number of questions have arisen under the law. I desire to have your opinion in regard to some of the more important questions which have arisen.

First. Does section 8 apply to license fee for sale prior to December, 1905. If so, should the State Food Commissioner begin prosecutions before December, 1905?

Second. Is there any penalty for violating said section 8 for selling any concentrated commercial feed stuffs without a license, and if so, where and what?

Third. If there is not any penalty for selling without a license does this invalidate the law, and if so, what part of it?

Fourth. How can money paid into the State treasury for licenses provided in section 8 be drawn out for the purposes specified in said section, i. e., Can it be drawn out on a warrant of the State Food Commissioner?

Fifth. Do the inspections provided for in this act come within the term food as used in the act of 1899 creating the office of State Food Commissioner, and can the expenses of taking samples, analyzing them and making reports to the Agricultural Station be paid for under the law of 1899 as the other expenses of the department are paid?

Sixth. Sections 4, 5 and 6 each provide penalty for violating different parts of the law; section 6 provides that the penalty under it be paid into the State Treasury. Where do penalties under sections 4 and 5 go?

Seventh. Section 7 provides for the appointment of suitable persons to make complaints; also for the employment of experts. Does this authorize the appointment of experts for all the time, if deemed necessary? How can they be paid?

Eighth. Under section 8 it is provided that the manufacturer, importer, agent or seller shall pay a license fee of \$25.00 annually for each brand and then provides when the manufacturer, importer or shipper of feed stuffs shall have filed statement, etc., and paid the license fee as prescribed in said section no agent or seller or such manufacturer may by his agent sell one brand of food stuffs all over the State under a single license fee paid into the State Treasury. If a manufacturer was selling two or more different kinds of feed stuffs—for example, one for hogs and one for poultry, but both bearing one brand name—can they both be sold under one license fee paid into the State Treasury? What is the statement referred to in the last sentence of section 8?

As many of the manufacturers and dealers are anxious to know what is expected of them, and as I do not wish to take any steps in the matter without legal advice, I would esteem it a great favor if you would answer the above questions at as early a date as possible.

Thanking you for an early reply, I am,

Very sincerely yours,

ALFRED H. JONES,

Commissioner.

July 26, 1905.

Hon. Alfred H. Jones, State Food Commissioner, Robinson, Ill.

Dear Sir—I have your favor of the 24th inst., in which you submit a number of questions in relation to the recent act of the legislature concerning the manufacture and sale of concentrated foods, as follows:

First. Does section 8 apply to license fee for sales prior to December, 1905?

Second. Is there any penalty for violating said section 8 for selling any concentrated commercial feed stuffs without a license, and if so, where and what?

Third. If there is not any penalty for selling without a license, does this invalidate the law, and if so, what part of it?

Fourth. How can money paid into the State Treasury for licenses provided in section 8 be drawn out for the purposes specified in said section, i. e., Can it be drawn out on a warrant of the State Food Commissioner?

Fifth. Do the inspections provided for in this act come within the term " food " as used in the act of 1899, creating the office of State Food Commissioner, and can the expenses of taking samples, analyzing them and making report to the Agricultural Station be paid for under the laws of 1899 as the other expenses of the department are paid?

Sixth. Sections 4, 5 and 6 each provide penalty for violating different parts of the law. Section 6 provides that the penalty under it be paid into the State Treasury. Where do penalties under sections 4 and 5 go?

Seventh. Section 7 provides for the appointment of suitable persons to make complaints; also for the employment of experts. Does this authorize the appointment of experts for all the time if deemed necessary? How can they be paid?

Eighth. Under section 8 it is provided that the manufacturer, importer, agent or seller shall pay a license fee of \$25.00 annually for each brand, and then provides when the manufacturer, importer or shipper of feed stuffs shall have filed statement, etc., and paid the license fee as prescribed in said section, no agent or seller of such manufacturer may by his agents sell one brand of food stuffs all over the State under a single license fee paid into the State Treasury. If a manufacturer were selling two or more different kinds of feed stuffs—for example, one for hogs and one for poultry, but both bearing one brand name—can they both be sold under one license fee paid into the State Treasury? What is the statement referred to in the last sentence of section 8?

Section 8 requires each manufacturer, importer, agent or seller of any concentrated commercial feed stuffs to pay annually, during the month of December, to the Treasurer of the State of Illinois, a license fee of \$25.00 for each and every brand sold or offered for sale; and whenever a manufacturer, importer, agent or seller of concentrated commercial feed 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 section 8, he shall pay the license fee prescribed in said section before making such sale.

While under the language of this section, if in any year a sale is desired to be made when the seller has not paid the license fee in the preceding December he must make the payment before he would be entitled to sell, yet during this year such payment as required by the provisions of this statute could not have been made last December, for the reason that this statute only took effect the first day of July of this year. While I am of the opinion that there is some uncertainty as to a correct construction of the section named, I am strongly inclined to the opinion that no payment would be due until next December, and that the portion of this law requiring the payment of license fees will not be effective prior to December of this year.

While section 8 contains no provision imposing a penalty for a violation of that section, said section does explicitly require the taking out of a license before any sale shall be made, and imposes an obligation on the part of each manufacturer, importer, agent or seller of concentrated commercial feed stuffs to pay the license fee named, and the State could recover the same in an action of debt upon a failure to pay it.

The fact that there is no penalty imposed by the section for a violation of its terms would not render it invalid.

Money paid into the State Treasury for licenses provided in section 8, can be drawn therefrom upon Auditor's warrants issued upon certified bills. The constitution and statutes of this State direct in what manner money shall be drawn from the State Treasury, and that it shall be drawn only upon Auditor's warrants.

Section 8 provides that the license fees received by the State Treasurer pursuant to the provisions of this section, shall constitute a special fund from which to defray the expenses incurred

in making the inspection and analysis required by this act, and enforcing the provisions thereof, and he shall report annually the amount received and the expenses incurred for salaries, laboratory expenses, chemical supplies, traveling expenses, printing and other necessary matters. This provision seems to cover all of the expenses necessary to be incurred in the enforcement of the provisions of this act by your department, and I am of the opinion that this act is an addition to the act of 1899, and the expenses of enforcing it must be paid out of the license fees as provided by said section 8.

Sections 4, 5 and 6 each provide for fines for the enforcement of the various provisions of the act, and section 6 provides "such fines shall be paid into the Treasury of the State." I am of the opinion that this language refers to all of the penalties in the three sections named.

As to the appointment of suitable persons to make complaint and the employment of experts, that may be done by the employment of persons to permanently engage in that work or from time to time, as in the exercise of sound discretion the Pure Food Commissioner may determine.

Section 8 requires that each manufacturer, importer, agent or seller of any concentrated commercial feeding stuffs, shall pay annually, during the month of December, etc., the fee required by the section. This language would require each person of the several classes herein named to take out license but said section further provides, whenever a manufacturer, importer or shipper of any concentrated feeding stuffs shall have filed the statement required by section 1 of this act and paid the license fee 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. This exception would allow agents and sellers of manufacturers, importers and shippers who have taken out a license, to sell without a further payment of license fees, but the section

does require the payment of fees by all sellers and agents who engage in business on their own account and not for some other person or corporation which has paid the fees required by section 8.

I believe this answers all the questions you submit.

Very truly yours,

W. H. STEAD,
Attorney General.



The Dairy Exhibit

AT

Louisiana Purchase Exposition

Committee—W. L. MOUNTS, Chairman; J. H. PIERCE, H. M. DUNLAP.

REPORT OF THE SUPERINTENDENT.
GEORGE E. HUNT, Hebron.

There was no exhibit at the Louisiana Purchase Exposition that excited more comment or was viewed with more genuine interest than the magnificent exhibition of butter in the mammoth glass refrigerated cases located in the Palace of Agriculture. There was none that people inquired for more or that will be remembered by them longer than the Butter Statuary. One of the most attractive and interesting sections of this exhibit is that installed by the Illinois Commission, under the direction of W. L. Mounts, John H. Pierce, and H. M. Dunlap, comprising the Dairy Committee, and Geo. A. Hunt, superintendent of the exhibit. The statuary in this exhibit consists of a full length ideal statute representing "Illinois," holding the Shield of State with one hand, while the other grasps the shaft holding the streamer reading "Illinois" in large clear golden letters. On either side of this figure were large busts of Lincoln and Grant. These busts and the full length figure were made of pure, Illinois creamery butter.

The character of the statuary reflects great credit on the representative of Lorado Taft's studio, Mr. Crunelle, who did

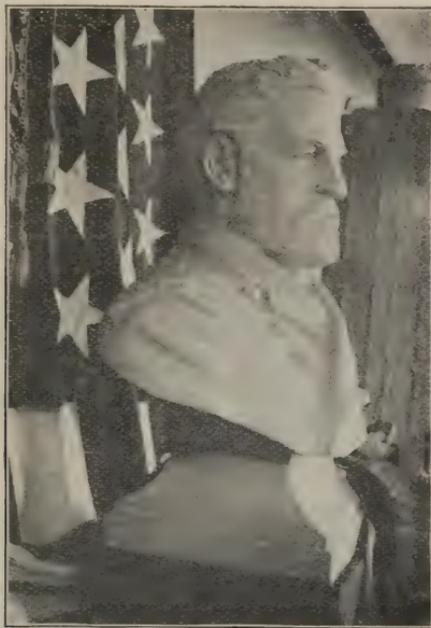


BUST OF LINCOLN IN BUTTER.

the work. The folds of the drapery and the features of the noted men represented are portrayed with a truthfulness and perfection that it will be difficult to equal and which no one can excel.

The background for the statuary was arranged with the banner won by the Illinois Creameries and two large United States flags which were in keeping with the historical character of the two men represented.

At the sides and in front heavy draperies separate the statuary from the commercial exhibits, which consist of print butter from the Elgin district and from the University of Illinois, arranged in various designs; also samples of Borden's Condensed Milk and Malted Milk, St. Charles Evaporated Cream and Mighland Evaporated Cream.



BUST OF GRANT IN BUTTER

There were also jars with samples showing the amounts of water, butter fat, casein, albumen and other ingredients entering into the composition of a thirty-pound tub of butter.

Tables showing the value of the great dairy industry of Illinois, the production of butter and cheese in the Elgin district, the butter and cheese market of Chicago, and large photographs portraying typical Illinois dairy cows and Illinois creameries and condensing plants occupy prominent positions among the exhibits. Several bulletins from the University of Illinois agricultural experiment station, showing the importance of clean milk and pure butter and other information of value to dairymen are distributed from the superintendent's desk. The cheese exhibit, consisted of samples made by students at the University of Illinois, and a large collection installed by M. Uhlmann & Co. of Chicago, occupy a space in the cheese case directly opposite the butter exhibit.

The refrigerator which contained these exhibits has a glass front formed of three thicknesses of plate glass with air spaces between. The temperature inside the case was kept close to the freezing point by an ice-making machine in constant operation.

There was no doubt that this exhibit gave great prominence to the dairy interests of the State to visitors from Illinois, as well as the hundreds of thousands of people from other States and foreign countries, who saw this exhibit were given an object lesson which will be far-reaching in its results.

Many a young man from Illinois and other States as well, went home with new thoughts and new ideas which will be put into practice as a result of his visit to the dairy exhibits.

While the wealth of Illinois is in her fertile soil, it is a well known fact that in order to maintain this wealth it is necessary to return to the soil the elements of fertility taken away by the continued cropping from year to year.

The great increase in dairying in Central Illinois during the past few years not only demonstrates the fact that dairying is a profitable business, but also draws attention to the fact that the farmers are beginning to realize that dairying with the proper crop rotation is one of the best methods known of retaining the soil fertility. As an instance of this; on a certain farm in Madison county, the yield of corn per acre was doubled in two years by this method of growing suitable crops and feeding the cows and returning the barnyard manure to the soil.

Another evidence of the effect of dairy farming on the soil is shown by the fact that in the best dairy counties of Northern Illinois, which are supposed to be north of the great corn belt of the State, the average yield of corn per acre is forty-two bushels; while in Central Illinois, where large yields can be obtained by proper methods, the average is only thirty-six bushels per acre. At Greenville, in Bond county, where in 1900 not more than 3,000 pounds of milk was delivered per day, the daily delivery has increased to about 70,000 pounds during the past four years and during this time the value of farm property in

that section has increased thirty-three and one-third per cent.

Since the building of the first creamery in 1867, the dairy industry of Illinois has made a steady increase; the value of butter and cheese in the Elgin district alone has increased from \$81,000 in 1872, to nearly \$12,000,000 in 1903.

Elgin, in Kane county, is in the center of what is known as the greatest dairy region in the world. A Board of Exchange, where butter and cheese are bought, is maintained at this point, which is an important factor in the butter markets of the world.

The average price for creamery butter on the Elgin Board during the past thirty-two years is 26 3-10 cents per pound.



ILLINOIS BUTTER EXHIBIT.

The butter production for 1903 amounted to 46,294,471 pounds, the cheese production for the same year was 4,177,407 pounds.

There has been a great increase in the Chicago butter and cheese market, during the past few years. The butter receipts during 1903 (not including through shipments) amounted to 110,000,000 pounds; the cheese receipts for the same period were 82,000,000 pounds. Illinois has in round numbers, 1,065,000 cows valued at \$42,500,000; produces annually 485,000,000 gallons of milk, valued at \$30,000,000.

Amount of butter produced annually, 86,600,000 pounds; amount of cream sold annually, 1,800,000 gallons; amount of cheese produced annually, 9,400,000 pounds; annual production of condensed milk, 100,000,000 pounds.

McHenry county, located in the extreme northern portion of the State, is the banner dairy county and produces more milk and over one million pounds more butter than any other county; has more creameries than any other county in the State and more cows per capita than any other county in the United States.

McHenry county has fifty thousand cows from which two million pounds of butter and over two hundred million pounds of milk are sold annually, bringing in to the farmers a revenue of between three and one-half and four million dollars annually from these two products alone.

List of Persons and Firms Who Furnished Exhibits for the Display Case.

1. John Newman Elgin, Ill.
2. Elgin Butter Co. Elgin, Ill.
3. Elgin Butter Tub Co. Elgin, Ill.
4. W. S. Moore & Co. Chicago, Ill.
5. George W. Linn & Son Chicago, Ill.
6. Geo. H. Gurler DeKalb, Ill.

7. University of Illinois Urbana, Ill.
8. Borden's Condensed Milk Co.
9. St. Charles Condensing Co.
10. Helvetia Milk Condensing Co.
11. M. Uhlmann & Co. Chicago, Ill.

List of Those Who Participated in the Creamery Butter Contests.

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|---|--|
| 1. Wm. Bote, Aurora. | 19. Geo. W. Hoppensteadt,
Beecher. |
| 2. Anton Buehler, Bemes. | 20. Ernest Johnson, Hebron. |
| 3. George Bloyer, Harper. | 21. William Kane, Morrison. |
| 4. K. B. Carpenter,
Mt. Carroll. | 22. L. H. Knigge, McHenry. |
| 5. Geo. A. Cutler, Belvidere. | 23. P. J. Kolbert, Oregon. |
| 6. Alice M. Cooksley,
Stillman Valley. | 24. G. W. Lorah,
Sugar Grove. |
| 7. J. H. Cooley, Hillsdale. | 25. Mat. Ludwig, Lockport. |
| 8. C. Christensen,
Mascoutah. | 26. C. McConaghie, Leland. |
| 9. Chas. Castells, Forreston. | 27. John Mingle, St. Marie. |
| 10. F. J. Dickinson,
Woodbine. | 28. Mutual Creamery Co.,
Mascoutah. |
| 11. H. R. Duell, Sandwich. | 29. Frank McFarlan,
Big Rock. |
| 12. Wm. Engelbright,
Fairhaven. | 30. Fred P. Maschke,
Milbrook. |
| 13. A. D. Farnham,
Thompson. | 31. Theo. W. Marquardt,
Lombard. |
| 14. E. F. Harrison,
Ringwood. | 32. Louis Nelson,
Camp Point. |
| 15. J. H. Hilfeler, Manhattan. | 33. P. J. Springsteen, Elgin. |
| 16. H. H. Hopkins, Hinckley. | 34. I. O. Schoch, Freeport. |
| 17. John G. Goeller,
Tower Hill. | 35. O. A. Selfried, Dakota. |
| 17. M. G. Holtgrave,
Strasburg. | 36. J. D. Terpening,
New Lenox. |
| | 37. F. B. Thompson, Warren. |

- | | |
|--------------------------------|--------------------------|
| 38. Chas. Thornton, Argyle. | 42. West Sangamon Cream- |
| 39. D. Van Patten, Plainfield. | ery Assn., New Berlin. |
| 40. S. J. Vankuren, Franklin. | 43. C. L. Weihe, |
| 41. A. C. Winter, Waterman. | New Minden. |

List of Those Who Participated in the Dairy Butter Contest.

1. Mrs. H. P. PurvianceLincoln, Ill.
2. Mrs. Orilla GillisHarvard, Ill.
3. Mrs. W. W. CorringtonSpringfield, Ill.
4. R. A. BloomfieldMt. Sterling, Ill.
5. Leland Hotel FarmSpringfield, Ill.
6. A. R. StickleGood Hope, Ill.

The advisory dairy committee who assisted the Superintendent and Dairy Committee of the Commission were: Chairman, Joseph Newman, Elgin; secretary, George Caven, 154 Lake St., Chicago; A. J. Glover, Elgin; D. E. Wood, Elgin; George H. Gurler, DeKalb; George W. Linn, 103 South Water St., Chicago, and Thos. F. Gallagher, 191 South Water St., Chicago. Mr. Newman is President of the State Dairymen's Association and Geo. Caven is secretary. These gentlemen very ably assisted the Dairy Committee of the Commission and the Superintendent and the success of the exhibit is largely due to them.

A gold Medal was awarded the Illinois butter exhibit by the jury.

Experiments with Hand Fed Calves

Bulletin From the Experiment Station of Kansas State Agricultural
College.

From the Kansas Experiment Station a bulletin on hand-fed calves has lately been issued and is of particular interest to dairymen. For the benefit of dairymen of Illinois it is added to this report. The bulletin follows:

With the advent of creameries, skimming stations, and hand separators, the question of successful and economical raising of calves on skim-milk is one of growing importance and vital concern to every creamery patron and private dairyman. As land increases in value, we can no longer afford to keep a cow the entire year for raising one calf to be used as a feeding steer.

For the last four years the Kansas Experiment Station has almost continuously been conducting experiments in rearing and feeding calves on skim-milk or substitutes for skim-milk. The material given in this bulletin is the result of our experience.

CARE OF THE COW BEFORE CALVING. Strong, thrifty calves cannot be expected from cows that have received poor feed and poor care previous to calving time. The cow must be supplied with wholesome and nutritious feed, containing the elements that are necessary to the proper development of bone and muscle in the fetus. It is better for the cow, and we believe better for her record in the production of milk and butter-fat, if she can go dry for six or eight weeks previous to calving. If it is impossible to dry her up without injuring the udder, continuous milking should be practiced.

Where the cow has access to good pasture with plenty of spring-water she needs little or no attention until two or three days before calving. If she has secluded, shady and otherwise comfortable quarters separate from the other cattle, and is carefully watched by an attendant, she may need no other attention until after the calf is dropped. Sometimes luxuriant pastures will stimulate heavy milkers to produce too much milk prior to calving, in which case the supply of feed should be reduced, and in extreme cases the milk removed before calving.

When kept on dry feed care should be taken to provide plenty of succulence. Ensilage and roots serve an excellent purpose, the object being to keep the bowels loose. When alfalfa or clover hay is used for roughness very little grain is necessary. With less nitrogenous rough feeds, a grain mixture of two-thirds bran and one-third oil-meal is excellent. Soy beans may be used as a substitute for oil-meal.

CARE OF COW AND CALF AT CALVING. In cool or cold weather the cow should be placed in a box stall, well lighted, with plenty of ventilation. When the calf is dropped it is well to blanket the cow until she regains her normal condition. In the absence of anything better gunny-sacks sewed together will do very well. Light, loosening feeds, water from which the chill has been taken off, should be given. Cold water is liable to cause contraction of the womb and retention of the afterbirth. If the latter is not discharged in from twenty-four to forty-eight hours it should be removed. If the udder is heated and caked it is advisable to milk the cow frequently, though not quite dry, and the udder should be steamed by rubbing with a flannel cloth dipped in as hot water as the hand will bear, after which the udder should be rubbed dry, and treated with camphor, olive oil, or camphorated vaseline. If there are any signs of constipation, it is well to administer from one and one-half to two pounds of Epsom salts dissolved in water. All these points will aid materially in keeping the cow in a good, healthy condition, and consequently give the calf a good, healthy start.

As soon as the calf is licked dry by its mother, it should have strength enough to rise and suck; if it has not, it should be assisted. The calf may be taken away from its mother after its first meal, or, if preferred, can be left with the cow until the milk is good. It is easier to teach the calf to drink if it is taken away early. Our experience is that if the calf is taken away at once, or when four or five days old, it will make good gains the first week, but if left two or three weeks, the first seven days after weaning will be a losing period. If the cow's udder is caked it is desirable to leave the calf with her, as the rubbing of the calf tends to alleviate the inflammation.

Feeding Milk and Skim-Milk.

BREAKING THE CALF TO DRINK. It is well to leave the calf by itself for at least twelve hours and, in case the calf has run with its mother for several days, possibly twenty-four hours. Attempts to feed the calf earlier than this usually do the calf no good and may injure the feeder's temper. If the calf's muzzle is held in the milk and its mouth pried open once, so that it tastes the milk, our experience tells us that the calf can be taught to drink without the feeder being obliged to place his hand in the milk and allow the calf to suck his finger—an unpleasant experience in winter weather.

This station has had some experience with calf-feeders, which consist of a rubber nipple and tube, the latter fastened at a convenient height for the calf to reach, and the tube placed in the milk-pail. The manufacturers of these feeders claim that a calf can be taught to feed itself easier, and that it does not gulp its milk down as when drinking out of a pail. Our experience indicates that the first point is not well taken; that it is as easy, if not easier, to teach the calf to drink without the feeder. With the feeder the calf loses the nipple, and is unable to find it without the assistance from the attendant. As to rapid drinking the statement is all too true—so much so, that in cold weather the milk will become entirely too cold before the calf can consume

it through the feeder. The feeder is difficult to keep clean, and a person will need a dozen in order to keep himself busy feeding calves. Four to five buckets will keep one man busy. We weighed our calves under experiment once every week, and found that there was no difference in gains between those which consumed their milk slowly through the calf-feeder and those which consumed it rapidly from the pail.

THE NECESSITY OF FEEDING SOME WHOLE MILK. The calf is unable to handle hay or grain until it is a week or ten days old. During this period it is not wise to try to feed skim-milk. At first the whole milk should be fed three times a day—four pounds in the morning, two pounds at noon, and four pounds at night, at blood temperature. In about a week or ten days the calf can be fed twice daily. During this time the allowance of whole milk can be gradually increased to about twelve pounds. The amount depends somewhat on the individuality of the calf and its ability to handle increased quantities.

CHANGING FROM WHOLE TO SKIM-MILK. The stomach of the young calf is very delicate, and all changes should be made gradually. When about two weeks old, the calf, if a strong, vigorous one, can be gradually changed to skim-milk. During the first day decrease the amount of the whole milk one pound and add one pound of skim-milk, and so on each day until the change is complete. Previous to this the calf should have a little grain (corn or Kafir corn meal, or a mixture of both) placed in its mouth immediately after drinking its milk. In this way it gets a taste of the grain and will soon go to the feed-boxes and eat with a relish.

After the change to skim-milk is completed the amount may be gradually increased as fast as the calf is able to consume it without scouring. Care must be taken not to increase too rapidly. The calf is a greedy animal, and will appear more hungry after drinking its milk than before, and if given too much it will soon be on the sick list. The milk fed should be weighed or measured at each feeding. Our experience has been that a

calf from three to five weeks of age can be fed from ten to twelve pounds daily; from seven to eight weeks old, fourteen to sixteen pounds, and when from three to five months of age can be fed eighteen to twenty pounds of milk. The milk should always be fed warm and sweet. Next to overfeeding, there is probably nothing which causes greater difficulty with hand-fed calves than feeding sweet milk one meal and sour milk the next.

THE IMPORTANCE OF SKIM-MILK. Skim-milk has all the ingredients of whole milk except the fat, as is shown in tables I and II.

Table I.—Composition of skim-milk and whole milk compared.

Ingredients.	Skim-milk general average (Babcock.) (Cooke.)	Whole milk. (Babcock.)
Water	90.25 %	87.17 %
Ash .....	.80	.71
Casein and albumen	3.50	3.55
Sugar	5.15	4.88
Fat .....	.30	3.69

Table II.—Digestible nutrients, per cent.—skim-milk, whole milk. (From Henry's "Feeds and Feeding.")

	Dry matter in 100 pounds.	Digestible nutrients in 100 pounds.		
		Protein.	Carbohydrates.	Ether extract.
Skim-milk	9.4	3.9	5.2	0.3
Whole milk	12.8	3.6	4.9	3.7

It will be seen in table II that the percentage of protein in skim-milk is greater than in whole milk, and as protein is what produces bone and muscle, the feeding value of skim-milk is apparent. The fat taken from the skim-milk can be readily supplied in the fat and starch contained in grains. The fat in the milk would go to keep up the animal heat and be deposited in the system. This makes the calf receiving whole milk look

plumper and slicker, but no better developed in bone and muscle. Comparing the different experiments that we have conducted in feeding calves on skim-milk, table III has been constructed. In figuring for this table, the calves have been charged with grain at fifty cents per hundred weight and hay at four dollars per ton.

Table III.—Money value of skim-milk.

Experiment No.	No. of calves.	When calves are worth \$3 per cwt.	When calves are worth \$4 per cwt.	When calves are worth \$5 per cwt.
I	10	\$0.24	\$0.32	\$0.41
II	10	.20	.32	.43
III	10	.24	.36	.49
IV	10	.19	.32	.44
V	10	.16	.27	.38
VI	10	.21	.35	.47
VII	10	.21	.35	.48
VIII	10	.23	.37	.50
IX	10	.17	.29	.41
X	10	.12	.22	.32
XI	10	.17	.29	.41
XII	10	.15	.27	.38
XIII	10	.21	.34	.47
Average	10	\$0.19	\$0.31	\$0.43

Table III makes a remarkable showing for skim-milk. With calves worth only \$3 per hundredweight, skim-milk is worth nearly 20 cents per hundredweight; with calves at \$4 per hundredweight, it is worth 30 cents; and at \$5 per hundredweight, over 40 cents.

On account of its superior feeding value, skim-milk should be handled and fed with considerable care. Where milk is delivered to a creamery or skimming station, it is a frequent practice to sterilize it by heating to a high temperature, which process destroys the germs. This is to be highly commended, but some care must be exercised in handling this heated milk. Too fre-

quently a can of skim-milk is brought home and set in a tub of cold water, with the expectation of cooling down sufficiently to keep from souring. The result is, that the heated milk heats up the water, and the water cools the milk, and both become in what is known as a lukewarm condition, which furnishes ideal conditions for the development of the souring germs. If hot milk is set in cold water, it should be running water; at least, the water should be changed and the milk stirred sufficiently to cool the latter. By far the best plan is to run the milk over the cooler and then set the cool milk in cold water to keep it cool. Skim-milk treated in this way has been kept from Saturday noon until Monday morning in good condition during the hottest weather of July and August.

CREAMERY *vs.* HAND-SEPARATOR SKIM-MILK. With the advent of the hand separator, the question is often asked as to the relative merits of skim-milk from the creamery and from the hand separator. A test comparing the two was made at this station with thirteen calves, results of which are shown in table IV.

Table IV.—Test of sterilized creamery and hand separator skim-milk

	No. of calves.	Days fed.	Average gains per head.	Daily gains per head.
Sterilized creamery skim-milk.....	6	142	250	1,760
Hand-separator skim-milk	7	142	251	1,767

At first the calves showed a dislike to the odor of the sterilized skim-milk, but they soon became accustomed to it and drank it readily. From the above table, it will be seen that there was practically no difference between the two classes of skim-milk. It should be stated, however, that the creamery took pains to thoroughly sterilize the milk, and was careful not to receive sour milk that would give it a tendency to clabber. The hand separ-

ator skim-milk was fed immediately after separation. Observations show that the calves receiving sterilized skim-milk were less subject to scours.

EFFECT OF STERILIZING SKIM-MILK. The amount of water added when heating skim-milk by steam is shown in table V.

Table V.—Showing amount of water added to skim-milk in the process of sterilization.

		Pounds of whole milk separated	2,948			
Test No. 1.		Pounds of skim-milk separated	2,675			
By weighing.		Pounds of skim-milk after being sterilized.....	3.010			
		Water added to milk, 335 pounds, or 11 per cent.				
	Sterilization Temp. F.	Lactometer reading of unsterilized skim-milk	Lactometer reading of sterilized skim-milk	Per- cent- age water	Weather	
	Degrees.					
Test No. 2.	1	180	36.3	32.0	12	Cool, but not cold.
With lactometer.	2	180	37.5	33.0	12	Cool, but not cold.
	3	180	37.0	32.0	13.5	A cold day.
	4	202	37.0	32.5	12.2	Very cold day.
	5	204	36.0	31.0	13.9	Cold wind blowing.

From the above table, it will be seen that in the process of sterilization with live steam there is from eleven to fourteen per cent of water added. The amount of water added is usually in proportion to the degree of heat to which the milk is raised. It also varies with the weather, requiring more steam to heat the same amount of milk to a given point on a cold day than on a warm day.

RESULTS WITH SKIM-MILK. The lots of calves fed on skim-milk in the different experiments are grouped in table VI. This table not only shows the possibilities in raising calves on skim-milk, but it also shows the variations in the results obtained. It will be noticed that with young calves it requires a very small amount of feed to produce a pound of gain. (See fig. 1.)

Table VI.—Summary of results obtained in feeding calves on skim-milk.

Lots.	No. of Days calves fed	Grain fed.	Roughness fed.	Average	Feed consumed per
				gains.	100 pounds gain.
				Daily.	Rough-
				Per per	head. Milk. Grain. ness.
				head.	head.
Skim-milk lot	10 150	Kafr-corn meal, corn-meal.	Alfalfa	2.5	1.37 1197.85 135.88 31.04
Corn-chop lot	10 133	Corn chop	Alfalfa, mixed hay, prairie hay	12.3	1.59 880.56 107.71 333.39
Shelled-corn lot	10 133	Shelled corn	Alfalfa, mixed hay, prairie hay	32.2	1.74 773.04 112.47 305.25
Ground Kafr-corn lot	10 112	Ground Kafr-corn	Alfalfa, prairie hay, orchard grass	177.7	1.58 829.93 72.78 491.16
Whole Kafr-corn lot	10 112	Whole Kafr-corn	Alfalfa, prairie hay, orchard grass	162.1	1.44 901.91 101.23 523.68
Blachford's sugar and flaxseed lot.	10 105	Shelled corn, ground Kafr-corn, Blachford's sugar and flaxseed	Prairie hay, alfalfa	186.7	1.77 726.16 144.89 375.46
Dried-blood lot.	10 105	Shelled corn, ground Kafr-corn, dried blood	Prairie hay, alfalfa	177.5	1.69 750.16 119.91 415.06
Check lot (1)	10 105	Shelled corn, ground Kafr-corn	Prairie hay, alfalfa	186.3	1.77 726.91 112.50 384.05
Rennet lot	10 140	Shelled corn, ground Kafr-corn	Prairie hay, alfalfa, oat hay, mixed hay	193.0	1.37 835.25 119.06 483.76
Reduced-grain-ration lot	10 140	Shelled corn, ground Kafr-corn	Tame hay, prairie hay, alfalfa, oat hay mixed hay.	60.9	1.14 1006.77 107.12 637.14
Check lot (2)	10 140	Shelled corn, ground Kafr-corn	Prairie hay, alfalfa, oat hay, mixed hay	188.5	1.34 875.11 122.86 405.51
Mixed-grain lot	10 126	Shelled corn, ground Kafr-corn, bran, oats, oilmeal, dried blood	Prairie hay, alfalfa	220.2	1.74 880.19 192.94 333.37
Check lot (3)	10 126	Shelled corn, ground Kafr-corn	Prairie hay, alfalfa	55.1	2.02 772.86 164.75 325.63
Average	10 125.15			196.85	1.58 853.20 124.16 387.26

THREE FORMS OF FEEDING MILK COMPARED. Twenty head of grade Shorthorn and Hereford calves purchased by the Kansas Experiment Station in the spring of 1900 were divided into two lots as nearly equal as possible. One lot was fed on sterilized creamery skim-milk with a grain ration of equal parts of corn and Kafir-corn meal, with all the alfalfa hay they would eat. The second lot was fed the same as the first, except that fresh whole milk was substituted for skim-milk. To compare with these two lots, the station secured the privilege of weighing twenty-two head of high-grade Hereford calves which were running with their dams in a pasture near by. A summary of the results is shown in table VII.

Table VII.

Experiment.	No. of calves.	Days fed.	Average gain per head.	Daily gain per head.
Skim-milk	10	154	233	1.51
Whole milk	10	154	287	1.86
Running with dams	22	140	248	1.77

Figuring skim-milk at fifteen cents per 100 pounds and whole milk at creamery prices for butter-fat (which during the past year was 21.08 cents at the college creamery), grain at fifty cents per 100 pounds, and hay at four dollars per ton, the cost of raising these calves is as follows, the value of the skim-milk in the whole milk consumed by the calves being left to balance the expense of hauling:

Table VIII.—Cost of raising calves.

	Cost per head.	Cost per 100 pounds gain.
Skim-milk lot	\$ 5.27	\$2.26
Whole-milk lot	19.13	7.06
Lot with dams	12.00	4.41

This experiment shows that the feed-cost of raising a good skim-milk calf need not exceed \$5.27, in contrast to \$19.13 for whole milk and \$12 for one raised by the dam. (See figs. 2 to 4.) A skim-milk calf becomes accustomed to eating grain and roughness early in life, becomes gentle, and when transferred to the feed-lot is ready to make economical gains. At the close of this experiment, the calves running with the dams were purchased by the Experiment Station and placed in the feed-lots in comparison with those raised on skim-milk and whole milk. The results in the feed-lots are shown in table IX.

Table IX.

Experiment.	No. of calves.	Months fed.	Average gain per head.	Daily gain per head.
Skim-milk	10	7	440	2.10
Whole milk	10	7	405	1.93
Running with dams	22	7	422	2.00

It will be seen that the skim-milk calves made the best gains. The feed records show that the skim-milk calves produced 100 pounds of gain for 439 pounds of grain, while the whole-milk calves required 470 pounds of grain per 100 pounds of gain, and the calves running with the dams required 475 pounds of grain per 100 pounds of gain.

Up to weaning time the calves running with their dams looked slicker and fatter than those raised on either skim-milk or whole milk. The critical period with the calves running with the dams was at weaning time. This is shown in table X.

Table X.—Gains and losses of calves when weaned from milk.

	Second week before weaning g		First week before weaning g		First week after weaning g		Second week after weaning g		Third week after weaning g		Fourth week after weaning g	
	Total in lbs.	Daily per he'd	Total in lbs.	Daily per he'd	Total in lbs.	Daily per he'd	Total in lbs.	Daily per he'd	Total in lbs.	Daily per he'd	Total in lbs.	Daily per calf
Skim-milk, ten calves	165	2.35	126	1.65	220	3.14	85	1.21	110	1.57	170	2.42
Whole milk, ten calves	193	2.75	219	3.27	77	1.10	3.10	4.43	155	2.21	125	1.78
With dams, eight- een calves					-73	-.58	75	.59	220	1.75	1.50	1.19

From this table it will be seen that the calves nursed by the cows lost 73 pounds the first week after weaning, while the skim-milk calves gained 220 pounds and the whole-milk calves 77 pounds. It took several weeks for the calves nursed by their dams to recover from the effects of weaning.

The dams nursing the calves were valued at \$40 per head; when weaned the calves brought from \$18 to \$20. The labor connected with keeping the cows probably did not exceed from \$1 to \$2 per animal. The expense of keeping, including feed, pasture, etc., was valued by the owner at \$12 per animal. When it is possible to raise a \$20 calf from a \$40 cow for from \$12 to \$14, a person ought to realize a handsome interest on the money invested. It should be said, however, that the owner of the cows, in making his estimate, paid only \$2.50 per head for pasture for the entire season. It requires at least from two to three acres of pasture per cow. As land becomes more valuable the cost of keeping the cow must increase. This comparison does not refer to pure-bred animals that are kept for breeding purposes, where a calf will bring \$100 and upwards. In that case there is no question about its profitableness, no matter by what method it is fed.

The economy of feeding grain feed in place of butter-fat in the above experiments is shown as follows:

Skim-milk calves consumed 122 pounds grain per 100 pounds gain. Whole-milk calves consumed 58 pounds grain and 31.8 pounds of butter-fat per 100 pounds gain. The 58 pounds of grain plus 31.8 pounds of butter-fat is equivalent to 122 pounds of grain. Subtracting the 58 pounds of grain from 122 pounds, we have 64 pounds of grain, equivalent to 31.8 pounds of butter-fat. At this rate, 100 pounds of grain is equivalent to 48 pounds of butter-fat. Figuring butter-fat at 15 cents per pound, the 100 pounds of grain will save \$7.20. At 20 cents per pound, it will save \$9.60 worth of butter-fat.

AN EXPERIMENT WITH RENNET. This experiment was planned to see if the addition of rennet to skim-milk would make any difference in the ability of the calf to utilize it. Rennet extract, such as is used in cheese-making, was added to the skim-milk at the rate of one cubic centimeter per calf per feed. The rennet was added to the milk just prior to feeding, but sometimes before the milk was entirely drunk the rennet would coagulate the milk, and the calf would finish his meal by eating the clabbered milk. In this test both hand-separator and sterilized skim-milk were used, in order to see the action of the rennet on each. With the sterilized skim-milk the rennet had no appreciable effect, while with the hand-separator milk it produced a thick clabber in a few minutes. The results are shown in table XI.

This table shows that there is practically no advantage in adding rennet to the milk.

Summarizing the results obtained in feeding milk, it will be seen that the best method is to feed sweet milk, either from the hand separator or sterilized from the creamery; that there is considerably more profit realized per animal where skim-milk is fed in place of whole milk, or in place of allowing the calves

Table XI.—Results in adding rennet to skim-milk.

	Number of Calves		Skim-milk fed (lbs.)	Grain fed (pounds)				Roughness fed (pounds)			
	Days fed			Shelled Corn	Ground Kafir corn	Total	Prairie hay	Alfalfa hay	Oat hay	Meal hay	Total
Lot 1, with rennet	10	140	16,120.5	1,149	1,149	2,298	1,990	5,870	1,131	346	9,337
Lot 2, without rennet	10	140	16,496.0	1,149	1,167	2,316	1,816	4,186	780	862	7,644
	Average gains, in pounds.			Feed consumed per 100 pounds gain (pounds.)							
			Per head	Daily per head.	Milk.		Grain.		Roughness.		
Lot 1, with rennet			193.0	1.37	835.25		119.6		483.78		
Lot 2, without rennet			188.5	1.34	875.11		122.86		405.51		

to run with the cows, providing, however, that the latter produce a large enough quantity to pay a man to milk them.

In the vicinity of creameries, buttermilk can sometimes be had at very reasonable figures, and in order to test both the value of buttermilk and also the feasibility of feeding sour milk to young calves, an experiment was inaugurated, January 21, 1903, in which one lot of calves was fed on buttermilk in comparison with another lot fed skim-milk, the grain and roughness being the same in both cases. These results are summarized in table XII.

Table XII.—Buttermilk and skim-milk compared as feed for calves.

	No. of Calves		Skim-milk	Grain fed (pounds)			Roughness fed (lbs)			
	Days fed			Shelled Corn	Ground Kafir corn	Total	Prairie hay	Alfalfa hay	Total	
Check lot	10	126	19,841.9	2,101.5	2,101.5	4,203	2,392	5,915	8,307	
	Buttermilk									
Buttermilk lot	10	126	19,730	2,092.5	2,092.5	4,185	1,790	4,305	6,095	

	Average gains, in pounds.		Feed consumed per 100 pounds gain.		
	Per head.	Daily per head.	Skim- milk	Grain.	Rough- ness.
Check lot	251.1	2.02	777.79	164.75	325.63
Buttermilk lot	225.5	1.79	Buttermilk. 874.94	185.58	270.51

From the figures presented, the buttermilk lot did not make quite as rapid gains as the skim-milk lot. Nevertheless the experiment shows beyond a doubt that calves can be successfully raised on buttermilk. In this experiment the buttermilk calves had less trouble from scours than the skim-milk calves.

Feeding Whey.

While there are comparatively few cheese factories in the state, they are numerous enough to make the question of how to utilize whey an important one. Whey, unlike skim-milk, has the casein as well as the butter-fat removed. Our experience consists of two trials; the first one began January 31, 1900, and extended to March 21 of the same year.

On account of the low nutrient quality of whey, an effort was made to increase the nutrients of the calf ration by feeding plenty of alfalfa, Kafir-corn meal, oats, and soy beans. This ration figured out very nicely as far as composition was concerned, but when we came to feed it we found that we had two feeds, namely, alfalfa and soy beans, that were very loosening, and the combination of the two with whey was too much for the calves; we found later that it is impossible to feed soy beans in large quantities, as they invariably cause scours. After the above experience the grain ration was changed to Kafir corn alone. The results of this experiment are recorded in table XIII.

Table XIII.—Results in feeding whey to calves.

FIRST TRIAL	No. of calves		Grain fed (pounds)							Roughness Fed (lbs.)				
	Days	fed	Whole Milk (lbs.)	Skim Milk (lbs.)	Whey (lbs)	Kafir corn meal	Oats	Soy beans	Total	Alfalfa Hay	Prairie Hay	Mixed Hay	Total	
Whey lot	7	50	104.5	59.5	3662	751.8	15.4	15.4	782.6	600.6	47.6	...	648.2	
Skim-milk lot	...	7	50	122.5	3761.5	627.9	627.9	518.7	32.9	79.8	631.4
			Average gains.				Feed consumed per 100 lbs. gain.							
			Per head.	Daily.	Whole head.	Skim-milk.	Whey.	Grain.	Roughness.					
Skim-milk lot	....		6658	1.33	26.28	807.18	.....	134.74	135.49				
Whey lot	..	....	53.20	1.06	28.09	15.97	984.4	210.15	174.24				

It will be noticed that the whey calves gained very poorly, and results obtained from feed consumed was very unsatisfactory.

In the second trial our experience was of much value to us. In place of alfalfa hay we used prairie hay, and for a grain ration we used a mixture of Kafir-corn meal and sifted oats. The calves were from three to five weeks old when placed on the experiment. It took two weeks more to change the skim-milk to whey, as the substitution had to be made very gradually. The calves were started on a full feed of whey February 5, 1901; they were continued on whey until March 20, a period of six weeks. The whey was fed at a temperature of 90 to 100 degrees; the amount fed to each calf was from ten to fourteen pounds per day, divided into two feeds. The calves seemed to relish their grain ration, and it seemed to have the desired effect on the bowels, and as a result, very little trouble was experienced from scouring. As soon as one was noticed getting off its feed its supply was cut down and its tendency to scour checked. Prairie hay was given to them all the time.

At the end of six weeks the calves fed whey were strong and healthy, had splendid appetites, and looked as well as the

average skim-milk calf that is raised on the farm. Although not fat, they were in a thrifty, healthy condition.

Our experience given in connection with the experience of men in cheese districts indicates that if we will take the pains of compounding other foods to be used in connection with whey, and carefully watch the calves, it is possible to raise very fair animals with whey as a substitute for milk.

Feeding Hay Tea.

To further solve some of the calf problems in the cheese districts and in localities where milk is used for human consumption, an experiment was inaugurated to feed calves hay tea. Two kinds of hay were used. First, mixed hay, which consisted largely of orchard grass, English blue grass, and a little red clover; second, alfalfa hay.

In test 1, the grain ration was first figured out for ground Kafir corn one part, oil meal one part, middlings one part, and soy bean meal one part. The above ration was soon found to be too loosening, and the grain was changed to equal parts of ground Kafir corn and middlings. Three-fourths of a pound of oil-meal was made into a jelly and fed to the hay tea lot daily. As the calves were still subject to scours, the middlings were scalded and fed in with the hay tea. It was found that a few of the calves would not drink the tea unless there was some skim-milk added to it. (See figs. 5 and 6.)

In making the tea a large skim-milk vat was used, and under this was constructed a fireplace. The hay was placed in the bottom of this tank and sufficient water added to completely cover it, and after being allowed to soak for a short time the fire was started, the tank covered, and the hay kept in boiling water from one to two hours, after which the hay was placed on a draining board and the tea allowed to drain back into the tank. After all the hay was taken out of the tank the tea was concentrated by further boiling. We found that it required twelve and

one-half pounds of hay to produce 100 pounds of tea. The cost of producing 100 pounds of tea was as follows:

Coal	\$0.038
Hay .....	.025
Labor .....	.045
Total	\$0.108

In the cost both the coal and the hay were figured at four dollars per ton. The coal consumed per 100 pounds of tea was 19.1 pounds. We found the tea could be kept about forty-eight hours, and in cool weather this time could be increased twelve or twenty-four hours. The result of the gain and the feed consumed are shown in table XIV.

Table XIV.—Results in feeding hay tea.

	No. calves fed	Days fed	Grain fed							Roughness fed			
			Mixed hay tea	Alfalfa tea	Skim-milk	Kafir corn meal	Middlings	Oil-meal	Soy beans	Total	Alfalfa hay	Mixed hay	Total
Mixed-hay-tea lot.	10	133	19,705	947.0	2015	408.0	36	3406.0	...	1780	1780
Alfalfa-hay-tea lot.	10	128	7668.5	759.5	315.5	772	249.6	..	1337.1	634	634
			Average gains.				Feed consumed per 100 pounds gain.						
			Per head.	head.	hay tea.	Alfalfa tea.	Skim-milk.	Roughness.					
Mixed-hay-tea lot	..	114.7	0.862	1,717.95	.....	.....	296.94	155.18				
Alfalfa-hay-tea lot	..	46.7	0.364	.....	1,642.07	162.63	286.31	135.76				

It will be noticed that these calves gained very poorly, and those on alfalfa-hay tea made poorer gains than those on mixed hay. The alfalfa seemed to be so loosening that it was almost

impossible to keep the calves from scouring. The cost per 100 pounds of gain in the hay-tea lots is as follows:

Mixed-hay-tea lot:

Cost of hay-tea at \$0.108 per cwt.....	\$1.85
Cost of grain at 50 cents per cwt.....	1.43
Cost of roughness at \$4.00 per ton.....	.30
<hr/>	
Total cost per 100 pounds gain.....	\$3.63

Alfalfa-hay-tea lot:

Cost of alfalfa-hay-tea at \$0.108 per cwt.....	\$1.77
Cost of grain at 50 cents per cwt.....	1.43
Cost of roughness at \$4.00 per ton.....	.27
Cost of skim-milk at 15 cents per cwt.....	.24
<hr/>	
Total cost per 100 pounds gain	\$3.71

Feeding Grain.

WHEN TO FEED. Calves will begin to eat grain when from seven to ten days old. The best way to start them is to put a little grain in their mouths immediately after feeding their milk, and in this way their attention is called to the grain instead of sucking each others ears and mouths. This taste will soon lead them to the feed-boxes, where they will eat greedily.

MIXING GRAIN WITH MILK. It is not advisable to mix corn, Kafir-corn or any other starchy feed with milk. While the starch in grain takes the place of fat in milk, its form must be changed to sugar before it is digestible. This change is effected by the alkaline fluids and chiefly by the saliva of the mouth. If the grain is gulped down with the milk, there is no time for the saliva to act, and as the gastric juice of the stomach is acid instead of alkaline, the starch is not acted upon until it reaches the intestines. The intestines of the calf are comparatively short, and complete digestion cannot take place. In this respect the calf differs from the hog, which has a comparatively small stomach and long intestines. The hog may gobble down his starchy food

without waiting for it to be acted upon by the saliva in the mouth, and it will be digested in the intestines.

IN WHAT FORM SHOULD CORN BE FED TO CALVES? This experiment consists of a comparison of shelled corn with corn chop as grain for young calves. The experiment began by tak-

Table XV.—Shelled corn and corn chop compared.

	Number of calves	Days fed	Grain fed (pounds)			Roughness fed (lbs.)			
			Skim-milk	Corn chop	Shelled corn	Alfalfa hay	Mixed hay	Prairie hay	Total
Corn-chop lot...	10	133	18,652.5	2,287.7	.....	970	2,068	4,040	7,078
Shelled-corn lot..	10	133	17,950.0	.....	2,611.7	970	2,078	4,040	7,088
			Feed consumed per 100 lbs.						
			Average gains (lbs.)			gain (lbs.)			
			Per head.	Daily per head.	Skim-milk.	Grain.		Roughness.	
Corn-chop lot			212.3	1.59	878.59	107.71		333.39	
Shelled-corn lot			232.2	1.74	773.04	112.47		305.25	

ing twenty head of grade Shorthorn and Hereford calves, and dividing them into two lots as nearly as possible. Both lots were treated alike, except in the form of the grain fed. The results are brought out in table XV.

From that table we see that the calves would begin eating shelled corn when from two to three weeks old, they relished it, and were less subject to scours than those fed corn chop. This experiment shows that it is possible to raise good, thrifty calves that will gain one and three-fourths pounds per day on feeds produced entirely on the farm and in a form that needs no extra preparation, outside of harvesting, except shelling.

IN WHAT FORM SHOULD KAFIR-CORN BE FED TO CALVES? After the excellent results secured with shelled corn, it was thought advisable to see what results would be obtained by feed-

ing whole Kafir-corn. In a similar manner, twenty head of young grade calves were divided into two lots of ten each, with results as given in table XVI; the feed differing only in the form in which the Kafir-corn was fed.

Table XVI.—Whole and ground Kafir-corn compared.

	Number of calves	Days fed	Skim-milk	Grain fed		Roughness fed				Av. gain	
				Whole Kafir corn	Ground Kafir corn	Alfalfa hay	Prairie Hay	Orchard grass	Total	Per head	Daily per head
Whole Kafir-corn lot	10	112	14,748	. . . . .	1,394.5	6,222	2,381	125	8,728	177.7	1.58
Ground Kafir-corn lot	10	112	14,748	. . . . .	1,394.5	6,222	2,381	125	8,728	177.7	1.58
Feed consumed per 100 lbs. gain.											
				Skim-milk.		Grain.		Roughness.			
Whole Kafir-corn lot					901.91		101.23		523.68		
Ground Kafir-corn lot					829.93		72.78		491.16		

The table shows that the best results were obtained from the use of the ground feed. Kafir-corn seems to be too hard for the young calves to masticate and digest, and it was noticed that considerable grain was passed through whole. However, the experiment demonstrates that very fair calves can be raised on skim-milk and whole Kafir-corn with such roughness as may be available on the farm.

Taking the two experiments together, we find that shelled corn and ground Kafir-corn are the forms in which these grains should be given to calves. In nearly all feeding experiments, it is found that a mixture of corn and ground Kafir-corn gives better results than either one alone. The practice of feeding the two has been in vogue at this station and has proven very

satisfactory, as indicated in table III, where the results with the different skim-milk lots are compared.

LIMITING THE GRAIN RATION. In the various experiments with skim-milk it was noticed that the calves ate considerable grain, and the question arose as to whether they did not eat more than was really utilized at a profit. In order to test this matter, two lots of calves, divided in the same manner as in the previous experiments, were placed in the feed-lots, one lot getting all the grain that it would eat up clean, and the other lot receiving only three-fourths as much as the first lot. The results of this test are given in table XVII.

Table XVII.—Effect of limiting the grain ration.

	Number of calves		Grain fed			Roughness fed						
	Days fed	Skim-milk	Shelled corn	Ground Kafir corn	Total	Prairie hay	Alfalfa hay	Oat hay	Mixed Hay	Tame Hay	Total	
Full-grain-ration lot...	10	140	16496	1149.0	1167.0	2316.0	1816	4186	780.0	862	7644.0
Three-quarters grain ration lot...	1	140	16199	861.8	861.8	1723.6	2176	6753	745.2	416	161.5	10251.7
			Average gains.			Feed consumed per 100 pounds gain.						
			Per head.		Daily per head.	Milk.	Grain.	Roughness.				
Full-grain-ration lot			188.5	1.34	875.11	122.86	405.51					
Three quarters grain ration lot..			160.9	1.14	1,006.77	107.12	637.14					

It will be noticed that the calves getting the full grain ration made the best gains, but the amount of grain consumed per 100 pounds of gain is greater than the lot getting only three-fourths of the full grain ration. Where grain is high and there is no particular object in forcing the calves to the possible limit, the grain ration may be reduced with profit.

ADDING FLAXSEED MEAL OR BLACHFORD'S MEAL TO THE CALF RATION. Several authorities on calf rearing advised the addition of flaxseed meal to the ration, in order that the fat in this meal may be utilized to take the place of the fat extracted from the milk in the process of separation. Balchford's calf meal has also been recommended for this purpose. The flaxseed meal was made into a jelly, and the quantity fed was increased gradually from a tablespoonful to one-half pound daily per head. Blachford's meal was made into a gruel and fed in about twice the quantities that flaxseed meal was. All the calves were given what Kafir-corn meal, hay and green alfalfa they would eat. The calves receiving the flaxseed meal did not do as well as those without it. Those getting Blachford's meal gained a little better than the others, but as the meal costs in the neighborhood of \$70 per ton and flaxseed meal in the neighborhood of \$125 per ton, it certainly will not pay the farmer to use these high-priced substitutes for butter-fat unless he can make better gains than were made in our experiment.

EFFECT OF FEEDING BLACHFORD'S SUGAR AND FLAXSEED AND DRIED BLOOD AS A PART OF THE GRAIN RATION. Thirty calves, divided in three lots of ten each, were used in this experiment. The results are recorded in table XIX.

Table XIX.—Results with Balchford's sugar and flaxseed and dried blood.

	No. of Calves	Days fed	Grain Fed					Total
			Skim-milk	Blachford's sugar and flaxseed	Shelled Corn	Ground Kafir-corn	Dried blood	
Dried-blood lot	10	105	13,215.5	.....	1,030	1,030	68.5	2,128.5
Blachford's sugar and flaxseed lot	10	105	13,557.5	529.2	1,088	1,088	....	2,705.2
Check lot	10	105	13,542.5	.....	1,048	1,048	...	2,096.0

	Roughness fed.			Average gains.		Feed consumed per 100 lbs. gain.		
	Prairie hay.	Alfalfa hay.	Total.	Per head.	Daily per head.	Per milk.	Grain.	Roughness.
Dried-blood lot . . .	4,090	3,100	7,190	177.5	1.69	750.16	119.91	405.06
Blachford's sugar and flaxseed lot	3,910	3,100	7,010	186.7	1.77	726.16	144.89	375.46
Check lot	3,855	3,300	7,155	186.3	1.77	726.90	112.50	384.05

Although dried blood serves an excellent purpose as a tonic, it did not prove, in this experiment at least, of any particular value as a feed. The calves did not like the taste of dried blood when used in large quantities, and when too much was mixed with the grain they refused to eat the mixture.

The calves did well on Balchford's sugar and flaxseed, but no better than the check lot receiving shelled corn and ground Kafir-corn. Both lots gained the same, but the check lot made their gains on less feed. This experiment, like the preceding one, emphasizes the fact that it is not necessary to go off the farm to find suitable feed for calves. There is no doubt but that excellent gains can be made from the use of feeds grown on the farm. It should be the aim of every farmer to supply his needs and buy just as little high-priced concentrates as possible.

VARYING THE RATION FOR DAIRY CALVES. When calves are fed for future usefulness in the dairy, care should be taken not to get them too fat. In the early part of the feeding period, when the calves are receiving a large amount of skim-milk and comparatively little grain, there is not much danger of getting them too fat, but as the grain ration increases it may be necessary to feed more nitrogenous grain. This can be done by changing a part of the corn or Kafir-corn for oats, bran or oil-meal whenever the calves appear too fleshy.

Feeding Roughage.

Calves will begin to eat hay about the same time they will begin to eat grain, namely, when from ten days to two weeks old.

They will not eat very much at first, but what they do have should be bright and clean. Tame hay from mixed grasses is probably the best for young calves. Bright prairie-grass is a close second. Clover and alfalfa can be gradually added to the roughage ration after the calves are several weeks old. We have tried alfalfa alone for young calves and find that it is too loosening. It proves a splendid feed, however, as the calves grow older, and should be introduced as soon as the calves can properly handle it. Avoid feeding in large quantities at any one time, but give them what they will eat up clean at each feed.

Difficulty is sometimes experienced in putting calves on pasture. On May 8, 1901, this station put twenty head of calves on pasture, making the change gradually. We allowed them on pasture only a short time the first day, and increasing the period each time until they became accustomed to it. For the two weeks after we started to turn on pasture the calves gained only 0.89 of a pound daily per head, although weather conditions were ideal. For several weeks before turning on pasture the calves had gained 1.2 pounds per day, under adverse weather conditions. As previously stated, sudden changes of food are usually injurious, and changing to pasture is at best a sudden one. We partially overcame this difficulty with another lot by adding a little green feed to their hay before turning out the first day. This was continued, increasing a forkful each day until they were getting about all they would eat; after that we turned on pasture without any apparent trouble.

Water and Salt.

Calves enjoy clean, fresh water. A test was made by weighing the water given to thirteen calves that ranged from two to three months of age. It was found that 868 pounds of water were consumed in seven days, or nearly ten pounds per day per head. It was also noticed that the calves drank several times a day, sipping a little at a time; even after their ration of milk they would take a swallow of water. An automatic waterer

situated a little above the surface of the ground is the best arrangement for supplying this want.

Calves seem to demand salt as well as older stock, and this should be kept before them at all times.

Calf Ties.

Where there are only a few calves to be fed, fairly good ties can be had by the use of short ropes with snaps, to be fastened to ropes around the calves' neck, supplied with rings. When this method is employed the calves should be hitched far enough apart to prevent their reaching each other after drinking their milk.

By far the best method of fastening calves is by means of stanchions. Here the calf finds his place and waits his turn. The feeder can set a bucket of milk down to the calf and then feed others, without fear of the calf tipping the bucket over. Where the stanchions are properly constructed, the calves cannot reach each other, and they can be left in the stanchions until their mouths are dry.

We find that calves will commence eating grain sooner when fastened in stanchions than when tied with ropes. The college has recently erected some new calf-sheds, in which are placed what we consider up-to-date calf stanchions. (See figs. 7 and 8.)

Our shed is sixteen feet wide, and closed at both ends and on the north side. The south side has movable panels, which enable us to close the shed in winter and to have it open in summer. There is an alleyway five feet wide in front of the stanchions, to enable the feeder to go in with a cart and have plenty of room to move around. The lumber required for ten stanchions is as follows:

1 piece 1x12 in. by 12 ft., for bottom of feed-box.

2 pieces 1x12 in. by 16 ft., for bottom of feed-box (8 ft.), upright partitions (24).

- 2 pieces 1x6 in. by 10 ft., for front of feed-box.
- 5 pieces 1x6 in. by 16 ft., cypress or full-thickness pine, for top and bottom rails.
- 5 pieces 1x4 in. by 12 ft., full thickness, for fixed uprights.
- 2 pieces 1x4 in. by 16 ft., $\frac{3}{4}$ in. thick, for swinging uprights.
- 10 pieces 3x6 in. by 1 ft., for tongues or locks.
- 3 posts 6 ft. in length.
- 3 blocks 6x12 in. under feed-box.

The six-inch upright in the picture is replaced in the above calculation by a four-inch piece, which will answer just as well.

The stanchions are two feet wide between the partitions and three and one-half feet high. The board along the front of the feed-boxes is hinged, so it may be turned down and the boxes thoroughly cleaned out. At the end of the stanchion is a rack for hay, as shown in figure 8. With these stanchions a feeder can keep four pails going and can feed a bunch of calves in a very short time. One of the feeders at this station timed himself with twenty calves, and found that he could weigh the milk for the calves in ten minutes, thus making one-half minute for each calf.

Scours or Diarrhea.

Undoubtedly the greatest difficulty that the calf-feeder has to contend with is scours. Here, as elsewhere, "an ounce of prevention is worth a pound of cure." The principal causes of this difficulty are overfeeding, sour milk, feeding cold milk, feeding grain with the milk, using dirty milk-pails, very cold water, too much water after periods of thirst, and irregularity in feeding. The careful feeder will watch very carefully the effect of his feed upon his calves, and as soon as there are any signs of scours the milk should be reduced one-half or more and gradually increased again as the calf is able to stand it.

The Kansas station has been very successful in using dried blood as a tonic for weak or scouring calves. A mild case of scours can usually be cured in from one to two days by reducing

the milk and adding a teaspoonful of dried blood while the calf is drinking.

In a test that was made with five calves that were scouring at the same time, two were fed dried blood after reducing the regular feed of milk; the others were fed dried blood without changing the feed of milk. In the former case the calves recovered after two feeds and the latter after three feeds.

For weakly or sickly calves, the following experiments may be of value to the reader:

In the spring of 1899, the station had a calf that did very poorly, in seventy-nine days it gained only four pounds. After trying several other remedies, dried blood was used with success; the calf began to gain, and by the time it was a year old weighed 578 pounds.

In October, 1900, a heifer belonging to the college dropped her first calf; the calf was small and sickly, and for the first few weeks did very poorly, as will be seen by the statement that on December 1 it weighed two pounds less than it did November 1, and for a few weeks its life was in a very critical condition. As soon as it was induced to eat a little dried blood it made very fair gains.

In feeding dried blood a teaspoonful at a feed is a great plenty. This should be continued until the scours disappear, or, in the case of a weak calf, the allowance may be increased to a tablespoonful per feed. The blood should be thoroughly mixed with the milk, to prevent it settling to the bottom of the pail.

The packing companies are now making soluble blood-meal that is claimed to dissolve in milk much more readily than the regular dried blood. No dried blood should be used that has not been thoroughly sterilized; otherwise it would be comparatively easy to carry disease into the herd.

In severe cases of scours, the addition of one or two eggs with the dried blood has been found to be very effective.

Another remedy that has been found to be successful is to give from one to two ounces of castor oil in the morning, and

follow in about twelve hours with fifteen to twenty drops of laudanum and a teaspoonful of dried blood. If the case is a persistent one, one or two raw eggs may be added, as mentioned above, which will help to keep the calf from suffering from hunger, as, under such conditions, it is useless—yes, worse than useless—to give it much milk.

Dehorning Calves.

It is much easier, to say nothing of being more humane, to dehorn calves when they are young, preferably when from three to four days old. Clip the hair away from the button; take a stick of caustic potash, wrapped in some material to protect the fingers, moisten one end with water, and rub gently over the button until the skin becomes slightly raw and smarts a little. In a few days a scab will form, which will soon disappear, and, if the work is properly done, will leave the calf without horns. One application is usually enough, but in case the horns start again the application can be repeated. Care should be taken that none of the caustic potash runs down over the hair, to injure the eyes and skin.

In case the horns break through the skin before the caustic is applied, it will probably be necessary to use a knife to cut off the button, after which a little caustic potash can be rubbed over the exposed surface.

There are a number of chemical preparations which give good results, but a man cannot afford to pay very much for them, as caustic potash is comparatively cheap and effective.

Table XX.—Weights of skim-milk calves at different ages.

Number of individuals considered	Age in months	Range of weights	Average weight	Number of individuals considered	Age in months	Range of weights	Average weight
23	Birth.	59-108	77.0	26	6½ mo.	313-486	369.8
32	½ mo.	66-112	87.7	38	7 "	288-461	402.5
45	1 "	70-154	111.4	25	7½ "	353-541	486.0
35	1½ "	77-149	117.1	28	8 "	332-507	455.1
56	2 "	88-199	144.4	20	8½ "	394-600	469.0
36	2½ "	117-220	152.6	21	9 "	370-575	514.8
60	3 "	111-248	181.3	18	9½ "	430-653	515.4
36	3½ "	135-275	189.0	20	10 "	427-645	577.5
60	4 "	148-290	229.1	17	10½ "	420-747	577.6
35	4½ "	189-346	247.3	20	11 "	444-730	625.7
54	5 "	183-363	286.9	16	11½ "	452-773	644.7
28	5½ "	263-412	309.3	19	12 "	476-770	669.4
43	6 "	228-425	349.4				

Weight of Skim-Milk Calf.

The question is often asked as to how large a skim-milk calf should be and what weight it should attain at different ages. In order to give a satisfactory answer to this question, we have averaged up the weights of a large number of skim-milk calves that we have raised at this station. Table XX gives both the range of variation and the average weights that have been obtained at the ages mentioned.

COST OF RAISING A SKIM-MILK CALF. In order to determine what is the cost of raising a skim-milk calf, the different experiments have been combined in the following table; charging fifteen cents per 100 for skim-milk, fifty cents per 100 for grain, \$4 per ton for roughness and ten cents per hour for labor:

Table XXI.—Cost of raising skim-milk calves

Experi- ment	No. days fed.	calves. No. of	fed. Milk	fed. Grain	ness fed. Rough-	Labor.	Total.	calf. Cost per
2.....	150	10	\$37.10	\$14.03	\$1.28	\$25.50	\$77.91	\$7.79
2.....	133	10	27.98	11.43	14.16	22.61	76.18	7.62
3.....	133	10	26.92	13.06	14.18	22.61	76.77	7.68
4.....	112	10	22.12	6.97	17.46	19.04	65.50	6.55
5.....	112	10	21.93	8.20	16.98	19.04	66.15	6.61
6.....	105	10	20.34	13.53	14.02	17.85	65.74	6.57
7.....	105	10	19.82	10.64	14.38	17.85	62.69	6.27
8.....	105	10	20.30	10.48	14.31	17.85	62.95	6.29
9.....	140	10	24.26	8.66	18.67	23.80	75.33	7.53
10.....	140	10	24.30	8.62	20.50	23.80	77.22	7.72
11.....	140	10	24.18	11.49	18.67	23.80	78.14	7.81
12.....	126	10	28.99	27.70	14.50	21.42	92.61	9.26
13.....	126	10	29.67	21.00	16.50	21.42	88.59	8.86
Average.	125.15	10	\$25.22	\$12.75	\$15.05	\$21.28	\$74.29	\$7.43

PROFIT REALIZED BY MILKING THE COWS. From table XX, we see that at six months of age the average calf weighs 349 pounds. From table VI we see that the average skim-milk calf consumes 858.2 pounds of skim-milk, 124.1 pounds of grain and 387.2 pounds of hay to produce 100 pounds of gain. The feed cost of this 100 pounds of gain is \$2.68, the labor 91 cents, making a total of \$3.59. This 858.2 pounds of skim-milk represents 953.5 pounds of whole milk, which, with an average test of 4.08 per cent, makes a butter-fat yield of 38.9 pounds. The average price of butter-fat at the college creamery during the past year was 21.08 cents per pound. This makes a total value of \$8.20. Deduct from this the cost of raising a skim-milk calf, \$3.59, and we have left \$4.61 to pay for the expenses of milking and hauling 953 pounds of milk to the creamery. (See fig. 9 and 10.)

These figures do not tell the whole story as to the profit. Cows that are milked produce larger yields than when suckling a calf. For instance, the college herd has averaged 6273.6 pounds of milk per cow during the year 1902. The amount of skim-

milk consumed by the skim-milk calf represents 1978 pounds of whole milk. Subtract this from the average product of the average cow in the college herd, and we have 4295.6 pounds to be credited to raising calves on skim-milk. According to the average test of the herd, this milk would contain 175.26 pounds of butter-fat, which, at 21.08 cents per pound, would amount to \$36.95. This 4295.6 pounds of extra whole milk produced by the cow that is milked would yield 3866.1 pounds of skim-milk, which, at 15 cents per 100, would be worth \$5.80, or a total of \$42.75 additional income per cow. Add to this the \$17.01, the income from the butter-fat secured from the milk furnishing the skim-milk for the calf, and we have a total of \$59.76. Deduct from this the cost of raising a calf, \$7.43, and we have left \$52.33 to pay for the expenses of milking and hauling 6273.6 pounds of milk to the creamery.

According to statements received from successful Kansas dairymen, it takes 13 minutes to milk a cow. Assuming that an average cow will milk 300 days, we have a total of 65 hours to be charged to each cow; at 12½ cents per hour, this costs \$8.12. It will probably cost 12½ cents per 100 pounds to haul the milk, making an expense of \$7.84 per cow, making the total expense for milking and hauling \$15.96. Subtract this from \$52.33, and we have left \$36.37 per head to pay interest on the money invested in a common cow, besides paying for the labor of the men and boys on the farm. (See figs .11 and 12.)

The figures just given represent averages. No enterprising dairyman will be satisfied with averages. We found that twenty-five per cent of the common cows purchased by the Agricultural college were unprofitable and such as every up-to-date dairyman would remove from his herd as soon as discovered. Making the above calculations on a basis of the profitable cows would show still greater profits.

WHEN WILL IT PAY TO MILK A COW AND RAISE THE CALF ON SKIM-MILK? The experience in raising calves outlined above indicates clearly that unless the cow gives considerably more

milk than is needed for the calf it will not pay to milk her. It costs about \$8 to pay for milking and about \$7.50 to raise the calf on skim-milk. To be a profitable milker a cow must produce at least \$15.50 worth of butter-fat, leaving the skim-milk to pay for hauling. With a four per cent test and 15 cent butter-fat, this would mean at least 2583 pounds of milk per annum; with 18 cents for butter-fat, 2152 pounds of milk per annum; with 20 cents for butter-fat, 1937 pounds of milk per annum. If the calf was raised on whole milk the amount required to be produced would be entirely different. Nobody can afford to feed whole milk by hand to a calf.

These figures do not mean that a cow giving the above amount of milk is really profitable, for usually a dairy cow will consume more grain than one nursing a calf, but it indicates what a man must expect to get from his animals before he can bear the expense of milking and raising the calf on skim-milk.

RELIEVING CALVES FROM FLIES. During the hot summer months flies are a constant torment to young calves. The entomological department of the Kansas State Agricultural College has been experimenting and compounding various substances, in order to produce an effective and economical mixture which, when applied to the surface of an animal, would ward off the flies. As a result of these experiments, it has succeeded in producing the following formula, which seems to answer the purpose reasonably well: Resin, one and one-half pounds; laundry soap, two cakes; fish-oil, one-half pint; enough water to make three gallons. Dissolve the resin in a solution of soap and water by heating; add the fish-oil and the rest of the water. Apply with a brush. If to be used as a spray, add one-half pint of kerosene. This mixture will cost from seven to eight cents per gallon, and may be used on either calves or cows. One-half pint of this mixture is considered enough for one application for a cow; a calf, of course, would require considerably less. It will be more economical to apply this only to the parts of the animal not reached by the tail. At first it will perhaps be nec-

essary to give two or three applications per week, until the outer ends of the hair become coated with resin; after that, retouch those parts where the resin is rubbed off.

TREATMENT OF DAIRY CALVES AFTER WEANING. Skim-milk can be fed profitably five or six months, and, where milk is available and is not needed for other purposes, even longer. The weaning may be done either gradually or at once. Tests made at this station show that there is practically no difference in either case, as will be seen from table XXII.

Table XXII.—Comparison of gradual and sudden weaning.

	Abrupt weaning 10 calves		Extended over 3 days, 10 calves		Extended over 1 week, 10 calves	
	Gain 1 week previous	Week after weaning	Gain week previous	Gain week after weaning	Gain week previous	Gain week after weaning
Experiment I	97	114	187	62	96	105
Experiment II	132	85	166	53	244	45

The calves weaned gradually made more fuss than those weaned abruptly. In these cases the allowance of grain was continued when the skim-milk was taken away.

If pastures with plenty of feed, shade and water are available, young dairy stock could ask no better quarters. If pastures become dry and scanty, it would be well to give them what they will eat of alfalfa, red clover, or cow-pea hay. These nitrogenous feeds can be supplemented by sorghum, corn stover, Kafir corn stover, millet, orchard grass or millet hay, but there should always be plenty of leguminous crops, so as to furnish plenty of protein to develop bone and muscle. Where plenty of protein is furnished in the roughness, heifers intended for the dairy need little or no grain. In fact, it is advisable to give them bulky foods, so as to develop large paunches. If the calves are weaned in winter they should be fed plenty of nitrogenous feed. At

this station we wintered a grade herd of Guernsey heifers in excellent shape on alfalfa and sorghum without any grain. (See figs. 13 and 14.)

It is desirable to develop as much hardiness in dairy cattle as possible, and for this reason it is not best to house young dairy stock or even dry cows too warmly. Under Kansas conditions, a reasonably tight shed open to the south, with the floor well bedded, furnishes ample protection.

As there is considerable loss every year over the state from black-leg, it would be well to have the older calves inoculated to prevent this disease. At present this station is furnishing inoculating material at cost. A man is running considerable risk in allowing his heifers to go uninoculated.

The breeding of dairy stock hardly gets within the scope of this bulletin, but as there are some breeders that are in the habit of breeding too young, even while the animals may still be called calves, a word of caution may not be out of place. Under Kansas conditions, with our liberal supply of cheap and nitrogenous feeds, it should be the aim to develop good size in our dairy cows; for, other things being equal, the larger the cow the more feed she can handle and turn into milk and butter-fat. It is never desirable to breed a heifer to calve before she is two years old, and she had better be over this age rather than under. If the heifer is a spring calf, it would be better to breed her to calve the fall following her second birthday, as fall calves are usually more profitable, both from the standpoint of the cow and the calf. Much depends upon getting the dairy heifers in the habit of calving at the time of year when they will bring the most profit.

SUMMARY. The results detailed in this bulletin ought to be a conclusive argument as to the great feeding value of skim-milk; they also indicate the possibility and even the advisability of growing the feeds that are needed upon the farm, thus saving the money that would otherwise be invested in high-priced feed stuffs. They indicate how it is possible to realize more income

from the cow and consequently greater income per acre of land—an important feature as the value of land increases. The results likewise indicate the extravagance of letting a calf nurse a good cow. It will not only eat its head off by the butter-fat it consumes, but it may materially lessen the production of the cow.



DAIRY LAWS OF ILLINOIS

Laws of 1879, page 111. (Hurd's Revised Statutes) (chapter 38, sections 9-9e).

AN ACT to regulate the sale of milk, and to provide penalties for the adulteration thereof. (Approved May 29, 1879).

Section 1. That whoever shall, for the purpose of sale for human food, adulterate milk with water or any foreign substance, or whoever shall knowingly sell for human food, milk from which cream has been taken, without the purchaser being informed or knowing the fact, or whoever shall knowingly sell for human food, milk from which what is commonly called "strippings" has been withheld, without the purchaser thereof being informed or knowing the fact, or whoever shall knowingly sell for human food milk drawn from a diseased cow knowing her to be so diseased as to render her milk unwholesome, or whoever shall knowingly sell for human food, milk so tainted or corrupted as to be unwholesome, or whoever shall knowingly supply, or bring to be manufactured into any substance for human food, to any cheese or butter factory or creamery, without all interested therein knowing or being informed of the fact, milk which is adulterated with water or any foreign substance, or milk from which cream has been taken, or milk from which what is commonly called "strippings" has been withheld, or milk drawn from a diseased cow, knowing her to be so diseased as to injure her milk, or milk so tainted or corrupted as to be unwholesome, or whoever shall knowingly, with intent to defraud, take from milk after it has been delivered to a cheese factory or creamery, to be manufactured into any sub-

stance for human food, for or on account of the person supplying the milk or cream, or shall, with like intent, knowingly add any foreign substance to the milk or cream, whereby it, or the products thereof, shall become unwholesome for human food, shall be guilty of a misdemeanor, and for each and every such misdemeanor shall be fined not less than twenty-five nor more than one hundred dollars or confined in the county jail not exceeding six months or both, in the discretion of the court.

Section 2. Any person who shall adulterate milk, with the view of offering the same for sale or exchange, or shall keep cows for the production of milk for market, or for sale or exchange, in an unhealthy condition, or knowingly feed the same on food that produces impure, diseased, or unwholesome milk, shall be deemed guilty of a misdemeanor, and, on conviction, shall be punished by a fine of not less than fifty dollars nor more than two hundred dollars, for each and every offense.

Section 3. Any person or persons who shall in any of the cities of this state, engage in or carry on a retail business in the sale, exchange of, or any retail traffic in milk, shall have each and every case in which the milk is carried or exposed for sale or exchange, and the carriage or vehicle from which the same is vended, conspicuously marked with his, her, or their name or names, also indicating by said mark the locality from which said milk is obtained or produced, and for every neglect for such markings, the person or persons so neglecting shall be subject to the penalties expressed in section 2 of this act; but for every violation of this act, by so marking said can, carriage, or vehicle, as to convey the idea that said milk is produced or procured from a different locality than it really is, the person or persons so offending shall be subject to a fine of one hundred dollars.

Section 4. Any person who shall, in any of the cities in this state, offer for sale any milk from which the cream or any part thereof shall have been taken, shall offer for sale and sell the same as skimmed milk, and not otherwise, and shall have

each can or vessel in which such milk is carried or exposed for sale plainly and conspicuously marked with the words "Skimmed Milk." Any person violating this section shall be subject to a fine not exceeding fifty dollars for each and every violation.

Section 5. Upon the rendition of judgment imposing a fine as provided in the foregoing sections, it shall be the duty of the justice of the peace or other court rendering said judgment, also to render a judgment for the costs, and forthwith to 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 hand 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 by section 308 of "An act to revise the law in relation to criminal jurisprudence," in force July 1, 1874, unless such fine and cost shall sooner be paid.

Section 6. The addition of water or any foreign substance to milk or cream intended for sale or exchange is hereby declared an adulteration. Any milk that is obtained from cows fed on distillery waste, usually called "swills," or upon any substance in a state of putrification, is hereby declared to be impure and unwholesome. Nothing in this act shall be construed to prevent the addition of sugar in the manufacture of condensed or preserved milk.

Section 7. Section nine of division one of an act entitled "An act to revise the law in relation to criminal jurisprudence (approved March 27, 1874); and all other acts and parts of acts inconsistent herewith are hereby repealed.

AN ACT to require operators of butter and cheese factories on the co-operative plan to give bonds, and to prescribe penalties for the violation thereof. (Approved June 18, 1883).

Section 1. That it shall be unlawful for any person or persons, company or corporation, within this state to operate, carry on, or conduct the business of manufacturing butter or cheese on the co-operative or dividend plan until such person or persons, company or corporation, shall have filed with the circuit clerk or recorder of deeds of the county in which it is proposed to carry on such business, a good and sufficient bond, to be approved by such circuit clerk or recorder of deeds, in the penal sum of six hundred dollars, with one or more good sureties, conditioned that such person or persons, company or corporation proposing to carry on such business will, on or before the first day of each month, make, acknowledge, subscribe, and swear to a report in writing, showing the amount of product manufactured, the amount sold, the prices received therefor, and the dividends earned and declared for the third month preceding the month in which such report is made, and will file a copy of such report with the clerk of the town or precinct in which such factory is located, and will also keep publicly posted, in a conspicuous place in such factory, a copy of such report for the inspection of the patrons thereof, and that such dividends shall be promptly paid to the persons entitled thereto.

Section 2. Such bond shall run to the people of the State of Illinois, and shall be for the benefit and protection of all patrons of such factory, and suit may be had thereon by any person or persons injured by a breach of the conditions thereof by any action of debt for the use of the person or persons interested for all damages sustained by them.

Section 3. Such bond shall be recorded by the circuit clerk or recorder with whom the same is filed, and all such reports so filed with any town or precinct clerk shall be preserved by him

and held subject to the inspection of any person or persons interested.

Section 4. Any person who shall willfully violate any provision of this act shall be liable to a fine of not less than two hundred dollars, or more than five hundred dollars, or imprisonment in the county jail for not less than thirty days nor more than six months, or both, in the discretion of the court.

Laws of 1879, page 11 (Revised Statutes, chapter, 38, sections 39a-39c).

AN ACT to prevent frauds in the manufacture and sale of butter and cheese. (Approved May 31, 1879).

Section 1. That whoever manufactures, sells, or offers for sale, or causes the same to be done, any substance purporting to be butter or cheese, or having the semblance of butter or cheese, which substance is not made wholly from pure cream or pure milk, unless the same be manufactured under its true and appropriate name, and unless each package, roll, or parcel of such substance, and each vessel containing one or more packages of such substance, have distinctly and durably painted, stamped, or marked thereon the true and appropriate name of such substance, in ordinary boldfaced capital letters not less than five lines pica, shall be punished as provided in section 3 of this act.

Section 2. Whoever shall sell any such substance as is mentioned in section 1 of this act to consumers, or cause the same to be done, without delivering with each package, roll, or parcel so sold, a label on which is plainly and legibly printed, in Roman letters, the true and appropriate name of such substance, shall be punished as is provided in section 3 of this act.

Section 3. Whoever knowingly violates section 1 or section 2 of this act shall be fined in any sum not less than ten nor more than three hundred dollars, or imprisoned in the county

jail not less than ten nor more than ninety days, or both in the discretion of the court; Provided, That nothing contained in this act shall be construed to prevent the use of skimmed milk, salt, rennet, or harmless coloring matter, in the manufacture of butter and cheese.

Laws of 1881, page 74 (Revised Statutes, chapter 38, sections 9f-9g).

AN ACT to prevent the adulteration of butter and cheese, or the sale or disposal of the same, or the manufacture or sale of any article as a substitute for butter or cheese, or any article to be used as butter and cheese. (Approved June 1, 1881).

Section 1. That whoever manufactures, out of any oleo-ginuous substances, or any compound of the same other than that produced from unadulterated milk, or cream from the same, any article designed to take the place of butter or cheese produced from pure, unadulterated milk, or cream of the same, and shall sell, or offer for sale, the same as butter or cheese, or give to any person the same as an article of food, as butter or cheese, shall, on conviction thereof, be fined not less than twenty-five dollars nor more than two hundred dollars.

Section 2. All acts or parts of acts inconsistent with this act are hereby repealed.

Laws of 1881, page 75 (Revised Statutes, chapter 38, sections 9h-9o).

AN ACT to prevent and punish the adulteration of articles of food, drink and medicine, and the sale thereof when adulterated. (Approved June 1, 1881).

Section 1. That no person shall mix, color, stain, or powder, or order or permit any person in his or her employ to mix, color, stain or powder any article of food with any ingredient

or material, so as to render the article injurious to health, or depreciate the value thereof, with the intent that the same may be sold; and no person shall sell or offer for sale any such article so mixed, colored, stained or powdered.

* * * *

Section 3. No person shall mix, color, stain, or powder any article of food, drink, or medicine, or any article which enters into the composition of food, drink, or medicine, with any other ingredient or material, whether injurious to health or not, for the purpose of gain or profit, or sell, or offer the same for sale, or permit any person to sell or offer for sale any article so mixed, colored, stained, or powdered, unless the same be so manufactured, used, or sold, or offered for sale under its true and appropriate name, and notice that the same is mixed or impure is marked, printed, or stamped upon each package, roll, parcel or vessel, containing the same, so as to be and remain at all times readily visible, or unless the person purchasing the same is fully informed by the seller of the true name and ingredients (if other than such as are known by the common name thereof) of such article of food, drink or medicine, at the time of making sale thereof, or offering to sell the same.

Section 4. No person shall mix oleomargarine, suine, butterine, beef fat, lard, or any other foreign substance, with any butter or cheese intended for human food, without distinctly marking, stamping, or labeling the article, or the package containing the same, with the true and appropriate name of such article, and percentage in which such oleomargarine or suine enters into its composition; nor shall any person sell or offer for sale, or order or permit to be sold or offered for sale, any such article of food into the composition of which oleomargarine or suine has entered, without at the same time informing the buyer of the fact, and the proportions in which such oleomargarine, suine, or butterine, beef fat, lard, or any other foreign substance

has entered into its composition. Provided, That nothing in this act shall be so construed as to prevent the use of harmless coloring matter in butter or cheese, or other articles of food.

Section 5. Any person convicted of violating any provisions of any of the foregoing sections of this act shall, for the first offense, be fined not less than twenty-five dollars nor more than two hundred; for the second offense he shall be fined not less than one hundred nor more than two hundred dollars, or confined in the county jail not less than one month nor more than six months, or both, at the discretion of the court; and for the third and all subsequent offenses he shall be fined not less than five hundred dollars nor more than two thousand dollars, and imprisoned in the penitentiary not less than one year nor more than five years.

Section 6, which makes ignorance of the provisions of the law a defense against prosecution, is repealed in the food commission bill .

Section 7. The State's Attorneys of this state are charged with the enforcement of this act, and it is hereby made their duty to appear for the people, and to attend to the prosecution of all complaints under this act, in their respective counties, in all courts.

Section 8. All acts and parts of acts inconsistent with the provisions of this act are hereby repealed.

Laws of 1897, page 3 (Revised Statutes, Chapter 38, Sections 39d-39n).

AN ACT to regulate the manufacture and sale of substitutes for butter. (Approved June 14, 1897).

Section 1. That for the purpose of this act every article, substitute, or compound 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.

Section 2. No person shall coat, powder, or color with annatto 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 combined 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 substance 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 products 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 natural 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 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 prohibited.

Section 3. Every person who lawfully manufacture any substance designed to be used as a substitute for butter shall mark by branding, stamping, or stenciling upon the top and

sides of each tub, firkin, box, or other package in which said article shall be kept and in which it shall be removed from the place where it is produced, in a clean 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.

Section 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 substance sold or offered for sale is imitation butter.

Section 5. No person, by himself for another, 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, or other package containing the same, as provided in this act, and unless it be consigned by the carrier and receipted 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.

Section 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 for themselves or their families. Every person who shall have in his possession or control 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.

Section 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.

Section 8. No action shall be maintained on account of any sale or contract made in violation of or with the intent to violate this act by or through any person who was knowingly a party to such wrongful sale or contract.

Section 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.

Section 10. Whoever shall violate any of the provisions of this act shall be punished by a fine of not less than fifty nor more than two hundred dollars, or by imprisonment in the county jail not to exceed sixty 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.

Section 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, which shall be taxed as costs in the case.

AN ACT to protect the public from imposition in relation to canned or preserved food. (Approved June 27, 1885).

Section 1. That it shall hereafter be unlawful in this State for any packer or dealer in preserved or canned fruits and vege-

tables or other articles of food to offer such canned articles for sale after January 1, 1886, with the exception of goods brought from foreign countries, or packed prior to the passage of this act, unless such articles bear a mark to indicate the grade or quality together with the name and address of such firm, person, or corporation that packed the same or dealer who sells the same. The firm, person, or corporation labeling such goods shall be considered the packer or packers.

Section 3. Any person, firm, or corporation, who shall falsely stamp or label such cans or jars containing preserved fruit or food of any kind, or knowingly permit such false stamping or labeling, and any person, firm, or corporation who shall violate any of the provisions of this act shall be deemed guilty of a misdemeanor and punished with a fine of not less than fifty dollars; in the case of vendors, and in the case of manufacturers and those falsely or fraudulently stamping or labeling such cans or jars, a fine of not less than five hundred dollars nor more than one thousand dollars, and it shall be the duty of any board of health in this State cognizant of any violation of this act to prosecute any person, firm, or corporation which it has reason to believe has violated any of the provisions of this act, and after deducting the costs of the trial and conviction, to retain for the use of such board the balance of the fine or fines recovered.

Pure Food Commissioner's Bill

For an act to provide for the appointment of a State Food Commissioner and to define his powers and duties and fix his compensation, and to prohibit and prevent adulteration, fraud and deception, in the manufacture and sale of articles of food, and to repeal certain acts or parts of acts therein named.

Section 1. Be it enacted by the People of the State of Illinois represented in the General Assembly: That the office of State Food Commissioner for the State of Illinois is hereby created. Within thirty days after this act shall take effect such commissioner shall be appointed by the Governor, by and with the advice and consent of the Senate, and his term of office shall be for two (2) years from the date of his appointment and until his successor is appointed and qualified. Thereafter the term of office of the commissioner shall be for four years and until his successor is qualified. The salary of the Commissioner shall be twenty-five hundred dollars (\$2,500) per annum and his necessary and actual expenses incurred in the discharge of his official duties.

2. Such commissioner may, with the advice and consent of the Governor, appoint two assistant commissioners, each of acknowledged standing, ability, and integrity, one of whom shall be an expert in the matter of dairy products, and the other of whom shall be a practical and analytical chemist, who shall be known as State analyst. The salaries of such assistants shall

not exceed eighteen hundred dollars (\$1,800) each per annum and their necessary and actual expenses incurred in the discharge of their official duties. In case of the absence or inability of the State analyst to perform all the duties of his office, the commissioner may appoint some competent person to assist in the same temporarily.

3. The food commissioner shall have authority to appoint necessary inspectors not exceeding six in number or to assist in the work of the food commissioner at such times and for such periods of time as may be required in the enforcement of the dairy food laws of the State. Such inspectors shall have the same right of access to places to be inspected as the commissioner. The compensation of such inspectors shall be three dollars (\$3.00) per day for each day of actual service, and their necessary and actual expenses when so employed.

4. It shall be the duty of the commissioner to enforce all laws that now exist or that may hereafter be enacted in this State regarding the production, manufacture, or sale of dairy products, or the adulteration of any article of food, and personally or by his assistants to inspect any article of food made or offered for sale within this State, which he may, through himself, or his assistants, suspect or have reason to believe to be impure, unhealthy, adulterated or counterfeit, and to prosecute, or cause to be prosecuted, any person or persons, firm or firms, corporation or corporations, engaged in the manufacture or sale of any adulterated or counterfeit article or articles of food contrary to the laws of this state.

5. It shall be the duty of the food commissioner to carefully inquire into the quality of the dairy and food products, and the several articles which are foods or the necessary constituents of food, which are manufactured for sale or sold or exposed or offered for sale in this State, and he may in a lawful manner procure samples of the same, and direct the state analyst to make due and careful examination of the same, and report to the

commissioner the result of the analysis of all or any such food or dairy products as are adulterated, impure or unwholesome, in contravention of the laws of this State, and it shall be the duty of the commissioner to make complaint against the manufacturer or vender thereof in the proper county, and furnish the prosecuting attorney with the evidence thereon and thereof to obtain a conviction for the offense charged. The food commissioner, or his assistants, or any person by him duly appointed for that purpose, shall have power in the performance of their duties to enter any dairy, creamery, cheese factory, store, salesroom, warehouse (except bounded warehouses for the storage of distilled spirits), where goods are stored or exposed for sale, or place where they have reason to believe food is stored or offered for sale, and to open any cask, tub, jar, bottle or package containing or supposed to contain any article of food, and examine or cause to be examined the contents thereof, and take therefrom samples for analysis. The person making such inspection shall take such samples of such articles of produce, in the presence of at least one witness, and he shall, in the presence of such witness, mark or seal such sample and shall tender, at the time of taking, to the manufacturer or vender of such produce, or to the person having the custody of the same, the value thereof, but if the person from whom such sample is taken shall request him to do so, he shall, at the same time and in the presence of the person from whom such property is taken, securely seal up two samples of the article seized or taken, the one of which shall be for examination or analysis under the direction of the commissioner, and the other of which shall be delivered to the person from whom the article was taken. Any person who shall obstruct the commissioner or any of his assistants by refusing to allow him entrance to any place which he desires to enter in the discharge of his official duty, or refuse to deliver to him a sample of any article of food made, sold or exposed for sale by such person, when the same is requested, and when the value thereof is tendered, shall be guilty of a misdemeanor, punishable by a fine of not exceeding fifty dollars (\$50.00) for the first offense, and not exceeding five

hundred dollars (\$500.00) or less than fifty dollars (\$50.00) for each subsequent offense.

6. It shall be the duty of the state's attorney in any county of the State, when called upon by the commissioner or any of his assistants, to render any legal assistance in his power to execute the laws and to prosecute cases arising under the provisions of this act.

7. The State board of health may submit to the commissioner, or to 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.

8. It shall be unlawful for the State analyst, while he holds his office, 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.

9. The salary of the commissioner shall be paid from the fund appropriated for the payment of the salaries of State officers, and his assistants shall be paid out of the State treasury from the same fund and in the same manner as the salaries of other employes of the State are paid, and their official expenses shall be paid at the end of each calendar month upon bills duly itemized and approved by the Governor, and the amount necessary to pay such salaries and expenses is hereby appropriated.

10. The commissioner may, under the direction of the Governor, fit up a laboratory, with sufficient apparatus for making analysis contemplated in this act, and for such purpose the sum of fifteen hundred dollars (\$1,500), or so much thereof as may be necessary, is hereby appropriated; and for the purpose of providing materials, and for necessary expenses connected with the making of such analysis, there is also hereby appro-

priated so much as may be necessary, not exceeding six hundred dollars (\$600) annually. The appropriation provided for in this section shall be drawn from the State treasury upon certified bills approved by the Governor.

11. The commissioner shall make an annual report to the Governor on or before the first day of January in each year, which shall be printed and published. Such report shall cover the doings of his office for the preceding year and shall show, among other things, the number of factories, creameries and other places inspected, and by whom; the number of specimens of food articles analyzed, and the State analyst's report upon each one when the analysis indicates the same to be contrary to law; the number of complaints entered against persons for violation of the laws relative to the adulteration of food; the number of convictions had and the amount of fines imposed therefor, together with such recommendations relative to the statutes in force as his experience may justify. The commissioner may also prepare, print and distribute to the newspapers of the State, and to such persons as may be interested or may apply therefor, a monthly bulletin containing results of inspections, the results of analysis made by the State analyst of articles offered for sale contrary to law, with popular explanation of the same, and such other information as may come to him in his official capacity relating to the adulteration of food and drink products and of dairy products, so far as he may deem the same of benefit and advantage to the public; also a brief summary of all the work done during the month by the commissioner and his assistants in the enforcement of the laws of the State, but not more than ten thousand copies of each of such monthly bulletins shall be printed: Provided the necessary printing shall be done by the State printer, and all expenses for stationery and printing shall be audited and paid from the same fund and in the same manner as other State printing and stationery.

All fines, penalties and costs recovered for violations of this

act and other acts now enacted or hereafter to be enacted prohibiting or regulating the adulteration of foods shall be paid into the State treasury to the credit of the general fund of the State.

12. No person shall, within this state, manufacture for sale, have in his possession with intent to sell, offer for sale, or sell any article of food which is adulterated within the meaning of this act.

13. The term "food," as used herein, shall include all articles whether simple, mixed or compound, used for food, candy, drink or condiment by man or domestic animals.

14. An article shall be deemed to be adulterated within the meaning of this act:

First—If any substance or substances has or have been mixed with it so as to depreciate, lower or injuriously affect its quality, strength or purity.

Second—If any inferior or cheaper substance or substances has or have been substituted wholly or in part for the article.

Third—If any valuable necessary constituent or ingredient has been wholly or in part abstracted from it.

Fourth—If it be an imitation of and sold under the name of another article.

Fifth—If it is mixed, colored, coated, polished or powdered, whereby damage or inferiority is concealed, or if by any means it is made to appear better or of greater value than it really is.

Sixth—If it contains wholly or in part of a decomposed, putrid, infected, tainted or rotten animal or vegetable substance or article, whether manufactured or not, or, if it is the produce

of a diseased animal, or if of an animal that has died otherwise than by slaughter. Provided, that an article of food that does not contain any ingredient injurious to health, and in the 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, or which shall be labeled so as to plainly indicate that they are mixtures, combinations, compounds or blends, and not included in definition fourth of this section, shall not be deemed to have been adulterated. Provided, further, that all manufactured articles of food offered for sale shall be distinctly labeled, marked or branded with the name of the manufacturer and place of manufacture, or the name and address of the packer or dealer who sells the same.

15. No person shall manufacture for sale, offer or expose for sale, sell or deliver, or have in his possession with intent to sell or deliver, any vinegar not in compliance with the provisions of this act. No vinegar shall be sold as apple, orchard or cider vinegar which is not the product of pure apple juice, known as apple cider and apple orchard or cider vinegar upon test shall contain not less than one and three-fourths per cent, by weight, of cider vinegar solids upon full evaporation at the temperature of boiling water.

16. 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." All fermented vinegar, not distilled, shall contain not less than one and one-fourth per cent, by weight, upon full evaporation (at the temperature of boiling water), of solids contained in the fruit from which said vinegar is fermented, and said vinegar shall contain not less than two and a half tenths of one per cent ash or mineral matter, the same being the product of the material from which said vinegar is manufactured. 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.

17. No person shall manufacture for sale, offer for sale or have in his possession with intent to sell, any vinegar found upon test to contain any preparation of lead, copper, sulphuric acid or other mineral acid, or other ingredients injurious to health. All packages containing vinegar shall be marked, stenciled or branded on the head of the cask, barrel or keg containing such vinegar, with the name and residence of the manufacturer or dealer, together with the brand required in section 16 of this act.

18. No person shall offer for sale, sell or deliver for food or drink purposes, ice, natural or manufactured, containing any decomposed, putrid, infected, tainted or rotten animal or vegetable substance or any ingredient which is poisonous or injurious to health. If intended for food or drinking purposes, shall not be composed of water of lower standard of purity than that required for domestic purposes by the State Board of Health.

19. Any person or persons manufacturing for sale or selling or offering to sell any candies or confectioneries adulterated by the admixture of terra alba, barytes, talc or other earthly or mineral substances, or any poisonous colors, flavors or extracts or other deleterious ingredients detrimental to health, shall, upon proper conviction thereof, be punished by a fine of not less than ten nor more than one hundred dollars or imprisonment in the county jail not less than ten nor more than thirty days, or both such fine and imprisonment, in the discretion of the court.

20. No packer or dealer in preserved or canned fruits and vegetables or other articles of food, shall sell or offer for sale such canned or preserved fruits and vegetables or other articles of food, unless such articles bear a mark, stamp, brand or label

bearing the name and address of the firm, person or corporation that packs same, or dealer that sells same. All soaked or bleached goods or goods put up from products dried before canning, shall be plainly marked, branded, stamped or labelled as such, with the words "Soaked" or "Bleached Goods" in letters not less than two-line pica in size, showing the name of the article and name and address of the packer or dealer who sells same.

21. No person shall manufacture for sale, have in his possession with intent to sell, offer or expose for sale, or sell as fruit, jelly, jam, or fruit butter, any jelly, jam or imitation fruit similar compound made or composed, in whole or in part, of glucose, dextrine, starch or other substance, and colored in imitation of fruit jelly, jam or fruit butter; nor shall any such jelly, jam or fruit butter or compound be manufactured or sold, or offered for sale, under any name or designation whatever, unless the same shall be composed entirely of ingredients not injurious to health; and every can, pail or package of such jelly, jam or butter sold in this state shall be distinctly and durably labelled "imitation fruit, jelly, jam, or butter," with the name and address of manufacturer or dealer who sells same.

22. Extracts made of more than one principle must be labeled with the name of each principle or else simply with the name of the inferior or adulterant.

In all cases when an extract is labeled with two or more names, the type used is to be similar in size and the name of any one of the articles used is not to be given greater prominence than another. The word compound cannot be used. Extracts which cannot be made with fruit, berry or bean, must necessarily be made artificially, as raspberry, strawberry, etc., shall be labeled "artificial." Chocolates and cocoas must not contain substances other than cocoa mass, sugar and flavoring and will not be required to be labeled "compound" or "mixture." Pre-

pared cocoanut, if so labeled, shall contain nothing but cocoanut, sugar and glycerine, and shall not be classed as compound or mixture.

23. Whoever shall falsebrand, mark, stencil or label any article or product required by this act to be branded, marked, stenciled or labeled or shall remove, alter, deface, mutilate, obliterate, imitate or counterfeit any brand, mark, stencil or label so required, shall be deemed guilty of a misdemeanor, and upon conviction thereof shall be punished by a fine of not less than twenty-five nor more than two hundred dollars, and costs of prosecution, or by imprisonment in the county jail for not less than thirty days nor more than ninety days, or by both such fine and imprisonment in the discretion of the court, for each and every offense.

.. 24. The taking of orders, or the making of agreements or contracts by any person, firm or corporation, or by any agent or representative thereof, for the future delivery of any of the articles, products, goods, wares or merchandise embraced within the provisions of this act, shall be deemed a sale within the meaning of this act.

25. Every person manufacturing, offering or exposing for sale or delivery to a purchaser any article intended for food, shall furnish to any person, or analyst or other officer or agent appointed hereunder who shall apply to him for the purpose and shall tender him the value of the same, a sample sufficient for the analysis of any such article which is in his possession. Whoever hinders, obstructs or in any way interferes with any inspector, analyst or other officer appointed hereunder, in the performance of his duty, and whoever wilfully neglects or refuses to do any of the provisions of this act, shall be guilty of a misdemeanor, and upon conviction shall, where no specific penalty is prescribed by this act, be punished by a fine not exceeding two hundred nor less than twenty-five dollars, or by imprisonment in

the county jail for a period not exceeding ninety days, or by both such fine and imprisonment, in the discretion of the court.

26. All acts and parts of acts inconsistent with this act, and section 6 of an act entitled "An act to prevent the adulteration of butter and cheese, or the sale and disposal of the same, or the manufacture or sale of any article as a substitute for butter or cheese, or any article to be used as butter and cheese." approved June 1, 1881, be and they are hereby repealed.

27. For the purpose of enabling dealers in products affected by this act to dispose of same without loss, it is hereby expressly provided that the penalties of this act, and prosecution under the same, are suspended until the first day of July, 1900.



MEMBERSHIP LIST FOR 1905

A

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| Atchison, M. C., Woodbine. | Ardrey, R. G., Oakdale. |
| Alexander, C. B., Chicago (Star Union Line). | Austin, F. G., Effingham. |
| Allen, Fred J., (C. M. & St. P. R. R.) | Anderson C. A., Belvidere. |
| Adams, Chas. J., Loda. | Allan, John, 71 S. Water st., Chicago. |

B

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| Biddulph, J. R., Providence. | Burton, G. F., Mt. Carroll. |
| Barwell, J. W., Waukegan. | Baldwin, Geo. H., Mendon. |
| Boethke, Wm., Elmhurst. | Beatty, Frank, Galena. |
| Bloyer, Otto, Elkhorn Grove. | Benton, D. C., Kaneville. |
| Bloyer, George, Harper. | Bartholomew, C. L., Cedarville. |
| Blood, F. J., Chicago (Wells, Richardson & Co.) | Brinker, F. H., Winneshiek. |
| Browning, H. A., Elgin. | Baldwin, R. C., Redpath. |
| Buelter, Henry, Batavia. | Brandt, W. B., Barrington. |
| Barclay, A. C., Elgin. | Burghart, A., 6038 Vernon Ave., Chicago. |
| Bueler, Anton, Bemes. | Blacet, Stephen, Greenville. |
| Bell, K. J., 306 Fisher bldg., Chicago. | Blizzard, J. J., Greenville, R. R. 2. |
| Betts, H. S., Rockford. | Bolander, A. F., Martintown, Wis. |
| Bagley, F. R., Chicago (Francis D. Moulton & Co.) | Benthien, H. H., Sandwich. |
| Boehmer, H., Barrington. | Bragg, C. T., Franklin. |
| Bloomfield, R. A., Mt. Sterling. | Bracy, E. L., Farmington, Ia. |
| | Bollman, Benj., Rockford. |

C

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| Clapp, C. E., Quincy. | Coolidge, John, Galesburg. |
| Carpenter, K. B., Thomson. | Cooley, Fred A., Yorktown. |
| Carbaugh, Wm. T., Lanark, R. R. 1. | Crosier, Eli I., Utica. |
| Christ, John, Washington. | Caven, George, Chicago. |
| Charles, A. D., St. Charles. | Cook, F. L., Lyle. |
| Carr, George S., Aurora. | Cooper, Miss Mae, Steward. |
| Coolidge, J. H., Galesburg. | Carr, J. W., Aurora. |
| Camp, L. E., Mt. Horeb, Wis. | Carr, F. A., Aurora. |
| Crissey, N. O., Avon. | Cassens, Geo., Alhambra. |
| Cooley, J. H., Cleburne, Texas. | Cobb, E. N., Monmouth. |
| Collyer, W. D., Chicago. | Carlisle, H. N., Effingham. |
| Cutler, Geo. A., Belvidere. | Colwell, J. H., Chicago (The Sharples Co) |
| Campbell, M. S., Genoa. | Cooksley, Alice M., Stillman Valley. |
| Collidge, C. P., Winnebago. | Coolidge, C., Winnebago. |
| Campbell, A. B., Oregon. | |

D

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|----------------------------------|---------------------------------|
| Davis, S. E., Elgin. | DeLano, H. W., Sugar Grove. |
| Davis Bros., Fairchild. | Dyer, Chas. M., Hinckley. |
| Danielson, Peter, McConnell. | Dorsey, Clarence B., Moro. |
| Davis, C. W., Woodstock. | Daniels, J. W., Greenville. |
| Davenport, Prof. E., Urbana. | Defrees, Tallie, Greenville. |
| Davis, A. E., Jr., Urbana. | DeLaval Separator Co., Chicago. |
| Davis, Wm. F., Quincy. | Dewey, F. E., Capron. |
| Duell, H. R., Sandwich. | Dickinson, F. J., Woodbine. |
| Dunlap, Mrs. Theodore, Abingdon. | Dalbert, A., Richard. |
| Dorsey, L. S., Moro. | Davis, T. W., Freeport. |

E

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| Eastman, H., Shabona. | Erf, Prof. Oscar, Manhattan, Kan. |
| Everts, M. C., 60 Wabash ave., Chicago. (The J. B. Ford Co.) | Eade, A. T., Greenville. |

F

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| Finch, N. W., Victor. | Fredericks, Andrew, Elgin (DeLaval Separator Co.) |
| Frein, H. P., Smithton. | Fryer, Wm., Winslow. |
| Freund, S. H., Johnsburgh. | Foster, J. C., Sparta. |
| Francisco, M., Wauconda. | Fischer-Mann, Commission Co., 907 N. 3rd St., St. Louis, Mo. |
| Fulrath, P. G., Bristol. | Farnham, A. D. Thomson. |
| Fraser, Prof. W. J., Urbana. | Fuller, Leo H., Chicago (J. B. Ford Co.) |
| Fairchild, A. E., Chicago (M. H. Fairchild & Bro.) | |
| Fourbain, B. C., Belvidere. | |

G

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| Gordon, M. D., Wyandotte, Mich. (J. B. Ford Co.) | Glover, A. J., Ft. Atchison, Wis. |
| Gurler, H. B., DeKalb. | Greene, S. F., 7617 Union ave., Chicago (Miller Pasteurizing Machine Co.) |
| Gurler, G. H., DeKalb. | Guseking, W. G., Altemont. |
| Gullickson, Martin, Frankfort Station. | Grube, Geo., Greenville. |
| Grout, A. P., Winchester. | Gates, C. N., Chicago (Creamery Package Mfg. Co.) |
| Gibbons, T. H., Elgin. | |

H

- Herman, G., Manhattan.
 Houghland, A. C., Owatonna, Minn.
 (Heller & Merz.)
 Haecker, Prof. T. L., St. Anthony
 Park, Minn.
 Hicks, J. E., Thompson.
 Henry, R. J., Millersburg.
 Hoppensteadt, Geo. W., Beecher.
 Hostetter, W. R., Mt. Carroll.
 Hardiker, F. H., Chicago (Mer-
 chants Despatch Transportation
 Co.)
 Hostetter, A. B., Springfield.
 Harvey, W. R., Clare.
 Herkenheim, P. J., Malta.
 Howe, T. J., Owatonna, Minn.
 Horsing, S. S., Stillman Valley.
 Hatch, Fred L., Spring Grove.
 Hopkins, H. H., Dubuque, Ia.
 Hollister, W. S., Pana.
 Hopkins, Geo. C., Oregon.
 Howell, Carrie B., R. R. No. 2, Ur-
 bana.
 Hall, C., R. R. No. 1, Cantrill.
 Hunt, James R., Ottawa.
 Hovey, E. L., Capron.
 Hilfiker, Jas. H., Manhattan.
 Hart, Prof, J. W., Urbana.
 Hopper, H. A., Urbana.
 Hayden, C. C., Urbana.
 Haecker, Prof. A. L., Lincoln, Neb.
 Hyne, W. J., Evansville, Wis.
 Hansen, H. C., Smith's Mills, Minn.
 Harwood, O. E., Madison, Wis.
 Hicks, J. E., Chadwick.
 Hunt, Geo. A., Hebron.

J

- Jennings, A. A., Chicago (Star
 Union Lines.)
 Johnson, L. E., Byron.
 Johnson, Ernest, Hebron.
 Janes, W. E., Hinsdale.
 Jensen, S. M., Orangeville.
 Johnson, Lars, Stewardson.
 Johnson, Ernest, Hebron.

K

- Kerns, Walter, Warren.
 Knigge, L. H., McHenry.
 Kendall, George, Mt. Carroll.
 Kirkpatrick, J. R., Oakdale.
 Kilbourne, C. S., Aurora.
 Kimzey, W. R., Tamaroa.
 Keeney, Z. J., Chicago (Sharples
 Co.)
 Kent, A. H., Mulberry Grove.
 Kane, Wm., Morrison, R. F. D. 4.
 Kleckner, H. S., Orangeville.

L

- Ludwig, Mat, Lockport.
 Lally, W. A., Chicago (New York
 Despatch Transportation Co.)
 Long, M., Woodstock.
 Lucas, O. F., Belvidere.
 Lorah, G. W., Sugar Grove.
 Litchardt, Herman, Schaumberg.
 Lorenzen, C. P., Rockford.
 Latzer, J. A., Delta, O.
 Leass, S. L., Sullivan.
 Lindley, Hon. C. J., Greenville.
 Lohmen, Wm. C., Sorento R. R. 2.
 Lee, Carl E., Urbana.
 Lowitz, Chas. C., Wyandotte, Mich.

M

- Mann, W. E., Pecatonica.
 Metzger, F. L., Millstadt.
 McNish, F. J., Chicago (Creamery
 Package Mfg. Co.)
 Moore, W. S., Chicago.
 Muller, F. J., Milledgeville.
 McCredie, Wm., Elgin.
 Mallory, Grant, Freeport.
 Mason, J. L., Elgin.
 Mason, J. P., Elgin.
 McFarland, Frank, Big Rock.
 Myers, O., Little Rock.
 Murphy, R. R., Garden Prairie.
 Monrad, J. H., New York.
 Musselman, S. L., Brookville.
 Maurer, W. H., Rock Grove.
 McFarland, Frank, Big Rock.
 McConnell, Carrie, Ridott.
- Michener, E. P., Chicago (Briggs
 House.)
 Mann, F. J., Gillman.
 Machamer, I. G., Lanark.
 McNurlin, Wm. L., Oregon.
 Mingle, John, Toledo.
 Montgomery, A. R., Capron.
 Misner, F. H., Rockford.
 Meyer, Adolph, Greenville.
 Morris, Geo. O., Greenville.
 Marquardt, T. W., Lombard.
 McCarnaghie, Samuel, Leland.
 Meredith, J. L., Elburn (A. H. Bar-
 ber Creamery Supply Co.)
 Montgomery, A. R., Capron.
 Maule, A., Shirland.
 Muller, L. Fred., Rockford.
 Myers, Henry, Rockford.

N

- Nowlan, Irvin, Toulon.
 Nelson, Peter, Creston
 Newman, Joseph, Elgin.
 Nelson, L., Camp Point.
 Newman, John, Elgin.
- Nolting, E. L., Elgin.
 Nolting, August, Elgin.
 Newman, Balch W., Elgin.
 Nelson, Ralph, Freeport.

O

- Olson, Chas., Kirkland.
 Poplett, C. A., Dunlap.
 Mfg. Co.)
- Osgood, H. B., Chicago (Cry. Pkg.
 Owen, E. R., 204 Market St., St.
 Louis (Blanke & Hank.)

P

- Poplett, C. A., Dunlap.
 Powell, J. W., Peoria (Merchants'
 Despatch Transportation Co.)
 Petit, Peter, North Aurora.
 Patterson, J. P., Plainfield.
- Peak, S. W., Winchester.
 Powell, L. A., Bowen.
 Phillips, Louis, Germantown.
 Patton, R. A., Hanna City.
 Paterson, Berger, Round Grove.

- Palmer, F. R., Pearl City.
 Phillips, J. A., Damascus.
 Patterson, R. M., Chicago.
 Purvis, Miller, 224 Dearborn St.,
 Chicago.
 Pflugston, H. W. F., Schaumberg.
 Pierce, Harry, Savanna.
 Palmer, H. W., McLean.
 Purviance, Mrs. H. P., Lincoln.
 Patterson, R. M., Chicago (State
 Food Commission.)
 Pelly, Mrs. Nora, Belvidere.

R

- Defpath, R. G., Baldwin.
 Rutter, Geo. E., St. Libory.
 Reed, Geo., Belvidere.
 Rawson, Frank E., Alden.
 Rice, H. B., Lewiston.
 Roessler, Theodore, Shelbyville.
 Robertson, N. Y., 262 Wabash Ave.,
 Chicago (Diamond Crystal Salt
 Co.)
 Riegel, John O., Highland.
 Roby, Wm., Fairfield.

S

- Skyles, Josiah, Kaneville.
 Sudendorf, E., Clinton (Wells, Rich-
 ardson & Co.)
 Spanger, E. E., Big Rock.
 Sloggett, John, Hinckley.
 Stewart, John, Elburn.
 Sullivan, Miss Lizzie, Providence.
 Sally, A. J., Garden Prairie.
 Spies, L. A., St. Jacob.
 Staples, W. S., Hooppole.
 Steidley, A. B., Carlinville.
 Spencer, C. V., Chicago (Santa Fe
 Railroad.)
 Swanzey, L. M., Ridott.
 Sawyer, J. F., 79 Dearborn St., Chi-
 cago.
 Schlattman, Fred, St. Libory.
 Springer, Mrs. Eva H., Springfield.
 Slouborg, Thomas, Savanna.
 Straw, T. H., Shannon.
 Springsteen, P. J., Egan.
 Schoch, Irwin E., Freeport.
 Seidel, C. H., Orangeville.
 Speed, Chas. V., Baileyville.
 Savage, B. W., Sigel.
 Stevens, J. D., 336 Fisher Bldg.,
 Chicago (Empire Separator Co.)
 Scotey, W. H., Greenup.
 Spaulding, F. W., 22 Sacramento
 St., Chicago.
 Strain, Jas. A., Greenville.
 Shoemaker, A. A., Nokomis.
 Swayze, Fred C., Pana.
 Scharth, John, Mascoutah.
 Snyder, J. E. (Cry. Pkg. Co.) Rock-
 ford.
 Stowell, J. E., Chicago (The Sharp-
 les Co.)
 Swartz, S. A., Greenville, R. R. 1.
 Sieck, W. J., Greenville.
 Schumaker, John, Eldermonth.
 Shilling, S. B., Mason City, Ia.
 Seaman, J., Greenville.
 Stocker, J. J., Greenville.
 Sanmann, J. F., Havana.
 Schwartz, Ed., Damascus.
 Segar, J. W., Pecatonica.
 Smith, S. F., Columbus.
 Shepherd, W. P., Madison, Wis.
 Scott, J. E., Scales Mound.

T

- Thompson, A. E., Poplar Grove.
 Thompson, Frank B., Greenwood.
 Thurston, Henry F., 355 Dearborn St., Chicago.
 Taylor, W. H., Stillman Valley.
 Thornton, Chas. H., Argyle.
 Tindall, W. K., Malta.
- Thompkins, H. S., Union.
 Terpening, J. D., New Lenox.
 Tatten, Geo. E., Garden Prairie.
 Tenney, J. G., Chicago (Merchants' Despatch Transportation Co.)
 Terry, D. M., Earlville.

V

- Van Patten, David, Plainfield.
- Van Kuren, S. J., Franklin.

W

- Whitney, R. A., Greenville.
 Waterman, M. H., 303 W. North St., Danville.
 Williams, C. H., Chicago (Colonial Salt Co.)
 Wright, F. W., Joslin.
 Wood, R. L., Woodhull.
 Wilson, Geo. R., Monmouth.
 Welford, R. G., Red Bud.
 Wilson, E. L., Manhattan.
 Wilder, C. R., Manhattan.
 Waspi, J. S., Spring Grove.
 Wiggins, L. N., Springfield.
 Woodard, C. H., Big Rock.
 Winton, W. W., Madison, Wis. (C. M. & St. P. R. R.)
 Waterman, Geo. E., Garden Prairie.
 Wentworth, E. M., Davenport, Ia. (Star Union Lines.)
 Willson, D. W., Elgin.
 Weaver, Vernon A., Greenville.
 Welsh, S. T., Lake Creek.
- Wise, Geo., Greenville.
 Wright, S. N., Elgin.
 Woolverton, D. C., 154 Lake St., Chicago.
 Walline, C. W., Cambridge.
 Wader, August, Highland.
 Wolf, Mrs. E., Rock City.
 Wood, D. E., Elgin.
 Willson, W. C., Elgin.
 Winnebago Butter Mfg. Co., Winnebago.
 Wilkening, W. C., Schaumberg.
 Walton, Edw. B., Arma.
 Wescott, N. E., Dennison, Ia.
 Welch, W. K., Wyandotte, Mich.
 Woodburg, A. E., Danville.
 Winter, A. C., Waterman.
 Willard, J. E., Belvidere.
 Wilson, L. D., Greenwood.
 Williams, C. H., Chicago (Colonial Salt Co.)
 Wyman, B. F., Sycamore.

Y

- Youngs, H. J., Stillman Valley.
- Young, W. H., Aurora.

Z

- Zion City Fresh Food Supply Co., Zion City.

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