

ing with a generous feed in the night yard. This we continue until through haying, anywhere from the 15th to the 25th of July, by this time our second cutting of alfalfa is ready, just when we need it the most. This carries the cows until the early sweet corn is partly gathered. Got to be careful in feeding sweet corn.

With flint, fodder corn, second cutting of clover, third, etc. of alfalfa there should be no dearth of roughage for our cows. I would suggest that the land on which we raise forage crops, be well fertilized, using plenty of seed, and drill the corn in thick for fodder or ensilage planning to plant as near as possible to where they are going to be fed.

We find that by seeding clover with barley, I mention barley especially because it is removed first, in a field adjacent to the pasture, and erecting a temporary fence after harvest, and later letting the cows in on this, helps out the problem of fall pasture.

Last year the spring seeded clover in one of our barley fields headed out after harvest, and produced a crop of seed, which we hauled. This field we top dressed with our manure spreaders this spring, getting a yield of hay of over two tons per acre. The men who did the work in this field say three.

We should seed clover with all our small grain, whether we intend keeping it for meadow the following year, fall pasture, or plowing under. It might be well to mix a few pounds of alfalfa with the clover seed, as we could then tell which parts of our farms are the best adapted for growing this most valuable forage plant.

In raising grains for dairy cattle I should place them in this way as to value: Oats first, with wheat, barley second, and corn third, sowing from a quarter to a half bushel of wheat per acre with the oats, increases their feed value, very materially. We get the best results with oats on fall plowing, harrowed, then a top dressing of manure, and double discing in the spring, seeding with a single disc drill. The top dressing with manure is especially essential in light sandy soil, that drifts with our high winds in the spring.

Barley has been yielding better than oats in our locality the last few years, and should of course be sown in rich, mellow, well worked ground. It should also be sown early, perhaps before your oats, as it will germinate at a lower temperature.

Corn, well there is so much to be said about raising corn, and you farmers, I expect know more about it than I do. We must select our seed in the fall, don't put it off too late, and take care of it. Put it where there is some artificial heat, and don't let it freeze, at any rate not until thoroughly dry, better not at all. I used to spread seed corn on the floor of the attic of our blacksmith shop, and got pretty good results, still in an ear test always had to throw out some. Now I drive 3-inch finishing nails in the floor, and stick the ears butt down on them, just close enough, so that no two ears touch. The last two years our seed corn has tested 100

per cent. I mention this on account of the importance of good seed corn. With your seed properly tested and sorted, a disc planter, with an edge drop, there is no excuse for a poor stand. Get the land in the best possible condition, if fall plowing—harrow as soon as the ground is in condition in the spring, and as often as you afterwards can; then double disc, and cross harrow. When you start the planters, let the cultivators follow, and again cross harrow. This is what I like to do, but am not always able to. Though I prefer fall plowing for corn, especially in light soil.

There is of course the land on which some of the winter manure has been hauled and plowed under in the spring—try to work this enough to firm it somewhat before planting. Corn from a feed stand point is one of our most valuable crops—the corn—the fodder, not forgetting the cob.

In raising roughage or grains the rotation of crops is important. Clover land should be plowed the fall of the year following that of seeding, unless carried over for the purpose of pasturage, and planted to corn, (I should of course say potatoes if I were not discussing food for dairy cows) then to small grains and clover, with some rape, which helps hold the snow during the winter.

With one quarter of our farms in clover, in rotation, more grain will be raised on the remaining three-quarters than otherwise would be on the entire farm.

Dr. H. A. Tomlinson, Superintendent St. Peter State Hospital: Cows must be studied individually, if we are going to deal with them intelligently. My knowledge of the cow has been gained largely in the study of the pathology of the diseases with which she is afflicted, our herd having been decimated from time to time by tuberculosis. This study, coupled with the practical knowledge gained in other ways, has led me to the conclusion that there is as much individuality among cows as there is among human beings. Therefore we can sum up all of the qualities of the animal into what may, for practical purposes, be called her character.

Prof. Boss told us how to get a good herd of cows. I want to speak of other conditions likely to be present in the make-up of the cow, which are not ordinarily considered, but which interfere more or less seriously with the usefulness of the animal, and have a great deal to do with her failure both as a milk producer and a herd producer.

Prof. Boss spoke of certain cows that might be excellent as individuals, that were not good as breeders; that is, their progeny were so limited in numbers that they failed to reproduce their kind. This characteristic I believe to be a family trait, pathological, and inherent in the constitution of the animal. Through arrested or defective development she is without reproductive capacity. Such an animal is harmful in the herd no matter how good she may be as an individual. So far as I know this defect is in the nervous system of the animal. This same condition occurs in plants, and, oddly enough, these defective plants may be conspicuously well developed as individuals.

There are other characteristics in the cow that indicate defect in the nervous system." Among them are a capricious appetite, and an irritable temper. These peculiarities are not uncommon, and may be easily aggravated by lack of intelligence on the part of the herdsman. Indeed high breeding in an animal means always development of the nervous system out of proportion with the rest of the organism; so that it is not strange that sometimes this over development becomes excessive; affecting both the appetite and digestion of the cow, and making her unduly susceptible to what is going on about her. Such a cow should also be eliminated from the herd. Not so much on her own account, as because her progeny will probably be defective in other ways also. Then there is the cow that consumes a large amount of food, shows no evidence of waste in the manure, but is still only an average producer of milk and butter fat. Besides this type, there is the cow that can not digest its food, as commonly shown by the large amount of excrement containing undigested grain and hay. Such an animal is not only bad in itself, but much worse as a possible herd producer. Irritability is well shown in the effect of flies on milk production. There is a well marked difference in cows in this respect, and it is a characteristic well worth studying, if you are trying to develop a first class herd of milch cows.

If I may be excused for using the term in this connection, these temperamental peculiarities in the animal are as important to study as is the evidence of its breeding, and in the end may turn out to be the most important, because they may be the parent of other and worse defects in the progeny.

With regard to feeding: The first thing to learn is, how much does the cow produce in comparison with the other members of the herd. It does not pay to feed and milk two cows to get the amount of milk one should produce. A cow worth one hundred dollars on account of her milk production, is not only economical on that account, but also because she requires less feed than two fifty dollar cows, and there is also the saving in labor. Every farmer will admit that the above statement is axiomatic, but he will still ignore the obvious conclusion. The farmer, more than any other kind of business man, fails to appreciate indirect cost, or indirect-profit. Sometimes we think our state authorities are afflicted with this same sort of blindness, but we hope to educate them in time. Professor Humphrey's figures are a plain statement of fact. If you feed the proper kind of a ration to the right kind of a cow, you will get the result.

The economy that is going to be of advantage to our institutions, is the economy that is used in any other kind of enterprise that is successful; that is, wise expenditure to put us in a position to have and care for a well bred herd of cows, and a well trained herdsman to care for them. The parsimony that has kept the herd at St. Peter in a defective and infected barn for twenty years, has resulted in the loss of enough cows to more than build a barn. Besides, instead of having a well developed herd,

we have been constantly handicapped by having to kill our best animals because they were tuberculous.

This brings me to the influence of environment upon the health of the cow. I mean by environment all the conditions which surround the cow as to her care, as to the food, as to the light and air, and as to the amount of room. It has been learned with regard to disease that if the causes of infection are spread out—in other words, if they are not concentrated—they are usually ineffectual in the production of disease; whereas if the cause of infection is developed in a restricted space, then disease will result. As an illustration: Some years ago we had in our county quite a number of cases of smallpox. Persons came in from the surrounding country, and went into the stores with the eruption on their faces, but there was no epidemic. A year ago last fall there were a few cases of smallpox in St. Peter—there was only one family particularly, all of whose members were infected. There happened to be an auction in town. It was late in the fall and the weather was cold and murky. For two or three evenings there were crowded into the store where the auction was held about one hundred and fifty persons. The doors were closed, the windows were shut, the air was humid, and there were four or five persons with the eruption of smallpox in this room. The result was that inside of two weeks we had an epidemic. I use this as an illustration of the fact that there are a great many conditions which are not harmful to the herd in proper surroundings, but that just as soon as you get a large number of animals together, with an insufficient supply of air and sunshine, or where the animals are crowded so that they have not sufficient room in the barnyard, you develop sources of disease which do not exist under the ordinary conditions of the farm. We know that persons who live in the country, isolated from others, can throw out excrement indiscriminately, and no harm comes of it; but when persons are aggregated in communities, and live in communities as they would on the farm, the result is disease. It is exactly the same with animals. As soon as you get them together in numbers, you have got to take just that much more precaution to eliminate the conditions which produce disease. Each animal needs so much light and so much air, and when you shut it up and put it with other animals so that the air is much more rapidly diluted and the exhalations from the lungs increase, you have got to provide artificial means of changing the air in order to prevent the animals from becoming diseased. Even if they do not become victims of specific disease, their vitality is lowered so that they do not produce such a large supply of milk or such good progeny. This is a very difficult thing to teach generally, because the average man has a few cows in his stable, who spend most of their time out in the barnyard with their noses against the strawstack and their butts to the wind, and their resistance to disease is increased on account of their environment. It is difficult to make that man understand that when you have one hundred cows in the barn, feeding each to the highest point of its

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capacity to make them produce milk, it is going to be harmful to allow those cows to stay there without a sufficient supply of good air and sunshine. They do not understand why you cannot put your cows in a stable just as you would put cattle in a car when you are going to ship them.

Crowded conditions in the barn are not only harmful to the products of the cow. If you milk in an illy-ventilated room, the milk absorbs all the contamination in the barn during the time of milking. If your milk room is in your cow barn, the difficulty is added to just that much more, because milk absorbs contamination more rapidly than almost any other fluid. Therefore, in building a cow barn it is absolutely necessary that the milk room should be entirely separate from the barn, so located and so built that it can be exposed to the air and the sunlight all the time. It should be so screened and protected that flies may be kept out of it, because we have no more frequent carrier of disease than the ordinary house fly. Then there should be, in connection with the cow barn, the means for furnishing plenty of hot water and plenty of steam. You know how difficult it is to get persons to keep things clean, even in the ordinary sense, and when you do not provide them with the means of doing things easily in a cleanly way, the result is they are going to let things go. There is nothing so essential in handling and storing milk as strict and rigid cleanliness with regard to all of the utensils used. I simply speak of the care of milk with relation to the building of a cow barn. I should say more upon the subject if I were going to speak about the care of milk generally. In point of fact, it is more simple and much more easy to be clean about handling milk than it is to be dirty. The essentials are an abundance of water, easily gotten at, and so arranged that the milk utensils may be readily rinsed out and protected from sources of infection. Therefore I believe that each cow barn should be supplied not only with the toilet room referred to by Mr. McFadden for the men—but also with a room where all milk utensils can be cared for properly and kept clean all of the time. In that room there should be an abundant supply of hot water and steam in order to secure thorough sterilization. If the milk buckets and cans were rinsed out first in cold water, then in warm soda water, then again in hot water, and then steam dried—but never touched with a rag of any kind—and kept on racks where they will be free from dust, we should have no difficulty with sour milk or contaminated milk; so I should also recommend a toilet room for the utensils. In our institution it is difficult to carry out strictly sanitary conditions in handling milk because the milking is done by patients; because it is done by persons too demented to do anything else.

With regard to feed, it seems to be thought that alfalfa cannot be raised in Minnesota. I even know persons in our own town who have watched our alfalfa fields for the last eight years who occasionally ask us if we ever tried to raise alfalfa, so you see it is pretty difficult to get even the ordinary information that persons may gain by the use of their

eyes disseminated throughout the community. Farmers have been too greedy with regard to alfalfa. They want to get a crop too soon. If a man has a piece of land reasonably well drained, there won't be any difficulty in his raising alfalfa provided he starts it right. We have raised it successfully. We started it first on a piece of land supposed to be too poor for anything else, and we turned that land, which looked just like the banks of the river, into apparently good, rich sandy loam. We now find that our alfalfa does even better on the heavy land than it does on the lighter land, so that the character of the soil is not so important as the preparation of the soil. I saw the statement recently that what alfalfa needed was lime, more lime, still more lime, and I believe the statement to be correct. Lime serves a double purpose. It not only keeps the surface of the ground porous and makes available certain nutrient material which would not otherwise be available, but by its slow disintegration the lime supplies an ingredient very necessary to the maintenance of the alfalfa plant.

In speaking of corn this morning, Professor Humphrey did not mention the corn cob. I have a special affection for the corn cob. We always grind the cob with the corn. We find that it has several advantages. There is some food value to it. Its presence makes the cow masticate her food more thoroughly, and acts mechanically to prevent the corn from massing in the digestive tract and causing fermentation. And, finally, it adds about twenty-five per cent to the value of the manure, because of the large percentage of potash which the corn cob contains.

Dr. A. F. Kilbourne, Rochester State Hospital: I am very sorry that I was unable to hear Professor Boss and Professor Humphrey, but I enjoyed Prof. Tomlinson very much.

I do not know much about alfalfa, but I do know something about cows, and I agree with Dr. Tomlinson in many of his remarks about cows.

Any old thing is generally supposed to do in the way of a stable for cows and the matter of ventilation is the one point almost always overlooked. There is no question but that cows need ample ventilation if they are to do well. You can almost tell whether there is an absence of ventilation by the appearance of the herd. We noticed that by putting up silos, connecting them with the barn, and running up the necessary shoot to deliver the ensilage from the silos to the basement of the barn—the shoot extends up to the ridge of the barn and is connected with the barn by tunnels—a most excellent method of ventilation was furnished. We are about to build a new cow barn, and are now looking for plans for such a building.

I should like to ask if any of the gentlemen present have had any experience with the milking machine. Our milking is done by patients, and as Dr. Tomlinson says, they are not cleanly. They need supervision. If possible, the patients should be eliminated and the milking should be done by employes; but with one hundred cows it is difficult to get enough employes to do the work, so that we have to fall back on the patients. It

has often seemed to me that if a milking machine were perfected which would do that work, it would be a very great improvement on the present method.

Just now we have not had any rain for five weeks, and our pastures are all dried up. It is a question in my mind whether we shall not have to provide for such contingencies by putting up an increased quantity of ensilage and feeding it through the summer. We have nothing with which to feed the cows now except clover hay, of which we have a large amount, which, combined with mill products, forms their ration, but bran and shorts are very high now and it makes rather an expensive ration where you have to increase the quantity on account of short pasturage. Perhaps somebody could suggest a method of carrying us through the dry season. It seems as if we had had more dry weather in the last few years than ever before, and this contingency arises more often than before. What to do when the pasturage is short is a very serious question.

John H. Hurst: We have tried rye to a large extent. It makes a first-rate ensilage. Cut it when it is in blossom.

Professor Humphrey: Dr. Kilbourne was speaking of a milking machine. At our experiment station we conducted a twenty-months' trial with the Burrell-Lawrence-Kennedy Milking Machine, and so far as our results were concerned, they were favorable to the machine. The production of the herd during the twenty months was as good as we could have hoped to have had if we had hand-milked. I might say that we need very satisfactory conditions for working the machine. I feel that unless the operator is a man who is more or less of a mechanic, at the same time a true herdsman, thoroughly in love with each cow in the herd, unless you have means of providing plenty of hot water for keeping the machine clean, unless the operator is as accurate as clockwork in caring for the machine, you are likely to get into difficulty. Properly handled, it gave us satisfactory results, and it was not harmful to the cow. We stripped the cows after milking, and the man was very careful to see that every cow was milked clean. A little neglect on the part of the man handling the cow would, I am satisfied, beget disastrous results. The machine might leave milk enough in the udder to dry the cow up, but we followed the practice of stripping the cow after the machine had completed its work. There were times when we did get a little more than there should be. We have a bulletin on that subject, which fully covers the work that we did. If any of you are contemplating putting in a milking machine, I shall be glad to furnish you a copy.

J. N. Tate, Superintendent School for the Deaf: What does such a machine cost?

Professor Humphrey: The cost of the machine as we installed it was about five hundred dollars. It was run by an electric motor, three horse-power, I believe. A two and one-half horse-power gasoline engine would run it satisfactorily. It comes as near, probably, to the sucking of a calf

as anything that could be put on the market in the way of a milking machine.

So far as the effect on the cow's udder, the tits, was concerned, we had no difficulty, but we feel that our success was due largely to the fact that we had a man who was ever ready to give attention to the machine and to clean it perfectly, which required about twenty minutes before and after milking; at the same time he was careful to see that every cow was milked thoroughly.

Dr. Kilbourne: Is this a permanent improvement, or merely on trial?

Professor Humphrey: It has been a matter of study and improvement for many years, and the company has gotten to the point where it is putting it on the market as a standard milking machine. There are opportunities for improvement yet, but we might say that it has reached a point where it will be successful in the hands of the right man. It is just like all other machinery; it must be understood. You can not hope to install it in any barn, under the supervision of any hired man, and expect it to give satisfaction. There have been quite a number of them put in in Wisconsin and later dropped out. Many people are thoroughly disgusted with them. On the other hand, where they have been properly handled, they have been thought very much of.

Dr. A. C. Rogers, Superintendent School for Feeble-Minded: Some time ago a number of us who attend these meetings, went out to observe a machine milk eighty cows. Following that we took the government bulletins giving not only the published results upon the herd, but also results of bacteriological examination of milk before and after the machine had been used some little time. Have you made any experiments which showed the condition of the milk as to bacteriological contents?

Professor Humphrey: Yes. Our bacteriological department made a careful study of this, and where we experienced no difficulty, that report is favorable.

We cleaned the tubes by first running lukewarm water through them; that was followed by hot water; then the tubes were rinsed with cold water; prior to milking the machine was rinsed again and the tubes and tit cups were kept in a solution of brine when not in use. Lime water is also used. I believe that we used brine throughout most of the period. The tubes could be poorly rinsed. You could drop them into the brine the two ends first. In that way the brine would never get into the tube, and there would be a chance for germs and infection. The matter of rinsing is very important.

The company sends out careful instructions, which we adhere to. The first six or seven months we followed their instruction as regards amount of vacuum which should be used. They said as high as seventeen inches, and we allowed it to go up to seventeen inches, supposing that was all right but as we turned the cows out in the spring—we ordinarily, in hand-milking, get a flush period—we found that there was no increase

with the machine milking. We thought it was fatal to the machine, but they studied the situation and found out that there was about a one and one-half inch too much vacuum, that a fifteen and a half was about as high as we should run. We had no difficulty when we used the fifteen and a half. We are not using the machine at the present time owing to the fact that after the twenty months were up the boys wanted to milk the cows by hand to see if they could improve on last year's production. Another reason is that in our dairy barn we are obliged to employ help enough to keep our barn and our cows in first-class order, always on dress parade, and with the amount of help we have in the barn we can do the milking in about the same length of time that we can to bother with the machine. Another feature that is bad is the arrangement of our stalls. It necessitated the taking out of a partition each time in order to get the machine in the right position

Dr. Kilbourne: Knowing our condition, should you not think a milking machine would be a good thing for us.

Professor Humphrey: I should think it might be. So much depends upon the management that I know you might fail if you got on hand the wrong man; but if you get the right kind of a man to take charge, and if your barn is properly arranged, I think the milking machine would be a good thing for you.

Dr. Kilbourne: Did the cows take kindly to the machine?

Professor Humphrey: The first cow we ever milked was one of the most nervous ones in the barn. If a stranger milked her, she would drop off three or four pounds. When we put on the machine, we got within two-tenths. She paid no attention to it. A few of the old cows objected to it.

Dr. Rogers: Professor Humphrey's report is exceedingly interesting, especially since the conclusions in the Government Bulletins to which I referred were something like his. They reported that the herds did well under the use of the machine but that it was impossible to clean the tubes properly. The prediction was made that they would not be satisfactory until something beside rubber could be used so that the tubes could be steamed. They stated that this method of cleaning is very important.

I have a number of questions that I should like to ask.

With regard to water troughs: I find that there are two plans proposed and used in various places. 1. The trough for each individual cow. 2. The watering of cows in a common trough. The objection to the latter is the danger of contagion. It makes considerable difference in the expense of outfitting the stable if one has to put in a separate trough for each cow.

Professor Humphrey: I myself favor the trough for the reason that I believe you are more likely to keep that clean. It is a matter of convenience first, and you are not very apt to have a sick cow standing there. She should be taken to a hospital stall as soon as anything is wrong. Where there is tuberculosis in a herd, there is danger of contamination, but I feel that with the individual watering troughs the cows do not always

fare as they should. In many instances the troughs are neglected until they become very filthy. At our institution during the winter season we practice watering in the cement trough. We have a well underneath one corner of our barn—not the best place for a well, I must admit, but we water from that. We have a tank above. The water is about fifty-five degrees in winter.

Dr. Rogers: With regard to stalls: I notice that quite a number of barns are constructed either without stalls or with a simple iron pipe. I think Mr. Merrill has that system installed at Owatonna. The iron pipe is the only separation between the cattle. Is there any danger of one cow injuring the udder of the cow next to her? It is so much easier to keep the stable clean if there are no stalls that I should think there would have to be considerable danger of injury to offset the advantage.

Professor Humphrey: I do not feel that I can recommend a stall; that is, there is none with which I am perfectly satisfied. The stall that I would approve today is the stall with the gaspipe partition. The James stall manufactured at Fort Atkinson probably comes as near perfection as any I have had anything to do with. We haven't it, but I should like it.

With regard to the danger of one cow's injuring another: The gaspipe directs the cow so that she will lie down in her place. The danger comes when there is nothing to guide her. If she is lying in the space devoted to her stall, there isn't very much danger of the other cow's injuring her in any way. It is so much easier to keep the stable clean with a gaspipe partition that I feel we ought to have it.

G. A. Merrill, Superintendent State Public School: We have stanchions and the iron pipe division between the stalls, and we have found them very satisfactory, indeed. The pipe coming down to the floor from the manger does not come back far enough to interfere with the milker and it does serve the purpose of keeping the cows in their places.

We have had no trouble with cows being stepped on by their neighbors since having the iron pipe, although we did have such trouble before that. In the old barn there were no stalls, no division, and we found that a cow was occasionally injured by having her udder stepped on by a cow standing near.

The entire arrangement is of iron, with a cement trough in front of the cows, so that it is very sanitary and very easy to keep in good condition at all times. We find it a very satisfactory arrangement.

Professor Boss: The most satisfactory stall I have ever seen I suppose is about as unsanitary as you could make it. That is the objection to it. There is a barn near Duluth fitted with the stall. It must be a combination of two or three kinds. The objection to the cement trough is that it is very difficult to adjust the cow to the length of the stall. This stall is a combination of the Hoard Stall with some others. It is about three feet in width, has a wooden partition, a wooden manger in front for grain, and just over that is a sloping hay rack, the roughage being fed above. That

sloping hay rack crowds the cow back over the gutter. Right across the rear of the stall they put in a piece of two by four, and the bedding is all in front of that. As a consequence, when the cow lies down, she steps ahead and she is always clean. I never yet saw a dirty cow in one of those stalls. That particular part of it, the idea of keeping them clean, appeals to me strongly. This stall is made of wood entirely, but I believe that it could be made of metal and that it would then be very satisfactory.

Dr. Rogers: Is there any special advantage in using any absorbent in the barn for the ammonia? If so, what?

Dr. Tomlinson: So far as the welfare of the cattle is concerned, there is no special advantage. The ammonia is the result of the oxidation of the urea, as you know and if you can have some substance which will absorb the urine, there will be no oxidation, and therefore there will be no ammonia. During the last winter and spring we have very successfully used the sifted coal ashes in the gutters. I was in the barn a number of times, and, although we have a very poor barn, one poorly ventilated, yet there was practically never any odor of ammonia after we began to use the dry, sifted coal ashes. In other words, if you take up the moisture, there will be no oxidation, and it seems to me that we have in the coal ashes, from our boilers a very valuable addition to the manure pile. While it has not in itself much value as manure, it has the indirect value of taking up moisture that would otherwise escape.

Dr. Rogers: I should like to know if it is an advantage to milk the heifers three times a day? Does it increase the milk capacity of the herd? How long ought it to be kept up?

Professor Humphrey: I cannot give you any specific data on that. Some of our best dairy men believe that there is great advantage in milking the heifers three times a day to encourage the habit of milk production. We have never conducted any tests at our station to try that out. Last spring we started to milk two heifers three times a day for twelve weeks. One of them dropped off a little over thirty per cent in her production in fat and milk and never went back. We were never able to get her back to the production she had been making. The other heifer went on with her usual rate of production. Mr. Gillette and several of our successful dairy men in Wisconsin advocate that with the heifer it is well worth while to go to this trouble.

Mr. Hurst: Theoretically, milking a heifer three times a day may be all right. Do you mean that it is practical for the ordinary farmer to drive his heifers in three times a day and milk them three times a day? We could do it better in the winter than we could in the summer.

Professor Humphrey: It depends upon the class of farmer you are. If you are making dairying your specialty and the breeding and production of high class dairy stock it would pay you to do so I believe. Mr. Gillette says he wishes that he had less land and more time to devote to his cows.

He practices it in summer. He turns his cows out in June pasture. I believe he had alfalfa and a splendid crop of clover and corn fodder that he used for soiling. He is a specialist. He milks the heifers three times a day. He claims that he is past the experimental stage of milking heifers three times a day.

Mr. Hurst: Lots of these things are theoretical but not practical.

Professor Humphrey: If we take a heifer and milk her three times a day for six or seven months of her first lactation and increase her output, it is practical. There is no carefully worked-out experiment on that subject. It looks reasonable to me.

Dr. Rogers: Our institution herds are one of the things to be studied without reference to our other farming. The dairying in our institutions is a thing by itself. If the farmer has to leave his milking to some of the subordinates, you are, of course, not able to do this. If the farmer can increase the capacity of these cows by having them milked three times a day when they are heifers, that is one of the points to be brought out. If a man has to let his hay spoil in order to do it that would, of course, be an objection. Mr. Selling, of Northfield, told us that he did not think of doing anything else with young heifers.

Mr. Hurst: That reminds me of the story about Mr. Selling and an Irishman who intended buying some cows from Mr. Selling. They met on a bridge and the Irishman said, "How about those cows, Mr. Selling? I understand you are milking them three times a day." Mr. Selling replied that he was. The Irishman then said, "Well, I don't want any of them. Once a day is often enough for me."

Dr. Tomlinson: I think the point that Dr. Rogers brought up is one well taken. It is the basis of this whole discussion. The primary object of the committee in having this set of papers prepared was to show that it was worth while to develop the institution herds to the point that they might be kept economically and advantageously; also, to show that if you could get one cow to do what you are now getting two cows to do, it would pay to do so; and to properly supply your cow barn with trained help, so that if it were necessary to milk heifers three times a day, the work might be done intelligently.

Mr. Hurst: Any man who has had a good herd of Holstein cattle has cows that he has to milk three times a day, but as a rule it doesn't pay. You cannot go out in the pasture and bring out three or four cows without getting the whole herd started up.

Dr. Rogers: The point Professor Humphrey intended to bring out was the establishment of the milk habit in the heifer.

F. L. Randall, Superintendent State Reformatory: I have just a few suggestions that I should like to make. Some two or three years ago a committee was appointed by the State Board of Control consisting of Dr. Tomlinson, Dr. Rogers, and myself, to make a report upon the grade of

efficiency in the state service at the institutions, and we reported a recommendation—which has never been acted upon adversely, nor approved, so far as we know—that heads of departments at state institutions where their work was similar, should have meetings at intervals, and it seems to me that the manifest interest on the part of superintendents and visitors, as well as farmers, at this meeting, in which only one branch has been discussed (farming), rather indicates the wisdom of that recommendation.

I notice that the Iowa institution farmers are required to attend a course during the winter at the State Agricultural School, during which time they receive their pay, and their pay is sufficient to meet the expenses of that visit. We had at one time the opportunity of sending the farmer to the State School, and he came back much benefited by it, and I am sure that he would gladly repeat that experience annually. If that were done, the farmer at the state institution would become an expert in his line as it seems to me he ought to be.

Some persons today have rather expressed the opinion that certain things were not feasible at institution farms. It seems to me if they are not feasible there, they are not feasible on the average farm, and that the work which ought to be done and which there is hesitation about doing, should be promoted by the State through its institutions as well as through its Agricultural Department at the Park. I make this as a suggestion because I believe it is important.

The discussions we have heard here today indicate that the farmers at the institutions are a sincere, earnest, and practical set of men, and not one of them knows as much as all of them know. It would be an advantage if they could get together occasionally.

They have an invitation from the foreman of the J. J. Hill Farm, located near this city, to go out there tomorrow. They had one meeting some years ago and effected an organization. They met at St. Peter. They were at that time, and are now, cordially invited, when they have the privilege of meeting again, to meet at the Reformatory. I presume it is the will of the meeting that the invitation from the Hill Farm be accepted?

Motion that they accept the invitation was adopted.

Mr. Randall: I think, Mr. Chairman and Gentlemen, that from a state institution farm there should radiate information to all who visit it, and I believe the suggestion of Professor Humphrey, made this morning, is a most valuable one. We want to have good stock. We want to buy a sire now for the dairy herd. We have difficulty in getting one. We have one there, a pretty good one. We should have an opportunity to exchange. There should be some place in this state where there should be the pure-bred stock, and in other places there should be pure-bred stock, so that an exchange might be made. When one animal was bought, he should be of service in the state so long as he is serviceable and it is a safe thing

to do, because the animal tried out and tested is the proper one to put in any other institution herd. I think that the stock of the state at large should be improved through the institutions. I think we ought not to have poor stock.

Our exhibit, which is based on the most painstaking work by Mr. McCulloch for twelve months, shows that we kept two cows during all that time that did not return to us as much as the value of their feed. We have a cow that returns three dollars above expense and one that returns eighteen dollars above. The one that returns eighteen dollars is worth six times as much to us as the one that returns three dollars. We look forward to producing just as much butter and milk at the Reformatory with one-half the number of cows and with one-half the amount of labor employed as at present. We have no doubt it can be done by proper selection. Why should not our neighbors have the opportunity to get good stock? Why should they not see what effect it would have on their own? Why should not the output in Minnesota be doubled in the next few years, as well as in Wisconsin? But the individual farmer is slow to proceed. The individual farmer is very often a man born in another country. He came here without much money; he had to build his barn; he had to pay his taxes; he had to help build the church; he had to open up the land one generation back. Now we have these things; they do not need to be supplied in the next generation. Now the farmer can devote himself to the things which his time formerly would not allow him to. Let the State take the initiative, lead the way, and show the people that it is a feasible thing. Why should not the stock of the farmer be improved until, finally, the whole of the state has the benefit of the stock that the State has caused to be introduced and bred?

Now, Mr. Chairman, I regard this as a very important meeting, indeed, and I make a personal request that I may be furnished with twenty-five or fifty extra copies of the proceedings of this meeting.

Dr. Kilbourne: The Iowa system is wrong in one thing. They allow the wages of the farmer to go on while he is attending the Agricultural School. That is all very well, but it would take all his wages to pay his way there, and what is his family going to live on while he is there? It is to be supposed that the farmer is sent there to help the institution, and it is only fair that the State should pay his expenses while there. Here, with the long winters, it would be worth ten times what it would cost the State to have the farmers go up there, and it seems to me it would be one of the best moves the Board could make to have them go there during the winter season. There is a short course there.

Professor Boss: We have a course of four weeks. Board costs from four to four dollars and a half a week, and there is a tuition fee of ten dollars. I do not know whether there would be any reduction made to that, or not.

Dr. Kilbourne: The expense, compared to the benefit derived would be very small.

I agree with Mr. Randall in the matter of exchanging cattle at the institutions.

Some time ago we brought up the question of registering our herds; that is, the full bloods that were eligible to registry; and I think it was only through a misunderstanding that the Board decided that we were not to register the cattle. I think it is a very grave mistake, and I think, when the Board takes the matter up again, that they will view the matter in a different light. No one wants the head of a herd unregistered. Another thing, the progeny of a registered herd are worth three times as much as the progeny of an unregistered herd. In our own experience, I could sell registered calves for three times the amount that we can get for an unregistered herd. At one of the hospitals in Michigan—they have one of the greatest herds in the country there—they have a registered herd, and the Doctor told me that very often he got five hundred dollars for his calves, and that all of their calves went at a very high price, while the unregistered calves sold for a mere nominal sum.

Mr. Hurst: I am very glad that the Doctor has brought that up. I brought it up before the members of the Board some years ago, but I got sat on and sat on hard. The reason given for not registering these cattle was that the State did not want to enter into competition with the regular breeder.

Dr. Kilbourne: There is another point. Don't ever buy a cow or a head of a herd that isn't vaccinated. We bought one, a hundred and fifty dollar cow, from Wisconsin. When we tested our herd of one hundred and seven, the only one we killed was that hundred and fifty dollar cow. We not only lost the hundred and fifty dollar cow, but there was danger of bringing infection in from that cow. We ran the risk of infecting all the rest of our herd. It is a mighty grave oversight to ever buy a cow that is not vaccinated.

Dr. Tomlinson: In connection with that, I should like to say that it is not only necessary that they should be tested, but you should know who tested them. We have some cows that were bought for us that were supposed to be tested, and we killed seven of them within a year.

Before we close this discussion, I want, in behalf of the Committee to thank Professor Boss for the interest he has taken in this matter; for his paper, and especially to thank him for his kindness in securing Professor Humphrey to read a paper before us. I do not know when we have ever had anything that has done us more good than the appearance of you two gentlemen here. I feel confident it will benefit the work at the institutions very much. I wish, on behalf of the Committee and this body, to thank you for what you have done today, and to express our appreciation.

Professor Boss: I feel like thanking you for the opportunity. I feel that there has been too little of sympathy and co-operation between the state institutions—those that are under the Board of Regents, as well as those under the Board of Control. We could each gain from frequent inspections and visitations back and forth.

I feel somewhat delinquent in finding that Mr. Hill has gotten ahead of us in the invitation. I should like very much to have the farmers and superintendents go to the University Farm. Things are at a very interesting stage just now, and we could perhaps interest you for a half or three-quarters of a day. We have six hundred acres under cultivation and most of it under experimentation. If you cannot come at this time, any time that you may meet again will be acceptable.

Prof. Humphrey: I feel like acknowledging the kind words that have been expressed relative to our being here today.

It has been a pleasure to me to come from Wisconsin over into Minnesota. I came here this morning with some degree of curiosity as to what kind of a meeting you could have this hot day, and I must say that it was way beyond my expectation. I feel that Wisconsin must not be behind in this same thing. Michigan I know has done a great deal and I am sorry to say that Wisconsin has not done as much in her state institutions as yet as she can do.

I congratulate you on holding such a meeting and upon the manner in which you have taken hold of it. I believe it is going to accomplish a great deal for your institutions and for your neighbors about your institutions.