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DAIRY INVESTIGATIONS.

REPORT OF PROGRESS.

By Wilber J. Fraser, M. S., Chief in Dairy Husbandry.

To the Advisory Committee of the Illinois Dairymen's Association :

GENTLEMEN: The issuing of bulletins at the conclusion of definite lines of work does not constitute such a report of progress as should be in the hands of a committee so closely identified with its work as yours, and this is issued with the purpose of outlining what has been done and how the work has been carried forward.

As you will remember, it was decided at the first conference to conduct investigations, as far as funds would permit, along the following lines :

1. Conduct field work, especially in the dairy regions of northern Illinois, by putting a man into the field to test the efficiency of individual cows in several herds in different sections of the dairy region and help in every possible way to improve the dairy conditions.

2. Continue the dairy experiments at present carried on by the Experiment Station, in regard to determining the difference in efficiency of individual dairy cows, on U. S. Government funds.

3. Devise if possible a cheap and effective method of keeping flies from cows.

4. Determine the smallest quantity of milk upon which calves can be successfully reared and what food will make the best substitute for milk.

5. Determine the immediate and continued effect of different quantities of the same kind of feed upon the production of milk.
6. Determine the width of ration most economical for conditions that exist in Illinois.
7. Conduct experiments showing why some cream whips while other cream containing the same per cent. of butter-fat does not.
8. Test the efficiency of different insulating materials for creamery refrigerators.
9. Conduct experiments on mold in refrigerators.
10. Determine the species of bacteria that cause butter to deteriorate at low temperature.
11. Determine the effect upon butter of the cream having been frozen.

#### DAIRY BARNS.

As one of the most neglected features of dairy farms is the sanitary condition of the barns, it was decided that the Department of Dairy Husbandry should set an example in this respect by putting the University dairy barn in the best possible condition. As the floors, joists, and sills were badly decayed and unsafe for longer use they were torn out and new sills were put in where needed. The loft was supported on iron columns and new windows were put in giving four times the original amount of light. The barn was ceiled on the inside and a room partitioned off at one end for the preparation of feed for experimental purposes. A cement floor, gutters and mangers were built on the ground and the "Drown" iron stalls were set in this cement. These stalls were the second lot manufactured and are giving good satisfaction. The "King" system of ventilation was also installed.

This makes a good barn for experimental work and with the small dairy building near it, which has also been remodeled, it constitutes, from a sanitary standpoint at least, one of the best dairy plants in the state.

#### FIELD WORK.

A capable man, Mr. Glover, has been located in the dairy region of Northern Illinois where he has spent all of his time in a study of the dairy conditions, both on the farms and in the creameries and factories. As the cow is the initial factor in dairy operations, and as great differences are known to exist, he began by testing individual cows in different herds. Every seventh week he visits each herd he

is testing. The week previous to this visit the milk from each cow is weighed and sampled at each milking and from the sum of these weights the total yield of milk for the week is obtained. At each milking a sample of the milk is placed in a bottle bearing the name of the cow and containing some preservative to prevent the milk from souring. At the end of the week this composite sample and the total weight of the milk are turned over to Mr. Glover. The sample is tested for butter-fat with the Babcock test and by multiplying the total weight of milk by the per cent. of butter-fat in the composite sample, the actual yield of the cow for the week is obtained.

As the test is made every seventh week the three weeks previous to and the three weeks following the test are figured in at the same rate. It will be seen that even though the cow may be shrinking in flow, that by taking the three weeks before and the three weeks following the test, the middle week of the seven will fairly represent the average.

The owners of the herds, their location, and the number of cows tested in each herd are as follows:

NAME	LOCATION	No. of cows in each herd that have completed a y'r's test.	No of cows s'ld from each herd during the year.
H. B. Gurler.....	DeKalb.....	48	12
E. B. Heim.....	Freeport.....	7	0
F. M. Barber.....	Greenwood.....	18	6
L. D. Wilson.....	Greenwood.....	20	7
Ray Wilson.....	Wookstock.....	17	10
Chas. Gilkerson.....	Marengo.....	7	0
M. S. Campbell.....	Genoa.....	15	0
S. S. Seward.....	Genoa.....	3	3
		135	38

NAME	LOCATION	No. of cows being tested.
H. B. Gurler.....	DeKalb.....	225
C. C. Burr.....	St. Charles.....	50
Joseph Newman.....	Wasco.....	45
J. E. Minard.....	Batavia.....	9
J. Phillips.....	Damascus.....	10
W. J. Phillips.....	Lena.....	8
J. F. Hardel.....	McConnell.....	10
H. J. Young.....	Stillman Valley.....	50
Harry Smith.....	Stillman Valley.....	15
Harry M. Phillips.....	Damascus.....	25
J. L. Mason.....	Elgin.....	50
L. D. Wilson.....	Greenwood.....	25
F. M. Barber.....	Greenwood.....	27
Ray Wilson.....	Woodstock.....	25
W. R. Hostetter.....	Mt. Carroll.....	30
M. S. Campbell.....	Genoa.....	20
J. F. Deyamond.....	Genoa.....	12
Chas. Gilkerson.....	Marengo.....	9
E. G. Heim.....	Freeport.....	8
		653

He has assisted many dairymen by advising such changes in the feed as not only to cheapen the ration, but often to increase and prolong the flow as well. Several have erected silos by his advice. As the tests have gone on, the high value of the best cows has become apparent as well as the comparative worthlessness of the poorer ones, and the inevitable result will be a better grade of cows.

Mr. Glover has attended farmers' institutes and other meetings, and in public and private has stood for better dairying. Living in Elgin, in the heart of the dairy region, his influence is beginning to be felt among the dairy farmers. He has visited and made a written report of about forty creameries and has been generally helpful to the dairy interests in many ways.

#### EFFICIENCY OF INDIVIDUAL COWS.

Extremely careful and accurate work in testing the individual efficiency of dairy cows has been done with a comparatively few cows at the University barn. In the summer of 1901 eight cows were selected from a dairy herd of one hundred cows in the Elgin region. These were brought to the University and as soon as each freshened a record was kept of all feed consumed and milk and but-

ter-fat produced. A like record was also kept of some of the best and some of the poorest ones in the University herd. As was shown in a previous test of this kind, great differences were found to exist in the individual efficiency of the cows. One cow produced over two and a half times as much butter-fat as another on an equal amount of the same feed.

What became of the extra amount of feed that the poorer cow ate has been a fruitful source of speculation. Some have thought that it was the inability of the poorer cow to digest her food as completely as the more efficient one.

#### DIGESTION EXPERIMENTS.

To determine this question a digestion experiment was undertaken last June in connection with the Department of Chemistry. Six of the cows in the above mentioned experiment were used for this purpose and the test extended over a period of fifteen days. During this time two men were kept with the cows night and day. All feed consumed of every kind and the water drunk, together with the dung and urine voided were accurately weighed on a delicate balance and a careful record of the milk and butter-fat produced was also kept. Samples of all the food eaten, of refuse left in the manger and of everything voided during this period were taken to the chemical laboratory for analysis. This work necessitates between seventy and eighty analyses and as these are not completed the results are as yet unknown.

#### BREEDING COWS.

This great difference in the efficiency of individual dairy cows shows the ruinous practice many of our dairymen are following today of buying springers and selling them as soon as they are dry, not only that, but when the cows are kept two or three years they are frequently fed so heavily that they are soon ruined and the heifer calves even from the best cows are seldom raised. This is indeed a ruinous practice for the dairy interests, as the progeny from the best cows are not preserved and our future cows must be raised on dairy farms. They cannot for obvious reasons be produced on the range as can the steers, sheep or horses. If we consider the great difference in efficiency of cows it is very evident that much better herds could be obtained by careful selection and breeding than are found on most of our farms. Most of our dairymen are keeping too large herds and wasting a large amount of both feed and labor on poor individual cows. If many of them would keep half the number of

cows but of better quality they would have both barn room and feed for calves and heifers, much less milking to do, and larger net profits.

Dairymen say they cannot afford to feed calves the necessary milk to raise them. To determine the smallest quantity of milk on which calves could be successfully reared, nine calves were divided into three lots of three each. Some of these calves were fed only 150 pounds of whole milk and 300 pounds of skim milk yet at six months of age they were good thrifty calves. Surely any dairyman can afford this much milk in order to start a new cow.

Ten of the different fly preventives were tried but none were found to be of any practical benefit. Their value seems to depend upon their volatility which causes their efficiency to be of short duration.

#### CONTAMINATION OF MILK.

Experiments in preventing the contamination of milk have been in progress for some years and within the past few months special attention has been given to the actual weight of the dirt which falls from the udder into the milk pail during milking and to what extent this can be prevented by washing the udders. With udders that were apparently clean, so that no dirt could be seen on them,  $3\frac{1}{2}$  times as much dirt fell from the unwashed udders during milking as fell from the same udders after being washed. Under slightly soiled udders there was 22 times as much and from muddy udders 94 times as much dirt caught under the unwashed as under the same udders after washing.

Work has been done in testing the efficiency of different insulating materials for creamery refrigerators. Several difficulties presented themselves as the work advanced and no definite results have yet been obtained.

Experiments have been carried on to determine the effect of freezing the cream upon the quality of the butter. This work should be continued.

The experiments outlined at the beginning were far in excess of what could be accomplished with the funds available. It might be stated that a considerable amount of money from the U. S. Government was also used for this purpose. The work has been greatly hampered on all sides from lack of funds but we have done well what we have undertaken and for this reason it has been impossible to undertake all the experiments at the beginning.

## RECOMMENDATIONS.

All these lines of work should be continued, and in my opinion the field work should be greatly extended. It is impossible to estimate the advantages of this house to house campaign for better dairying, especially when accompanied, as it is thus by demonstrations so easily understood and so readily applied.