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# AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF DAIRY HUSBANDRY AND
COLBY BRANCH STATION

## SUGGESTIONS REGARDING DAIRYING IN NORTHWESTERN KANSAS

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The soil and climatic conditions existing in northwestern Kansas are such that farming systems in this region have been developed upon an extensive scale. The farms average about 480 acres each. Approximately one-third of this acreage is still in native grass pasture and the remainder is cultivated. Wheat, corn, and barley are the leading crops and rank in importance in the order named. Little attention has been given to the production of livestock and feed crops as compared to grain farming, and although a considerable acreage of sorghums is grown each year, these drouth-resistant crops do not receive the attention which they merit. The annual rainfall varies greatly, both in total amount and seasonal distribution. Failures of the grain crops are not infrequent although the feed crops seldom fail. Since the grain crops hold such an important place in the agriculture of the region, crop failures here are more serious than in regions where more diversified farming systems are followed. Although wheat probably always will be the leading crop, too much dependence should not be placed upon this crop. Exclusive wheat farming does not allow an economical distribution of labor throughout the year, nor does it provide any source of revenue during years when the grain crops fail.

Observations of northwestern Kansas conditions and the results obtained by some farmers in this territory, have shown that the conditions are favorable to dairying as a

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farm industry for the region. Farmers of northwestern Kansas who are selling cream have frequently stated that the cows pay the living expenses of the family during the winter when most families in the district depend upon credit for provisions.

It is not necessary to have any great amount of money invested in cows and equipment to get a start in dairying in a small way. It is likely that relatively small herds—no more cows than one man can handle in each herd—will fit into the agriculture of the region better than would be possible if the dairy industry were based on large herds.

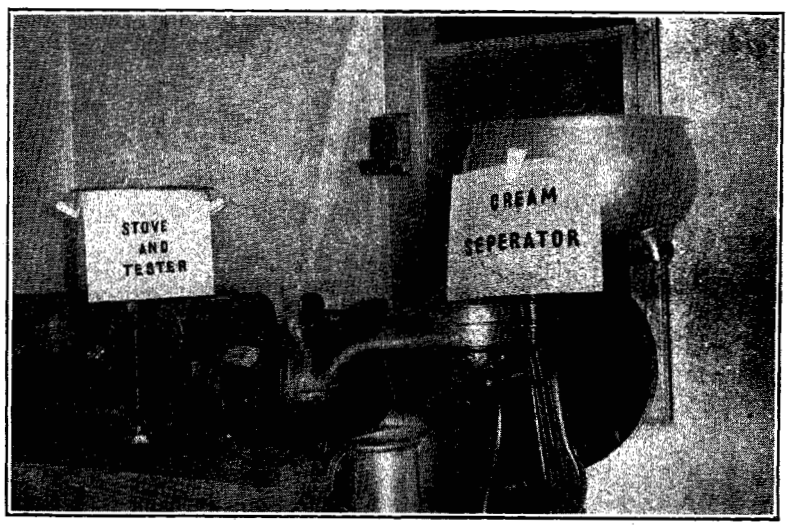


FIG. 1.—Equipment for handling milk, Colby Experiment Station

## DAIRY WORK AT THE COLBY EXPERIMENT STATION

As an example of what can be done with dairy cows in northwestern Kansas, the results obtained with a small herd at the Colby Branch Experiment Station are presented. The equipment on this farm consists of two pit silos and places for housing the cows and handling the milk. (Fig. 1.) The cows are housed in one side of the horse barn which has been fixed with wood stanchions and a cement floor and gutter at a cost of less than $50, prewar prices. In October, 1915, six grade cows and an Ayrshire bull were purchased at a cost of $900. The cows were grade Ayrshire-Shorthorns, and were no differ-

ent in appearance from those found on many Kansas farms. (Figs. 2 and 3.)

During the first year, the cows were each fed daily 35 to 40 pounds of silage made from corn, cane, and kafir; and what sorghum stover they would eat. Those producing more than 1½ gallons of milk per day were fed 1 pound of grain mixture per day for each 4 pounds of milk produced. This grain mixture consisted of 10 parts of bran, 8 parts of ground barley, and 6 parts of linseed meal by weight. During the fall and winter,the cows were allowed to run on wheat pasture, and in the spring had access to native grass pasture. The pasture reduced the amount of silage and stover eaten, but the high-producing cows were still fed grain.

Beginning November 1, 1915, daily weights were kept of the milk produced by each cow. The following is a record of milk and butterfat produced by each cow from November 1, 1915, to July 1, 1916, a period of eight months.

| Cow | Pounds milk | Test | Pounds butterfat |
|---|---|---|---|
| Pet | 4,204 | 3.1 | 130 |
| Rose | 5,640 | 3.6 | 203 |
| Queen | 5,881 | 3.7 | 217 |
| Spot | 5,096 | 3.7 | 188 |
| Brownie | 4,931 | 3.2 | 157 |
| Bessie | 6,264 | 3.7 | 231 |
| Total | 32,016 | | 1,126 |

The cost of grain from the time the cows were delivered to the station in October, 1915, until July 1, 1916, a period of 8½ months, was $137.70. During this time $567.25 worth of whole milk was sold from the herd. This represents the milk sold from the farm in addition to what was fed the calves. Since the sale of whole milk represents the largest gross return from dairy products, this project is somewhat different from that on farms where cream is sold. When the value of skimmed milk and the labor of selling milk is taken into account, however, one can readily see that the difference in returns is not great.

From July 1, until the last of August, 1916, the cows were all dry. The first cow freshened, August 28, 1916, and all had dropped calves by November 11, 1916. The records from September 1,1916, to August 31, 1917, are given below:

| Cow | Pounds milk | Test | Pounds butterfat |
|---|---|---|---|
| Pet | 5,893 | 3.6 | 212 |
| Rose | 7,695 | 4.0 | 308 |
| Queen | 9,002 | 4.2 | 378 |
| Spot | 8,434 | 3.7 | 312 |
| Brownie | 7,857 | 3.4 | 267 |
| Bessie | 8,451 | 3.6 | 304 |
| Total | 47,532 | | 1,781 |

During this time the cows were fed practically the same as the year before.

From January 1, 1918, to December 31, 1918, the cows produced as follows:

| Cow | Pounds milk | Test | Pounds butterfat |
|---|---|---|---|
| Pet | 5,617 | 3.10 | 177.0 |
| Rose | 8,170 | 3.60 | 297.0 |
| Queen | 8,839 | 3.70 | 330.0 |
| Spot | 6,208 | 3.70 | 230.0 |
| Brownie | 7,607 | 3.20 | 247.0 |
| Bessie | 8,422 | 3.70 | 316.0 |
| Star (*a*) | 3,775 | 4.70 | 177.0 |
| Lady (*a*) | 7,366 | 4.50 | 331.4 |
| Princess (*a*) | 4,534 | 4.30 | 195.0 |
| Juneau (*a*) | 3,680 | 3.87 | 141.0 |
| Daisy (*a*) | 2,603 | 4.27 | 111.0 |
| Total | 67,021 | | 2,552.4 |

(*a*) Star, Lady, Princess, Juneau, and Daisy are first heifer calves from the original cows. The records given for Princess, Juneau, and Daisy cover only a few months of their milking period.

Most of the cows were dry from August 31,1917, till January 1, 1918. During 1918 the cows were fed a grain mixture of 5 parts of shorts, 2 parts of bran, and 1 part of linseed meal. One pound of this mixture was fed for each 4 pounds of milk that each cow produced above 1½ gallons per day. The cows were on wheat pasture until December 1,1917, after which they were fed cane and kafir silage, 40 pounds per head daily, and what wheat straw they would eat in addition to their grain. They mere turned on native grass pasture, March 1, 1918, and kept there until the heavy snowfall came on December 17.

For the 12 months ending December 31, 1918, the account, exclusive of labor, was as follows:

| | |
|---|---|
| Milk sold | $2,039.95 |
| Sale of calves | 112.50 |
| Total sales | $2,152.45 |
| Grain purchased | 675.76 |
| Net returns | $1,476.69 |

This represents a return for milk and calves sold over cost of grain, of $1,476.69, or an average of $123 per month. This milk was sold in bottles for 7 cents per quart at the farm and 9 cents per quart delivered in Colby. If this milk had been separated and sold as cream, it would have made 2,552 pounds of butterfat, which at 50 cents a pound would have brought $1,276 for the cream alone, leaving the skimmed milk on the farm to be fed to calves and hogs, or made into cottage cheese for table use.

Covering the period of three years, the six cows with four heifers in milk, produced milk and butterfat as follows:

| | Pounds milk | Pounds fat | | Value of fat |
|---|---|---|---|---|
| 1915-16 ( 8 mos. period)..... | 32,016 | 1,126 | at 30 cents, | $337.80 |
| 1916-17 (12 mos. period)..... | 47,532 | 1,781 | at 40 cents, | 712.40 |
| 1918 (12 mos. period)..... | 67,021 | 2,552 | at 50 cents, | 1,276.00 |
| Total ..... | 146,569 | 5,459 | | $2,326.20 |

With butterfat at the average price for the different years, the total received for butterfat would amount to $2,326.20. Estimating 85 percent of the milk production to be skimmed milk, and putting a value on skimmed milk of 40 cents per hundredweight for 1916, 50 cents per hundredweight for 1917, and 60 cents per hundredweight for 1918, would make the total value of skimmed milk, $652.61, or dairy products valued at $2,978.81 for the three years.

The inventory of livestock on hand at the end of this period was as follows:

| | |
|---|---|
| 1 Purebred Ayrshire bull ..... | $150 |
| 6 Cows at $125 ..... | 750 |
| 5 Young cows at $100 ..... | 500 |
| 2 Heifers at $60 ..... | 120 |
| 2 Heifers at $25 ..... | 50 |
| 7 Bulls at $20 ..... | 140 |
| Total ..... | $1,710 |

At the end of three years, $2,356 worth of milk had been produced, and the livestock on hand was valued at $1,710, making a total valuation of $4,688.81, or an average of $1,562.90 per year—a good return for the energy exerted and the money invested.

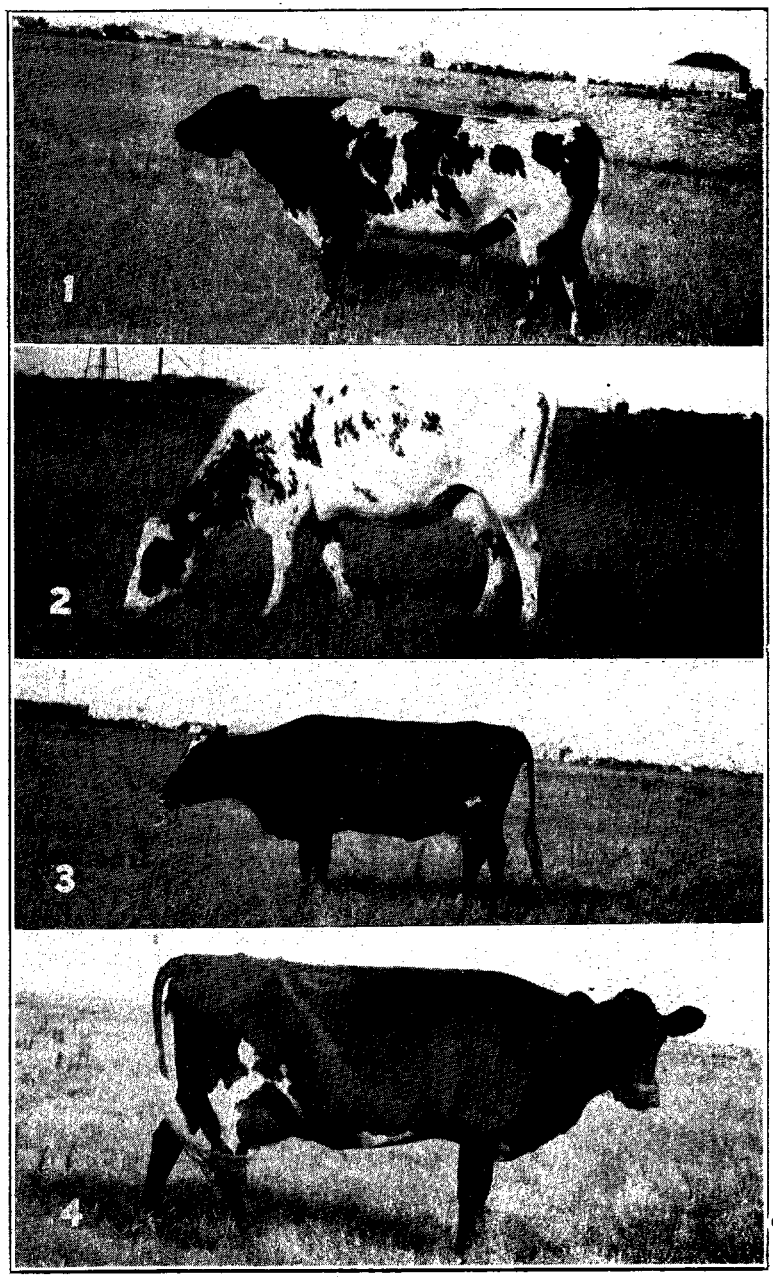


FIG. 2.—Part of the dairy herd, Colby station: (1) The herd bull, (2) Spot, (3) Star, (4) Bessie

## DAIRYING AMONG FARMERS IN NORTHWESTERN KANSAS

**Greater Interest at Brewster.** — During the last few years Mr. C. A. Horney, cashier of the Brewster State Bank at Brewster, Kan., has been very much interested in the promotion of dairying in the vicinity of Brewster. He reports interest in the dairy industry gradually increasing in that community. Mr. Horney has kept a record of the cream checks handled through his bank since 1911. The totals are given as follows:

| | |
|---|---|
| 1911 | $13,009.77 |
| 1912 | 15,784.95 |
| 1913 | 17,142.82 |
| 1914 | 19,875.25 |
| 1915 | 17,378.10 |
| 1916 | 15,075.24 |
| 1917 | 27,033.91 |
| 1918 | 40,223.03 |

The increase noted may have been due in part to the high price paid for butterfat in recent years, but it shows a very decided increase in the amount of cream sold. In this connection the benefits derived from the distribution of this amount of money to the farmers in any locality in Kansas are clearly apparent.

**One Farmer's Experience.**—Mr. Teague of Collyer, Kan., in a recent conversation, stated that three years ago he purchased eight grade Holstein cows, and a bull for $1,200. During the three years he has sold $1,380 worth of cream in addition to what dairy products they have used in their home, and at the present time the herd has increased to 24 head of animals. Mr. Teague says that his cows have made him more money than anything he has ever worked with. They have made him more independent of crop conditions.

These results can be duplicated by many farmers in northwestern Kansas who are willing to do the necessary work. When farmers in this region admit that there is money in milking cows, and still continue to complain about crop failures, it is certain that their failures are due chiefly to their own actions.

## MARKETING DAIRY PRODUCTS

Most of the dairy products sold in northwestern Kansas are sold as sour cream, to cream stations located in practically all the towns that have shipping facilities. A few dairymen living near the larger towns and cities sell whole milk or

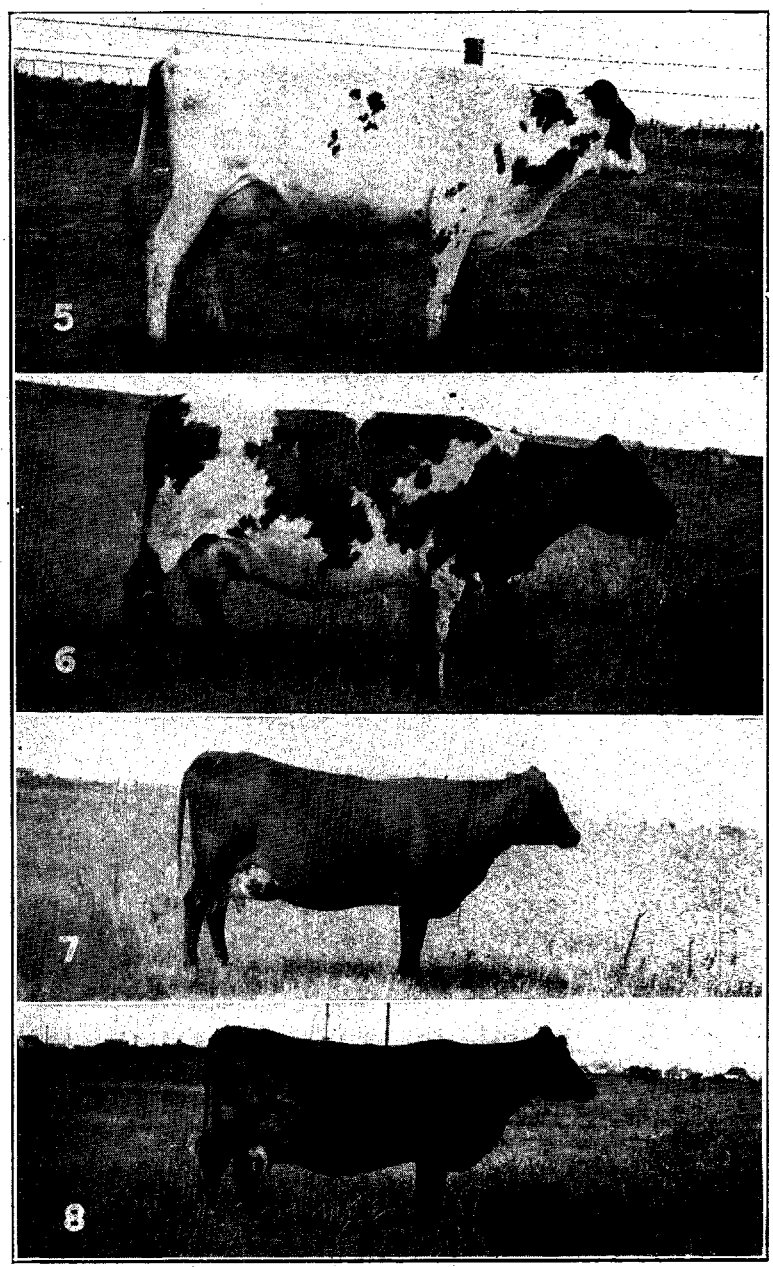


FIG. 3.—Part of the dairy herd, Colby station: (5) Lady, (6) Queen, (7) Pet, (8) Rose

sweet cream, but this represents a small percent of the products sold. Ninety percent of the creamery butter made in Kansas is made by 60 centralized creameries, which have some 2,000 cream stations distributed over the state. These cream stations receive the cream from the farmers, test it for butterfat, and pay them for the fat delivered. This butterfat is then shipped to the creamery for which it is bought.

Recently there has been much agitation among the creameries for the establishment of a grading system whereby cream would be paid for on the quality basis. To make a good quality of butter that will command the highest market price, the butter maker must receive the cream in good condition. For this reason the creameries are encouraging the farmer to take better care of his cream, by paying him according to grade.[1] The ruling under the Kansas dairy law is as follows:

*Rule 18.*—All cream shall be graded according to the following rules, and each grade shall be kept in a separate can, plainly marked to indicate the grade contained therein.

1. First-grade cream shall consist of cream that is clean, smooth, free from all undesirable odors, clean to the taste, and sweet or only slightly sour.

2. Second-grade cream shall consist of cream that is too sour to grade as first, that contains undesirable flavors or odors in a moderate degree, that is foamy, yeasty, or slightly stale, or that is too old to pass as first-grade cream. All sour cream containing less than 25 percent butterfat shall be graded as second grade.

3. Unlawful cream shall consist of cream that is very old, rancid, moldy, dirty, or curdy, and such cream shall not be purchased, sold, or used for food purposes.

At present (October, 1919) the creameries, through their stations, are paying 3 cents more for first-grade cream than for second-grade. The difference in grade depends upon two factors on which the quality of all dairy products depends. They are (1) The production of milk under clean conditions, and (2) keeping the product cool.

The making of butter on the farm is in most cases an unprofitable operation. While the farm butter maker has all conditions under his control, his product is usually inferior and is far below creamery butter in price. The farmer had better take his cream to the cream station. He will usually receive more for the butterfat than for the butter he might

[1] For full information regarding the sampling, testing, and grading of cream write to the Agricultural Experiment Station, Manhattan, Kan., for a copy of the latest edition of the state dairy commissioner's bulletin on "The Permit System of Cream-Buying."

have made from it. At least he is seldom able to sell the butter for enough more to give a reasonable return for the extra labor required in the butter making. In general, farm butter making is advisable only for home consumption or where distance from markets makes the delivery of cream impracticable.

The northwestern Kansas farmer will find a good market for his cream through the cream stations, and in practically all cases it will pay him to produce his product under clean conditions, cool it immediately, and market it at least three times each week during the summer and twice each week during the winter.

## WINTER DAIRYING

Much has been said in all sections of the country about winter dairying, but there is no place where it is more necessary or where it fits in with cropping methods any better than in northwestern Kansas. Milking cows during the winter months is a means of the profitable utilization of labor during this less busy season. The difference between failure and success on many Kansas farms depends upon the use of available labor. Those who depend exclusively on wheat, work but four or five months of the year. It is this type of farmer to whom winter dairying should appeal. Another reason why winter dairying is profitable, is that dairy products are always higher priced in winter than at any other time of the year. If a farmer has on hand some cows that are due to freshen in the fall or winter, these cows can be milked during his idle months and allowed to go dry during the hot summer months when pasture is relatively poor and when crop work is most urgent.

Having cows freshen in the fall is not only the most convenient for the farmer but it is also the best for both the cow and her calf. A cow calving in the fall will produce 20 to 30 pounds more butterfat than one calving in the spring. She can be fed on dry feed and silage during her period of highest production, and as her production declines in the spring she can be turned on pasture. This has a tendency to keep up her production. She can then be turned dry for the hottest part of the summer when pastures are short and flies are bad. Cows should be given a rest of from six weeks to two months, and should be fed while dry so that they will calve in good condition. Any surplus flesh acquired will generally be milked off after calving.

## MANAGEMENT OF THE DAIRY HERD

The feed and care a dairy cow receives is as important as the animal herself in determining her profit. All good milkers should be kept from one year to another. Buying cows in the fall and selling them in the spring will not build up a profitable herd. Good cows are not that plentiful.

It is a waste of money to feed cows well and not care for them properly. They should be protected from cold weather in the winter time, and kept in quarters clean enough to produce human food.

### THE SIRE

It will pay, even in a herd of six cows, for a farmer who wishes to build up a small herd of milk cows, to keep a bull of one of the dairy breeds. By using a good dairy bull on common cows, the heifers from the first cross will be better producers than their dams. The increased production of the daughters of a dairy bull over cows of the beef breed will more than compensate for the investment in the dairy bull. A good plan is for a group of farmers to buy a bull together. In this way they can purchase a good bull and at the same time keep down the cost of bull service in their herds. Some provision should also be made by breeders with small herds to exchange bulls.

The value of a bull of any breed will be measured by his ability to sire individuals of good type and high production. A bull that has proved his worth in this way should be used as long as he lives. A poor bull should be discarded as soon as his inferiority is established. A breeder is apt to look for a young bull rather than one that has proved his ability. The value of a young bull will be measured by his individuality and by the record of his parents. Too often a bull is disposed of before his heifers come in milk.

### THE BREED OF CATTLE TO KEEP

The breed of cattle to keep depends on the likes and dislikes of the owner and the breed that can be purchased to the best advantage in his locality. This will generally mean to get the best cows that can be bought locally and head the herd with a dairy bull. The Holstein and Jersey breeds are the most popular in Kansas at the present time. Breeders of Holsteins and Jerseys are located in almost every county in the state, and it would not be difficult to get in touch with either. Most of the breeders have bull calves for sale at reasonable prices. To replace scrub bulls and to encourage the use of dairy sires, Holstein and Jersey breeders have offered purebred bulls at 15 cents per pound. The breeders are doing this as an advertising proposition in the hope of developing future business.[1] The Ayrshire breed is also well adapted to Kansas conditions and Ayrshires are becoming popular on account of their hardiness and rugged nature.

### PRODUCTION RECORDS

It is essential to know the production of each cow in the herd. In order to know this the milk from each cow for every milking must be weighed. This may sound like needless work, but a year's trial will bring many surprises and no time spent on

[1] If interested in obtaining a bull calf under these conditions, write to the Dairy Department, Kansas State Agricultural College, Manhattan, Kan.

the farm will pay larger returns. For a herd of 10 cows it will not take to exceed six minutes per day. All that is necessary is to get a spring balance scale graduated in tenths of a pound and a few milk record sheets.[1] Arrange these in a position ready for use near where the milk is to be emptied. The scale will pay for itself in other uses about the farm. Cows should be fed grain in proportion to their production and thus grain may be saved by following the record sheets.

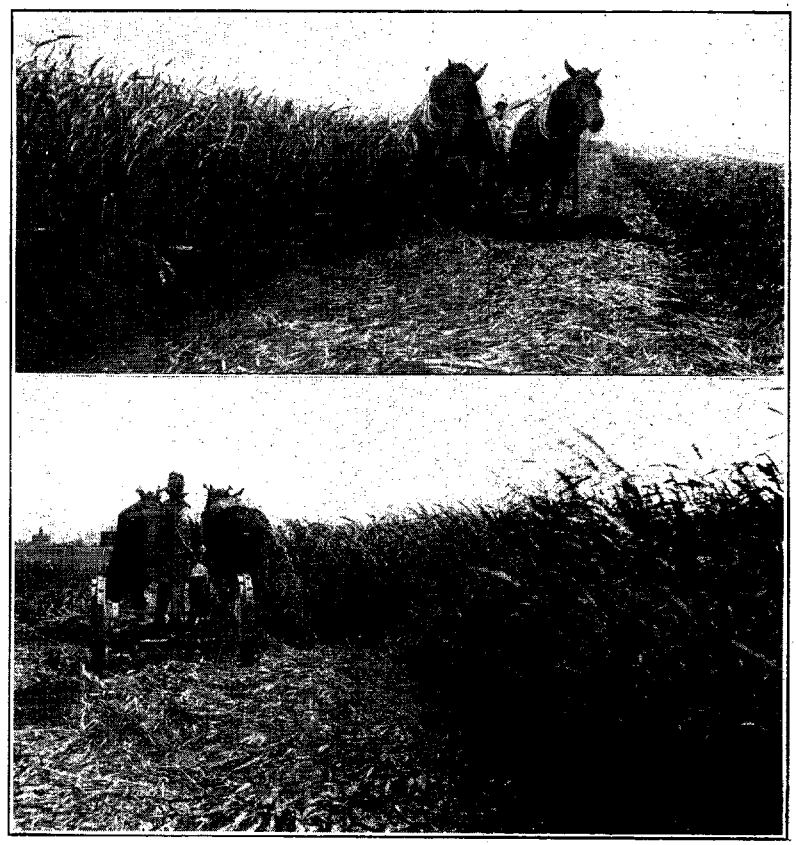

FIG. 4.—Fields of Sudan grass on the Colby Experiment Station Farm, 1917

### FEEDS AND FEEDING

After freshening cows should be fed in proportion to their size and the amount of milk they produce. Many Kansas cows are poor producers because they do not get sufficient feed to make milk. Others, although receiving a big feed of roughage, are unable to hold enough of this bulky feed to supply suffi-

[1] Regular milk record sheets will be furnished free of charge upon request to the Dairy Department, Kansas State Agricultural College, Manhattan, Kan.

cient nutrients. In this case nutrients must be supplied in the form of grain.

If a farmer has alfalfa hay and silage, he has the best and cheapest balanced ration he can get. There is no excuse for not having silage, but alfalfa in western Kansas is quite scarce. Alfalfa is usually the cheapest protein feed and, for feeding the right kind of cows, the owner can afford to pay three times the value of silage to get it. If it is impossible to get alfalfa some cottonseed meal or linseed meal should be used. Feeding trials seem to indicate that Sudan grass (fig. 4) is a fairly good roughage for milk production. However, analyses show it to be much lower in protein than alfalfa; hence it must be fed with a greater amount of protein concentrates than when alfalfa is used.[1] In the absence of alfalfa hay or Sudan grass, Russian thistle hay has proved a very satisfactory roughage.

FIG. 5.—A field of Red Amber cane on the Colby Experiment Station Farm, 1917

A 1000-pound cow will generally eat 30 pounds of silage and 10 pounds of alfalfa hay per day. For cows not giving more than 1½ gallons of milk per day, the silage and hay will be sufficient. If, however, a cow is producing more than this, she should be fed a grain mixture in the proportion of 1 pound of the mixture for each 3 or 4 pounds of milk. If her milk tests more than 4.5 percent butterfat, she should be fed 1 pound of grain for each 3 pounds of milk produced. The average cow testing 3.5 percent will do well when fed 1 pound of grain to 4 pounds of milk. A good grain mixture can be made as follows:

| | |
|---|---|
| Corn chop | 400 pounds |
| Bran | 200 pounds |
| Linseed meal or cottonseed meal | 100 pounds |

[1] For full information regarding the adaptability and methods of growing and handling Sudan grass, write to the Kansas Agricultural Experiment Station for their bulletin 212, "Sudan Grass in Kansas."

In this mixture, ground kafir, ground barley, or ground oats can be substituted for corn. Cottonseed meal can be used in place of linseed meal, but linseed meal is preferred in the absence of silage and alfalfa hay.

Silage made from corn, cane (fig. 5), kafir can be used interchangeably. In the absence of silage, fodder from the sorghums can be used. When the cows are on pasture, the silage or fodder can be reduced but the high-producing cows will still demand grain. In feeding grain, the keeping of records is especially valuable in order that feeding may be in proper proportion to milk production. If the poor producers could be eliminated and the good producers properly fed, profits would be materially increased.

## PIT SILOS

The successful management of the dairy herd at the Colby Experiment Station would not have been possible without silos. There are two pit silos at the station. One was built in 1917. (Fig. 6.) It is 13 feet in diameter, 34 feet deep, and will hold about 85 tons if full of settled silage. It was built at a cost of $167 for labor and material. The material consisted of 9 loads of sand and 65 sacks of cement. This silo is much larger than the average pit silo. Some common sizes for pit silos are 7 by 25; 8 by 18; and 10 by 20. Such silos can be built for from $50 to $125.

The pit silo is very simple in construction and can be made by any farmer that knows how to mix cement.[1] The plan of the silo is to make a curb of cement 6 inches thick extending at least 6 inches above the ground and 18 inches below the surface, The inside of this curb will represent the inside of the silo. When the curb has hardened sufficiently the forms that were used to make the part above ground, can be removed and the soil can be thrown out. When the soil is removed to below the curb, a straight edge can be used to keep the edge of the wall even with the curb. After 5 or 6 feet of soil have been removed, the concave surface should be carefully smoothed down and about three-fourths to one inch of cement plastered on the wall. A mixture of 1 part of cement to 2 parts of clean sand has proved satisfactory. When this section has been plastered, more soil can be removed. By plastering as the silo is dug the necessity of building a scaffold is removed.

A pit silo completed should have a smooth perpendicular wall. A floor is not necessary but is often very convenient in removing silage. The most difficult part of building a pit silo is removing the soil. In most cases some sort of windlass or system of pulleys is made for excavating, and is afterward used for removing the silage.

[1] For complete information on the construction of pit silos, write to the Kansas State Agricultural College, Manhattan, Kan., for their bulletin on "Underground Silos."

Pit silos can be constructed satisfactorily wherever the wall is firm and dry. In sandy or wet soils, the thin layer of cement will not hold. For this reason, pit silos are not recommended east of the 100th meridian in Kansas,

### ADVANTAGES OF PIT SILOS

The advantages of the pit silo are as follows:

1. The pit silo calls for little cash expenditure. Labor is the chief item.
2. It is constructed easily, requiring very little skilled help.

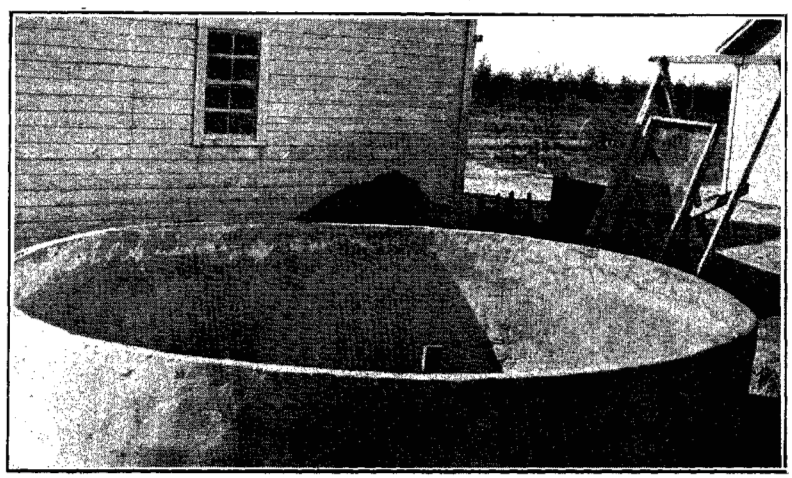

FIG. 6.—Pit silo, built in 1917, Colby Experiment Station

3. The ensilage cutter does not require a blower, and therefore costs less and can be operated with less power than a cutter with an elevator.
4. The pit silo will not blow down.
5. The silage will not freeze.
6. The silage will keep well if it is properly distributed and packed.
7. Since pit silos can be constructed without much cash expense, many farmers could have two, using one for summer feeding or keeping it in reserve to use in case crops fail entirely.
8. No expensive forms are required in building a pit silo.

## CROPS FOR SILAGE

The use of sorghum crops in western Kansas is so common that little need be said concerning them. The growing of kafir, milo, feterita, and sweet sorghum, is the best insurance against crop failures. Rarely does it happen that all of these crops fail. Usually sufficient rough feed can be grown to carry livestock through the winter if this roughage is properly cared for. The silo is the most efficient means of conserving it.

Results of feeding experiments conducted by the Kansas Agricultural Experiment Station, both at Manhattan and Hays, have proved that cane and kafir are practically as good as corn for silage. When the tonnage per acre is considered, an acre of cane or kafir in the silo will produce more milk or beef than one acre of corn silage. An acre of corn silage fed with alfalfa hay and grain produced 22,000 pounds of milk when fed to dairy cows; an acre of kafir silage, 22,400 pounds of milk; and an acre of cane silage under the same conditions, 30,000 pounds of milk. When beef calves wintered on silage at the Hays station, the silage produced from an acre made gains as follows: Corn, 1,039 pounds of beef; kafir, 1,013 pounds; and cane, 1,376 pounds.

The corn crop is so uncertain in northwestern Kansas that its use should give way largely to the sorghums. The farmer should raise the crop for silage or roughage that will insure the greatest amount of feed. It is important in making silage from the sorghums to cut the crop when it has matured. That is, the grain should be sufficiently hard that it cannot be crushed between the thumb and finger. If the crop is immature, it should be allowed to stand as long as it would be benefitted by rain. If, however, the leaves begin to shatter off it should be cut immediately. It is better to run the risk of having a crop frosted than to put it in the silo too green. After being frosted, however, there is no advantage in letting it stand.

## CONCLUSION

Two of the things that are making living conditions better in northwestern Kansas, are pit silos and cream checks. The first makes the second possible. As the number of dairy farmers increases greater prosperity will come to this section of the state.

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