

OCTOBER, 1926

CIRCULAR 128

AGRICULTURAL EXPERIMENT STATION

KANSAS STATE AGRICULTURAL COLLEGE
MANHATTAN, KANSAS

DEPARTMENT OF ANIMAL HUSBANDRY



THESE CALVES (LOT 1, PART I) MADE SATISFACTORY BABY BEEVES ON A RATION CONSISTING OF CANE SILAGE, SHELLED CORN, AND COTTONSEED MEAL.

CATTLE FEEDING INVESTIGATIONS, 1924-'25¹

C. W. McCAMPBELL, M. ANDERSON, AND H. W. MARSTON

PART I

TO WHAT EXTENT MAY ONE DEPEND UPON SILAGE AS A ROUGHAGE FOR BABY BEEF?

Silage can be produced satisfactorily and is the cheapest feed available for beef cattle in practically every county in Kansas. It, however, is not used in this state as extensively as its value justifies. To what extent may one depend upon silage as a roughage for calves that are to be marketed as baby beef is a question often asked. In the fall of 1924, the Department of Animal Husbandry of the Kansas Agricultural Experiment Station started an experiment for the purpose of securing data that would help to answer this question.

1. Contribution No. 80 from the Department of Animal Husbandry.

Six lots of steer calves dropped in the spring of 1924 were used. They would have graded choice and were bred by Mr. Charles Collins, Kit Carson, Colo. The experiment extended from November 4, 1924, to May 18, 1925, a period of 195 days.

Lot 1 received no roughage other than silage. In addition to all the silage it would consume, lot 2 received 2 pounds of alfalfa per head per day during the last 75 days of the experiment; lot 3, during the last 135 days; and lot 4, during the entire feeding period. Lot 5 also received alfalfa hay in addition to silage during the entire feeding period, but since no cottonseed meal was fed in this lot, the calves were fed all the alfalfa hay they would consume, which averaged 3.26 pounds per head per day. Lot 6 was fed no silage. The roughage in this lot consisted of alfalfa hay and served as a check for the other lots.

In order to keep the protein content of each ration the same, the cottonseed meal fed to lots 1 to 4, inclusive, was varied according to the amount of alfalfa fed. Each lot was fed the same amount of corn.

CATTLE FEEDING INVESTIGATIONS, 1924-'25

RESULTS

The results of this experiment are given in detail in Table I.

TABLE I.—Results of a 195-day feeding experiment indicating the extent to which one may depend upon silage as a roughage for baby beef.

(November 4, 1924, to May 18, 1925.)

| Lot No..... | 1 | 2 | 3 | 4 | 5 | 6 |
|--|----------------|----------------|----------------|----------------|----------------|----------------|
| Number of days on test..... | 195 | 195 | 195 | 195 | 195 | 195 |
| | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| Weight per calf at beginning of test, November 4, 1924..... | 380.27 | 359.60 | 358.93 | 360.60 | 359.60 | 361.13 |
| Weight per calf at end of test, May 18, 1925..... | 765.13 | 794.40 | 790.33 | 817.80 | 821.27 | 821.93 |
| Gain per calf during test..... | 404.86 | 434.80 | 431.40 | 457.20 | 461.67 | 460.80 |
| Daily gain per calf during test..... | 2.08 | 2.23 | 2.21 | 2.34 | 2.37 | 2.36 |
| Average daily ration per calf: | | | | | | |
| Shelled corn..... | 10.05 | 10.05 | 10.05 | 10.05 | 10.05 | 10.05 |
| Cane silage..... | 9.81 | 9.03 | 7.26 | 8.35 | 7.15 | ..... |
| Alfalfa hay..... | ..... | (a) | (b) | 2.00 | 3.26 | 6.07 |
| Cottonseed meal..... | 1.37 | 1.18 | 1.03 | .95 | ..... | ..... |
| Feed required to produce 100 pounds gain: | | | | | | |
| Shelled corn..... | 484.12 | 450.20 | 454.33 | 428.70 | 424.49 | 425.17 |
| Cane silage..... | 472.51 | 405.04 | 328.23 | 356.19 | 301.82 | ..... |
| Alfalfa hay..... | ..... | 34.50 | 62.59 | 82.30 | 137.78 | 256.66 |
| Cottonseed meal..... | 66.22 | 52.98 | 46.50 | 40.38 | ..... | ..... |
| Cost of 100 pounds gain..... | \$12.35 | \$11.46 | \$11.43 | \$11.01 | \$10.27 | \$10.42 |
| Cost of calves per head at \$8 per cwt..... | 28.82 | 28.77 | 28.71 | 28.85 | 28.77 | 28.89 |
| Cost of feed per head..... | 50.01 | 49.86 | 49.28 | 50.35 | 47.44 | 48.05 |
| Calf cost and feed cost..... | 78.83 | 78.63 | 77.99 | 79.20 | 76.21 | 76.94 |
| Value per head at home at end of test..... | 76.51 | 81.43 | 82.98 | 87.91 | 83.36 | 85.40 |
| Margin per head, not including hog gains..... | -2.32 | +2.80 | +4.99 | +8.71 | +7.15 | +8.50 |
| Per calf value of hog gains..... | 2.39 | 2.39 | 2.39 | 2.39 | 2.39 | 2.39 |
| Margin per head, including hog gains..... | + .07 | +5.19 | +7.38 | +11.10 | +9.54 | +10.89 |
| Necessary value per cwt. at feedlots to break even, not including hog gains..... | 10.30 | 9.90 | 9.87 | 9.68 | 9.28 | 9.36 |
| Necessary value per cwt. at feedlots to break even, including hog gains..... | 9.99 | 9.60 | 9.57 | 9.30 | 8.99 | 9.07 |
| Value per cwt. at feedlot, Kansas City price minus 50 cents per cwt..... | 10.00 | 10.25 | 10.50 | 10.75 | 10.15 | 10.40 |

Feed price: Corn, \$1.12 per bushel; cottonseed meal, \$45 per ton; alfalfa hay, \$15 per ton; cane silage, \$5 per ton.

(a) Lot 2, no alfalfa hay fed first 120 days. Two pounds alfalfa hay per head per day fed last 75 days.

(b) Lot 3, no alfalfa hay fed first 80 days. Two pounds alfalfa hay per head per day fed last 135 days.

DISCUSSION OF RESULTS

This test indicates: (1) That fairly satisfactory baby beef can be produced on a ration consisting of cane silage, shelled corn, and cottonseed meal. The calves fed this ration gained 2.08 pounds per head per day for 195 days. These calves practically broke even financially. In other words, they furnished a market for silage on the farm at \$5 a ton or \$90 per acre and paid the market price of \$1.12 per bushel for corn and \$45 per ton for cottonseed cake.

(2) That the longer alfalfa is fed with silage to baby beef the greater the daily gains, economy of gains, and finish. The daily gain increased from 2.08 pounds in lot 1, where no alfalfa was fed with silage, to 2.34 pounds where alfalfa was fed with silage the entire feeding period. The cost of gains was reduced from \$12.35 per hundred in lot 1, where no alfalfa was fed, to \$11.01 per hundred where alfalfa was fed with silage the entire feeding period. The price per hundred, which is the index to finish, increased from \$10 per hundred in lot 1, where no alfalfa was fed with the silage, to \$10.75 per hundred where alfalfa was fed with silage the entire feeding period.

(3) That a higher degree of finish and better bloom can be secured where both silage and cottonseed meal are fed with corn and alfalfa than where either one or both are omitted from the ration. In both lot 5, where corn, alfalfa, and silage but no cottonseed meal was fed, and lot 6, where corn and alfalfa but neither silage nor cottonseed meal was fed, greater and cheaper gains were made, but the lack of finish and bloom in these two lots resulted in a selling price per hundred enough lower than in lot 4 where corn, alfalfa, cottonseed meal, and silage was fed to make their profits less.

(4) That it is usually more profitable to add a limited amount of cottonseed meal to a ration of corn, alfalfa, and cane silage, than it is to depend upon these feeds alone.

(5) That it is not the cost price, the selling price, the rate of gain, or the cost of gain that determines the profit or loss in cattle-feeding operations. Each plays an important part and each must be given thoughtful consideration in planning such operations.

Corn, alfalfa hay, and cottonseed meal have definite specific market values. They are of such a nature that they can be sold upon an open market if the producer so desires. Silage does not have a definite specific market value and it can be marketed only on the farm through live stock. This being true, one is justified in crediting to silage the returns cattle pay over and above the market price of marketable feeds consumed. In this particular test the cattle in the

different lots returned a per ton and a per acre income for silage consumed over and above the market value of other feeds consumed as follows:

Lot 1—fed corn, cottonseed meal, cane silage, and no alfalfa hay, paid \$5.10 per ton and \$91.80 per acre for the silage consumed.

Lot 2—fed corn, cottonseed meal, cane silage, and 2 pounds of alfalfa hay per head per day the last 75 of a 195-day feeding period, paid \$10.94 per ton and \$196.42 per acre for the silage consumed.

Lot 3—fed corn, cottonseed meal, cane silage, and 2 pounds of alfalfa hay per head per day for the last 135 of a 195-day feeding period, paid \$15.39 per ton and \$277.02 per acre for the silage consumed.

Lot 4—fed corn, cottonseed meal, cane silage, and 2 pounds of alfalfa hay per head per day for the entire 195-day feeding period, paid \$18.72 per ton and \$336.96 per acre for the silage consumed.

Lot 5—fed corn, cane silage, and an average of 3.26 pounds of alfalfa hay per day for the entire 195-day feeding period, paid \$19.69 per ton and \$354.42 per acre for the silage consumed.

In noting these returns per acre it must also be remembered that each steer consumed only a small portion of an acre yield, varying from one twenty-sixth of an acre in lot 5 to one-nineteenth of an acre in lot 1. This emphasizes the fact that it would require a large number of calves to consume a very large acreage of silage.

The cane from which the silage used in this test was made yielded 18 tons per acre.

These figures show that combining a small quantity of alfalfa with silage adds greatly to the returns one gets for silage when fed to cattle. They also show that silage when fed to cattle is one of the best-paying crops one can grow in Kansas.

MANNER OF FEEDING

The corn allowance of these calves was increased gradually. They were started on 3 pounds per head. At the end of 3 days they were eating 4 pounds per head; at the end of 21 days, 5 pounds; at the end of 35 days, 6 pounds; at the end of 43 days, 7 pounds; and at the end of 60 days, 9 pounds. They were finally gotten up to 14 pounds of corn per day.

The different lots that received cottonseed meal were started on $\frac{1}{2}$ pound per head and gotten up to a full allowance in 21 to 30 days.

The lots that received silage were fed all they would clean up right from the beginning of the test.

When a lot was started on alfalfa it received its full daily allowance with the first feed.

The calves in this experiment were fed grain, cottonseed meal, and silage twice daily; alfalfa hay, twice daily in lots 1, 2, 3, and 4 and once daily in lots 5 and 6. The silage was put in the bunk first, the corn was placed on the silage and the cottonseed meal was sprinkled over the corn. All calves had free access to salt at all times. The average daily gains by 30-day periods are given in Table II.

TABLE II.—Average daily gain by 30-day periods.

| Lot No. | 1 | 2 | 3 | 4 | 5 | 6 |
|---|---|---|--|--|---|----------------------------|
| Ration. | Shelled corn, cane silage, cottonseed meal. | Shelled corn, cane silage, alfalfa hay last 75 days, cottonseed meal. | Shelled corn, cane silage, alfalfa hay last 135 days, cottonseed meal. | Shelled corn, cane silage, alfalfa hay, cottonseed meal. | Shelled corn, cane silage, alfalfa hay. | Shelled corn, alfalfa hay. |
| | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| First 30 days | 2.30 | 2.09 | 2.14 | 2.32 | 2.02 | 1.88 |
| Second 30 days | 2.07 | 2.11 | 1.97 | 2.23 | 2.38 | 2.21 |
| Third 30 days | 1.78 | 1.95 | 2.13 | 2.17 | 1.82 | 2.32 |
| Fourth 30 days | 2.35 | 2.39 | 2.85 | 2.81 | 2.76 | 2.78 |
| Fifth 30 days | 1.98 | 2.20 | 1.99 | 2.07 | 2.49 | 2.19 |
| Sixth 30 days | 2.14 | 2.28 | 2.55 | 2.76 | 2.81 | 3.05 |
| Last 15 days | 1.74 | 2.06 | 1.46 | 1.79 | 2.20 | 3.10 |
| Average for entire period, 195 days | 2.08 | 2.23 | 2.21 | 2.34 | 2.37 | 2.36 |

CATTLE FEEDING INVESTIGATIONS, 1924-'25

The average daily feed consumption by 30-day periods is given in Table III.

TABLE III.—Average daily feed consumption by 30-day periods.

| Lot No..... | 1 | 2 | 3 | 4 | 5 | 6 |
|---|----------------|----------------|----------------|----------------|----------------|----------------|
| First 30 days: | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| Shelled corn..... | 4.20 | 4.11 | 4.20 | 4.20 | 4.19 | 4.17 |
| Cottonseed meal..... | .69 | .68 | .69 | .65 | ..... | ..... |
| Alfalfa hay..... | ..... | ..... | ..... | 2.00 | 2.87 | 5.35 |
| Cane silage..... | 10.47 | 10.24 | 10.47 | 8.57 | 8.21 | ..... |
| Second 30 days: | | | | | | |
| Shelled corn..... | 7.07 | 7.07 | 7.07 | 7.07 | 7.07 | 7.07 |
| Cottonseed meal..... | 1.50 | 1.50 | 1.50 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | ..... | ..... | 2.00 | 3.13 | 6.96 |
| Cane silage..... | 13.73 | 13.27 | 12.97 | 11.27 | 9.67 | ..... |
| Third 30 days: | | | | | | |
| Shelled corn..... | 9.52 | 9.52 | 9.52 | 9.52 | 9.52 | 9.52 |
| Cottonseed meal..... | 1.50 | 1.50 | 1.00 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | ..... | 2.00 | 2.00 | 2.33 | 6.39 |
| Cane silage..... | 10.53 | 10.43 | 6.78 | 8.37 | 7.52 | ..... |
| Fourth 30 days: | | | | | | |
| Shelled corn..... | 11.53 | 11.53 | 11.53 | 11.53 | 11.53 | 11.53 |
| Cottonseed meal..... | 1.50 | 1.50 | 1.00 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | ..... | 2.00 | 2.00 | 3.01 | 4.35 |
| Cane silage..... | 8.45 | 8.35 | 5.40 | 6.98 | 6.15 | ..... |
| Fifth 30 days: | | | | | | |
| Shelled corn..... | 12.75 | 12.75 | 12.75 | 12.75 | 12.75 | 12.75 |
| Cottonseed meal..... | 1.50 | 1.00 | 1.00 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | 2.00 | 2.00 | 2.00 | 3.40 | 5.34 |
| Cane silage..... | 7.40 | 4.55 | 3.97 | 6.82 | 6.25 | ..... |
| Sixth 30 days: | | | | | | |
| Shelled corn..... | 13.16 | 13.16 | 13.16 | 13.16 | 13.16 | 13.16 |
| Cottonseed meal..... | 1.50 | 1.00 | 1.00 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | 2.00 | 2.00 | 2.00 | 3.87 | 7.17 |
| Corn silage..... | 9.02 | 7.23 | 5.25 | 7.63 | 5.97 | ..... |
| Seventh period—15 days: | | | | | | |
| Shelled corn..... | 14.20 | 14.22 | 14.20 | 14.20 | 14.20 | 14.21 |
| Cottonseed meal..... | 1.50 | 1.00 | 1.00 | 1.00 | ..... | ..... |
| Alfalfa hay..... | ..... | 2.00 | 2.00 | 2.00 | 5.10 | 7.73 |
| Cane silage..... | 8.33 | 9.30 | 4.73 | 9.30 | 5.37 | ..... |
| Average for entire period, 195 days: | | | | | | |
| Shelled corn..... | 10.05 | 10.04 | 10.05 | 10.05 | 10.05 | 10.05 |
| Cottonseed meal..... | 1.37 | 1.18 | 1.03 | .95 | ..... | ..... |
| Alfalfa hay..... | ..... | .77 | 1.38 | 2.00 | 3.26 | 6.07 |
| Cane silage..... | 9.81 | 9.03 | 7.26 | 8.35 | 7.15 | ..... |

PART II
COTTONSEED MEAL VERSUS GROUND CORN AS A FATTENING FEED

Cottonseed meal or cake is frequently fed to cattle on grass as a fattening feed. Large amounts are also frequently fed to cattle that are being fattened in a dry lot. This practice is based largely upon the tradition that a pound of cottonseed meal or cake is much more efficient than a pound of corn as a fat producer. The chemical analysis of the two feeds does not justify such an assumption, but to secure more practical data a comparison of these two feeds for fattening purposes was made during the winter of 1924-'25. Light-weight yearling steers were used. One lot was fed cottonseed meal as the concentrated portion of the ration; the other 1 pound of cottonseed meal per head per day and enough ground corn to make the corn and 1 pound of cottonseed meal equal the amount of cottonseed meal in the other lot. In addition each lot was also fed the same amounts of alfalfa hay and silage. The test extended over a period of 140 days.

RESULTS

The results of this experiment are given in detail in Table IV.

TABLE IV.—Results of a 140-day feeding experiment indicating the relative value of cottonseed meal and ground corn as fattening feeds.

| Lot No. | 1 | 2 |
|--|------------------|--------------|
| Basal ration | Cottonseed meal. | Ground corn. |
| Number of days on feed | 140 | 140 |
| Initial weight | 546 lbs. | 552 lbs. |
| Final weight | 880 lbs. | 892 lbs. |
| Total gain | 334 lbs. | 340 lbs. |
| Average daily gain | 2.39 lbs. | 2.43 lbs. |
| Average daily ration: | | |
| Corn | | 10.04 lbs. |
| Cottonseed meal | 11.04 lbs. | 1.00 lbs. |
| Alfalfa hay | 2.01 lbs. | 2.01 lbs. |
| Silage | 20.00 lbs. | 20.00 lbs. |
| Feed required for 100 pounds gain: | | |
| Corn | | 413.47 lbs. |
| Cottonseed meal | 462.81 lbs. | 41.18 lbs. |
| Alfalfa hay | 84.13 lbs. | 82.65 lbs. |
| Silage | 838.32 lbs. | 823.53 lbs. |
| Cost of 100 pounds gain | \$13.14 | \$11.88 |
| Necessary selling price per cwt. at home to break even | 9.95 | 9.48 |
| Appraised value per cwt. at home | 10.00 | 9.75 |

Feed prices: Corn, \$1.12 per bushel; cottonseed meal, \$45 per ton; alfalfa hay, \$15 per ton; silage, \$5 per ton.

OBSERVATIONS

The yearlings receiving ground corn as a basal ration made slightly greater daily gains than the yearlings receiving the cottonseed meal as a basal ration. However, the yearlings receiving cottonseed meal as a basal ration showed a bit more finish, better coats of hair, and more bloom than the yearlings receiving a basal ration of ground corn and outsold them by 25 cents per hundredweight. On the other hand the gains where cottonseed meal was fed as a basal ration cost \$1.26 per hundredweight more than where ground corn was fed. This experiment indicates that when (1) daily gains, (2) cost of gains, and (3) selling price are taken into consideration, ground corn is worth approximately 95 per cent as much pound for pound as cottonseed meal as a fattening feed and in this connection it should be emphasized that ordinarily its cost, is less than 70 per cent of cottonseed meal pound for pound.

It might be well to mention here that other experiments have shown that cottonseed meal is a very satisfactory protein supplement. When no legume hay, such as alfalfa, clover, sweet clover, or cowpea hay is fed, 4 pounds of cottonseed meal per 1,000 pounds of live weight will be needed as a protein supplement. When a legume hay constitutes a part of the roughage, 2½ pounds of cottonseed meal per 1,000 pounds of live weight will suffice, and when a good legume hay constitutes the entire roughage only 1 pound of cottonseed meal per 1,000 pounds of live weight will be needed to supplement the protein.

A word of caution may be offered relative to feeding large amounts of cottonseed meal. More can be fed for a longer period of time with the succulent feeds, grass and silage, than with dry feeds. When large amounts are fed for long periods of time one should watch carefully for signs of nervousness, lameness, and blindness and when symptoms of these disturbances begin to appear cattle should be marketed immediately or the cottonseed meal discontinued. The cattle in this experiment, fed an average of 11.04 pounds of cottonseed meal per head per day for 140 days, seemed to be normal in every respect at the end of the test.

METHOD OF FEEDING

The cattle in lot 1 receiving cottonseed meal as a basal ration were started on 5 pounds of cottonseed meal and those in lot 2 on 4 pounds of corn and 1 pound of cottonseed meal. The cottonseed meal was gradually increased until a maximum daily allowance of 1.5 pounds was fed during the last few days. Whenever the cotton-

seed meal allowance was increased in lot 1, the corn allowance was increased a like amount in lot 2. The same amounts of silage and alfalfa hay were fed each lot each day of the experiment. The average daily gains are given in Table V.

TABLE V.—Average daily gains by 30-day periods.

| Lot No. | 1 | 2 |
|-----------------------------|------------------|----------------|
| Basal ration | Cottonseed meal. | Ground corn. |
| | <i>Pounds.</i> | <i>Pounds.</i> |
| First 30-day period | 1.93 | 2.00 |
| Second 30-day period | 2.73 | 3.20 |
| Third 30-day period | 2.53 | 2.60 |
| Fourth 30-day period | 1.64 | 1.83 |
| Final period—20 days | 3.44 | 2.56 |
| Whole period—140 days | 2.39 | 2.43 |

The average daily feed consumption is given in Table VI.

TABLE VI.—Average daily feed consumption by 30-day periods.

| Lot No. | 1 | 2 |
|---------------------------------|----------------|----------------|
| | <i>Pounds.</i> | <i>Pounds.</i> |
| First 30-day period: | | |
| Ground corn | | 7 08 |
| Cottonseed meal | 8 08 | 1 00 |
| Alfalfa hay | 2 03 | 2 08 |
| Silage | 20 00 | 20 00 |
| Second 30-day period: | | |
| Ground corn | | 9 00 |
| Cottonseed meal | 10 00 | 1 00 |
| Alfalfa hay | 2 00 | 2 00 |
| Silage | 20 00 | 20 00 |
| Third 30-day period: | | |
| Ground corn | | 10 10 |
| Cottonseed meal | 11 10 | 1 00 |
| Alfalfa hay | 2 00 | 2 00 |
| Silage | 20 00 | 20 00 |
| Fourth 30-day period: | | |
| Ground corn | | 11 89 |
| Cottonseed meal | 12 89 | 1 00 |
| Alfalfa hay | 2 00 | 2 00 |
| Silage | 20 00 | 20 00 |
| Fifth period—20 days: | | |
| Ground corn | | 13 18 |
| Cottonseed meal | 14 18 | 1 00 |
| Alfalfa hay | 2 00 | 2 00 |
| Silage | 20 00 | 20 00 |
| Average for entire test: | | |
| Ground corn | | 10 04 |
| Cottonseed meal | 11 04 | 1 00 |
| Alfalfa hay | 2 01 | 2 01 |
| Silage | 20 00 | 20 00 |

PART III

WINTERING YEARLING STEERS PREPARATORY TO GRAZING WITHOUT GRAIN THE FIRST HALF OF THE GRAZING SEASON AND FULL FEEDING THE LAST HALF

In the many sections of the country where grass, good roughage, and grain are available, live-stock men have been seeking a method of handling cattle that would yield a greater return than either winter feeding or summer grazing. The Kansas Agricultural Experiment Station has been working on this problem for some time. It seemed a combination of winter and summer handling was necessary. It was evident that young cattle offered the greatest possibilities for such a method because growth as well as fat could be produced. A growth-producing ration can be made up largely of roughage, but grain must be the basis of a fat-producing ration. These facts indicated the desirability of wintering well; feeding some grain with a liberal roughage ration; grazing without grain during the early part of the grazing season; and full feeding for 90 days during the latter part of the grazing season. As a check on the lots well wintered, one lot should be roughed through the winter.

In the fall of 1924 a bunch of light-weight yearling steers were purchased for the purpose of conducting a test along these lines. There were three phases to this experiment. First, winter feeding from December 6, 1924, to May 5, 1925—150 days. Second, grazing without other feed from May 5, 1925, to August 3, 1925—90 days. Third, full feeding from August 3, 1925, to November 1, 1925—90 days.

FIRST PHASE: Winter Feeding, December 6, 1924, to May 5 1925

The light-weight yearlings used in this experiment were divided into three lots. Lots 1 and 2 were fed a limited grain ration, light feeds of cottonseed meal and alfalfa hay, and a heavy feed of silage. Both lots were fed alike for the purpose of checking the same ration with two lots. Lot 3 was fed no grain, a light feed of cottonseed meal, and a heavy feed of silage. Details of the results secured from the first phase of the test are given in Table VII.

The outstanding features of the first phase of this experiment are: (1) The large gains produced by a heavy feed of silage and a limited feed of corn—an average of 2.3 pounds per head per day.

(2) The fact that whereas the yearlings that were fed a limited grain ration showed a small margin of profit on May 5, when ready to go to grass, the steers that had been well wintered but had received no grain during the winter showed a loss of a bit over \$6 per head on the basis of market values on that date.

TABLE VII.—Winter Feeding, December 6, 1924, to May 5, 1925—150 days.

| Lot No. | 1 | 2 | 3 |
|---|----------------|----------------|----------------|
| Number of steers per lot..... | 10 | 10 | 10 |
| Daily winter ration: | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| Corn..... | 4.83 | 4.83 | |
| Cottonseed meal..... | 1.00 | 1.00 | 1.00 |
| Alfalfa hay..... | 2.00 | 2.00 | |
| Cane silage..... | 33.03 | 33.03 | 33.01 |
| Initial weight, December 6, 1924..... | 536.33 | 539.60 | 540.67 |
| Weight to grass as two-year-olds, May 5, 1925..... | 835.20 | 882.80 | 711.00 |
| Gain per steer during winter—150 days..... | 348.87 | 343.20 | 170.33 |
| Daily gain per steer during winter..... | 2.33 | 2.29 | 1.14 |
| Cost per steer, December 6, 1924, at \$8.00 per cwt..... | \$42.91 | \$43.17 | \$43.25 |
| Feed cost per steer during winter..... | 32.83 | 32.83 | 16.10 |
| Steer cost plus feed cost, May 5, 1925..... | 75.74 | 76.00 | 59.35 |
| Necessary selling price per cwt. to break even..... | 8.56 | 8.61 | 8.35 |
| Appraised value per cwt., May 5, 1925, less \$0.75 per cwt. to cover shrinkage and shipping expenses..... | 8.75 | 8.75 | 7.50 |
| Margin per cwt..... | + .19 | + .14 | — .85 |
| Margin per steer..... | +1.68 | +1.24 | —6.04 |

SECOND PHASE: Grazing Without Other Feed, May 5 to August 3, 1925

The three lots were grazed on bluestem grass pasture without grain from May 5 to August 3, 1925. Details of the results of this phase including a financial statement are given in Table VIII.

The gains the steers made on grass during this period were in direct proportion to the amount of flesh they carried when they went to grass. Lot 3, which was well wintered without grain and therefore much thinner in flesh, made a much greater gain than lots 1 and 2, fed some grain during the winter.

At the end of this period lots 1 and 2 had increased their margin of profit to an average of nearly \$4 per head and lot 3 had reduced its loss from \$6 per head at the beginning of this phase of the experiment to \$1.06 per head at the end of it.

CATTLE FEEDING INVESTIGATIONS, 1924-'25

TABLE VIII.—Grazing without grain, May 5 to August 3, 1925—90 days.

| Lot No. | 1 | 2 | 3 |
|--|----------------|----------------|----------------|
| | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| Weight to grass as two-year-olds May 5, 1925. | 885.20 | 882.80 | 711.00 |
| Weight August 3, 1925. | 944.80 | 953.40 | 884.40 |
| Gain per steer May 5 to August 3—90 days. | 59.60 | 70.60 | 173.40 |
| Daily gain per steer May 5 to August 3. | .66 | .78 | 1.93 |
| Steer cost plus feed cost to August 3, 1925 (a). | \$83.74 | \$84.00 | \$67.35 |
| Necessary selling price per cwt. to break even. | 8.86 | 8.81 | 7.62 |
| Appraised value per cwt. less \$0.75 per cwt. | 9.25 | 9.25 | 7.50 |
| Margin per cwt. | + .39 | + .44 | — .12 |
| Margin per steer. | 3.68 | 4.19 | —1.06 |

(a) Grass for whole season, \$8.00, included.

THIRD PHASE: Full Feeding, August 3 to November 1, 1925

Since some feeders are of the opinion that it is better to feed in a dry lot than on grass, lot 1 was placed in a dry lot on August 3 and put on a full feed of corn, alfalfa hay, and 1 pound of cottonseed meal per head per day. Lots 2 and 3 were continued on bluestem pasture and put on a full feed of corn and 1 pound of cottonseed meal per head per day. Details of this phase and a financial summary of the entire experiment are given in Table IX.

TABLE IX.—Full feeding, August 3 to November 1, 1925—90 days.

| Lot No. | 1 | 2 | 3 |
|---|----------------|----------------|----------------|
| Where fed. | Dry lot. | Pasture. | Pasture. |
| | <i>Pounds.</i> | <i>Pounds.</i> | <i>Pounds.</i> |
| Ration fed: | | | |
| Corn. | 17.55 | 17.00 | 17.55 |
| Cottonseed meal. | 1.00 | 1.00 | 1.00 |
| Alfalfa hay. | 4.70 | | |
| | | Pasture | Pasture |
| Weight, August 3, 1925. | 944.80 | 953.40 | 884.40 |
| Weight, November 1, 1925. | 1,200.00 | 1,152.00 | 1,096.00 |
| Gain, August 3 to November 1, 1925—90 days. | 235.20 | 198.60 | 211.60 |
| Daily gain, August 3 to November 1, 1925—90 days. | 2.84 | 2.21 | 2.35 |
| Cost per head to grass, May 5, 1925. | \$75.74 | \$76.00 | \$59.35 |
| Feed cost August 3 to November 1, 1925—90 days, including grass for season. | 43.69 | 37.66 | 38.53 |
| Total cost at home, November 1, 1925. | 119.43 | 113.66 | 97.88 |
| Necessary selling price to break even. | 9.95 | 9.87 | 8.93 |
| Appraised value per cwt. less \$0.75 per cwt. to cover shrinkage and shipping expenses, November 1, 1925. | 10.75 | 10.25 | 9.75 |
| Margin per cwt. | .80 | .38 | .82 |
| Margin per steer. | 9.60 | 4.39 | 8.99 |

Particular attention is directed to the fact that the margin of profit of \$9.60 per head for lot 1 includes a charge of \$8 per head for pasture which the steers in this lot did not use after August 3. If the grass could have been utilized by other cattle the remainder of the year or for winter grazing one would have been justified in charging only \$4 for pasture in the case of lot 1. This would have left a margin of profit of \$13.60 per head for this lot.

One of the most important facts in connection with this test is not the fact that all the lots made money but rather that they paid \$5 a ton or \$90 an acre for silage; \$15 a ton or \$60 an acre for alfalfa; the market price for corn; and the going price for grass.