

UTILIZATION OF GRASS IN FATTENING YOUNG CATTLE FOR MARKET

by

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B. S., University of Missouri, 1929

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A THESIS

submitted in partial fulfillment of the

requirements for the degree of

MASTER OF SCIENCE

KANSAS STATE AGRICULTURAL COLLEGE

1930

## TABLE OF CONTENTS

	Page
INTRODUCTION	3
METHODS AND MATERIALS	5
HISTORICAL	7
GENERAL OBSERVATIONS ON THREE YEAR AVERAGE	21
OBSERVATIONS BY PHASES FOR THREE YEAR AVERAGE	22
Wintering Phase	22
Grazing Phase	23
Full Feeding Phase	24
CONCLUSIONS	24
ACKNOWLEDGMENT	25
REFERENCES	26

## INTRODUCTION

Grass has been the natural feed for cattle from very early times to the present day. In ancient Babylonia graziers received large herds of cattle from several owners and pastured them together for several months on the west slopes of the Euphrates, a practice similar to the one used by our present day Kansas pasture owners.

The life of the early Hebrew patriarchs as described in the Book of Genesis was distinctly pastoral. When Abraham left Ur of Chaldea and migrated westward into the country now called Palestine, he was a herdsman and cattleman.

Western England was the cradle of most of our modern breeds of cattle. This was due largely to an abundance of luxuriant grasses. Our own western plains are one of the world's greatest cattle producing regions because of the grass found there.

Every year many calves are dropped on the range, grown, and finally fattened without having had a mouthful of grain. These cattle are usually marketed as two and three-year-olds, and while not as fat as corn-fed cattle many are purchased by the packers for slaughter purposes.

Because of the change that has taken place in our mode of living there is no longer a good demand for large cuts of beef from big two, three, or four year old cattle. Consumers have also learned to distinguish the quality of grain-fed and grass-fed beef. Consequently, the packer demand for large, grass-fattened cattle, and all other large cattle as well, has materially fallen off. As a result cattlemen grazing and marketing big steers are meeting a discriminating and indifferent market. Many of these men have been losing money and are now looking about for new methods of cattle production whereby they can utilize their grass and at the same time produce a product for which there is a good demand.

Agricultural experiment stations have become interested and some have conducted experiments in an effort to determine some means of utilizing grass in the production of young cattle for market.

Foremost in this work have been the studies made by the Kansas Agricultural Experiment Station. This is only natural because the vast bluestem area of this state is one of the valuable resources of Kansas and it is to her advantage that this be utilized economically and efficiently.

## METHODS AND MATERIALS

In many sections of Kansas grass is plentiful, roughage in the form of silage is cheap, and grain is comparatively high in price, particularly compared to prices prevailing in the corn belt. This being true one of the problems confronting cattle feeders of these sections is the production of well finished cattle with the use of a maximum of roughage and a minimum of grain.<sup>1</sup>

Previous tests conducted at the Kansas Agricultural Experiment Station have shown that wintering calves on a light feed of corn in addition to silage, alfalfa hay, and cottonseed meal, grazing without other feed from May 1 to July 31, and then full feeding in a dry lot for 100 days, is a satisfactory method of producing well finished young cattle in most sections of Kansas.

The question of the necessity of feeding any grain during the winter period arose. To help answer this a test was started December 19, 1926 in which one lot of calves was wintered on cane silage, alfalfa hay, one

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1. Kansas Agricultural Experiment Station Circular 151, pages 10-11.

pound of cottonseed meal per head per day, and another lot on silage, alfalfa hay, one pound of cottonseed meal per head per day, and a light feed of corn. Both lots were grazed together in one of the college bluestem grass pastures from May 1 to July 31. On August 1 the cattle were again placed in their respective dry lots and started on a full feed of ground shelled corn, cottonseed meal, and alfalfa hay. During the years from 1926 to 1929 this experiment was repeated, and it is these results and their averages that will be discussed in this thesis.

The cattle used in the experiments were high grade Hereford calves weighing approximately 350 pounds and averaging from six to seven months of age when the experiments were started. They were purchased in each case from the Matador Land and Cattle Company, Matador, Texas. They usually arrived in Manhattan around a month before the experiment was started and thus were made thoroughly accustomed to conditions existing here. Near the middle of December the calves were divided into lots of ten head each. They were selected in a manner to insure as nearly as possible, uniformity in size, weight, quality, and general conformation between lots. The

calves were weighed individually for three consecutive days at the beginning and at the end of the experiment, and an average of these three days weights was taken as the initial and final weights respectively. At the end of each thirty days individual weights were taken of each of the calves.

Each steer had a neck strap with a brass numbered tag to serve as a means of identification.

During the 135-day winter feeding period the calves were fed in a shed open on the south.

Before going into this Kansas work in detail, it would be well to review the work that has been done at other stations in which grasses have been a part of the ration for producing fat market cattle.

Owing to the fact that very little work has been done with young cattle in the utilization of grass for the production of slaughter animals, much of the following review is related to this work only from the standpoint that grass played an important part in the system.

#### HISTORICAL

During the years 1914, 1915, and 1916, experiments were conducted at the Kentucky Agricultural Experiment



Station<sup>1</sup> in which two-year-old steers and yearlings were wintered fairly well and then finished on grass without grain the following summer. The real object of this experiment was to determine the effect of corn silage which had been fed during the winter, on the following summer gains on grass. It will be reviewed in connection with this work however, as it presents a method of utilizing grass in the feeding of cattle.

In Kentucky the custom has been to feed steers a sufficient amount of corn and roughage during the winter to make substantial gains and then finish the steers on grass alone the following summer.

Following the introduction of the silo there was some controversy as to the effect of feeding of silage in the winter ration on the gains made on grass the following summer. Some thought that the winter feeding of silage caused smaller grass gains.

The cattle used in these experiments during the first two years were two-year-old grade Shorthorn, Hereford, and Angus steers grading good. Those used the third year were the same except that they were yearlings.

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1. Kentucky Agricultural Experiment Station Bulletin 267.



Rations fed while the steers were in the dry lot consisted of various combinations of cottonseed meal, corn stover, silage, cottonseed hulls, clover hay, and oats straw.

The results of this experiment indicated that two-year-old steers could be wintered fairly well and then finished on grass alone for satisfactory packer trade. However, this was not possible in the case of the yearlings. This can be accounted for by considering the stage of growth that these cattle were in. The older cattle had more nearly completed their growth and consequently could use all of the food nutrients, outside of those needed for maintenance, for the production of fat.

A similar experiment, although more general in nature, has been conducted in the bluegrass section of West Virginia near Morgantown.<sup>1</sup>

Most of the cattle from this section are marketed either as feeders or as grass-fat cattle. It is a common practice to winter steers on such feeds as hay, corn stover, wheat straw, and corn silage to a less extent, in such a manner that they lose materially in weight. They are then pastured the following summer and then sold from

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1. West Virginia Agricultural Experiment Station Bulletin 186.

the grass either as stockers, feeders, or finished steers. There were some feeders who held the idea that it was profitable to permit this loss in weight which with older steers usually varied from 35 to 100 pounds; others looked upon the practice as unprofitable.

An experiment was started in 1918 the objects of which were: (1) To learn the effect of wintering rations upon subsequent pasture gains. (2) To determine the most satisfactory and economical method of wintering. (3) To determine the best method and the cost of raising baby beef in West Virginia.

Trials were conducted over a period of three years with calves and for four years with yearlings. They were grade Shorthorn, Hereford, and Angus weighing at the start of the experiment 385 and 675 pounds respectively.

In the case of the calves the most satisfactory winter ration, from the standpoint of the least cost per pound of yearly gains, was one composed of corn silage 12.3 pounds, and clover hay 4.9 pounds per head per day. The average daily gain for the entire period was .79 pounds. This ration was compared with two others of which one was composed of corn silage 12.3 pounds, rye hay 3.9 pounds, cottonseed meal .6 pounds, and the other mixed hay

(clover and timothy) 9.2 pounds, and a grain mixture of 2.61 pounds per head per day.

The yearlings making the greatest gains at the smallest cost received a ration composed of corn silage 23.1 pounds, wheat straw 4.9 pounds, and cottonseed meal 1 pound.

During the summer period the cattle in the lots that did the poorest during the winter gained the largest number of pounds while on the grass. However, they did not catch up with those that had made the largest gains during the winter.

These results showed that from an economical standpoint it paid to put some gain on calves or yearlings during the winter feeding period.

In the summer of 1923 an experiment was conducted at the University of Illinois<sup>1</sup> on the subject of summer rations for fattening cattle, and among other things to compare the pasture and dry lot methods of fattening steers.

The steers which were purchased on the Omaha market April 30, 1923 were three-year-olds of mixed Hereford and Shorthorn breeding. They weighed approximately 1,000

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1. Illinois Agricultural Experiment Station Bulletin 328.

pounds May 12 when they were started on feed. A ration consisting of shelled corn on bluegrass pasture was compared with a ration which consisted of shelled corn and alfalfa hay fed in a dry lot. The feeding period continued for 140 days or until September 29.

The steers on grass consumed an average daily feed of 19.9 pounds of corn during the 140 days, and made an average daily gain of 2 pounds per head per day.

The steers in the dry lot consumed 19.7 pounds of corn plus 8.7 pounds of alfalfa hay and made an average daily gain of 2.12 pounds per head per day.

The conclusions drawn from these results were that pasture used by steers receiving a full feed of grain should be regarded, in the main, as a substitute for the roughage that would be required were the cattle fed in the dry lot. Also that it should not be counted on to replace any corn, as approximately 10 per cent more grain was required to produce 100 pounds of gain by the cattle on pasture than by those in the dry lot.

Some work was conducted at the University of Missouri from 1925 to 1929 that compares in many respects with the work conducted at Kansas that this thesis is to treat. As this work has not been put into bulletin form, the conclusions presented were taken from mimeographed sheets, consequently accurate references cannot be given.

This work was conducted under the general title, "Fattening Beef Calves," and the main problem under consideration was to work out a satisfactory method of handling calves for the production of fat yearlings.

The general lot arrangement for each of the three tests was as follows:

Lot 1 - steer calves full fed in the dry lot for 168 days.

Lot 2 - steer calves fed one-half as much grain as lot 1, and roughage (corn silage and legume hay) ad.lib. until spring; pasture without grain for sixty days; full fed on grass until fat.

Lot 3 - steer calves fed one-half as much grain as lot 1 and roughage ad. lib. until spring; full fed on grass until fat.

Lot 4 - steer calves fed roughage ad. lib. until spring; put on grass sixty days without grain; full fed on grass until fat.

Lot 5 - steer calves fed roughage until spring; full fed on grass until fat.

The cattle used were high grade Hereford calves purchased in Texas from the Matador and S.M.S. ranches.



The feeds used were: mixed corn grade No. 3; pea size cottonseed meal (40% protein); legume hay (red clover or alfalfa) medium quality; corn silage, from corn that would make from 45 to 50 bushels per acre.

During the winter the calves were fed in the University Experimental Feeding Shed which opens to the south. In the summer they were carried on a rolling bluegrass pasture.

The following conclusions were drawn from the results of these experiments.

Gains in all lots of calves included more or less growth and this fact widened the period over which a market could be selected.

The calves wintered on legume hay and corn silage were in excellent shape for grazing and feeding purposes. As a result they made larger gains when turned on grass than did the grain-fed calves. They also made larger gains when put on full feed on grass.

Good quality Hereford calves wintered on one-half a grain ration plus roughage, made small gains in weight when grazed without grain during the early summer. Unless they are to be fed at least 60 days after grazing, the practice is of doubtful value and its use depends upon existing conditions.

Calves wintered on roughage only, grazed for 60 days without grain, then full fed 112 days were fat enough for slaughter but not advantageously. They made a maximum use of roughage and pasture with a minimum grain consumption. Thirty to 60 days more full feeding is required to make them sell to the best advantage.

In 1923 an experiment was conducted at the Kansas Agricultural Experiment Station<sup>1</sup> which was more or less the beginning of the work with which this thesis is to treat.

A group of calves were purchased for the purpose, among others, of comparing results that could be secured from half feeding through the winter followed by full feeding on grass, with half feeding through the winter, grazing without additional grain from May 1 to August 1 and then full feeding on grass from August 1 to November 1.

The winter period began December 7, 1923 and continued until May 5, 1924, a period of 150 days.

Good quality Hereford calves were used which weighed approximately 450 pounds at the start of the experiment. At the end of the winter period, although the two lots had

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1. Kansas Agricultural Experiment Station Bulletin 117.



been fed exactly alike, the animals in lot 1 averaged 780 pounds and those in lot 2 averaged 766 pounds.

The 780 pound calves were immediately put on full feed on grass, while the 766 pound calves were grazed from May 5 to August 1 and then put on full feed. By November the cattle that had been fed on pasture continuously since May 5, weighed 1,117 pounds and their total cost at this time was \$122.19 per head or \$11.23 per hundred pounds.

The cattle that had been permitted to graze until August 1 averaged 1,073 pounds and their total cost was \$96.36 or \$9.28 per hundred pounds.

As there was not enough difference in the finish of the two lots to cause the buyers to purchase them separately, they all sold for \$11.25 per hundred. This left a profit of \$.22 per steer for those that had been full fed the entire period on grass, and \$21.10 for those that had been grazed for a period without grain.

This test demonstrated the possibility of using calves to utilize roughage and grass and produce high class, well finished beef which the market now demands.

Table I. Wintering well; grazing without grain to July 31;  
and full feeding in a dry lot for 100 days.

Phase I - Wintering - December 16, 1926 to April 30, 1927 - 135 days		
Lot number	: 1	: 2
Number of steers in lot	: 10	: 10
Daily winter ration per steer:	: Pounds	: Pounds
Ground corn	: 4.66	: . . . .
Cottonseed meal	: 1.00	: 1.00
Alfalfa hay	: 2.00	: 2.00
Cane silage	: 18.81	: 25.51
Initial weight per steer December 16, 1926	: 330.80	: 327.60
Weight to grass as yearlings May 1, 1927	: 612.67	: 537.00
Gain per steer during winter - 135 days	: 281.87	: 209.40
Daily gain per steer during winter	: 2.09	: 1.55
Initial cost per steer December 16, 1926 at \$10 per cwt.	: \$ 33.08	: \$ 32.76
Feed cost per steer during winter	: 19.39	: 13.00
Feed cost plus steer cost May 1, 1927	: 52.47	: 45.76
Necessary selling price to break even when steers went to grass	: 8.56	: 8.52
Appraised value per cwt. May 1, 1927 less 75¢ per cwt. to cover shrinkage, shipping expenses, etc.	: 8.75	: 9.25
Margin per cwt.	: .19	: .73
Margin per steer	: 1.16	: 3.92

Phase II - Grazing - May 1 to July 31, 1927 - 90 days		
	: Pounds	: Pounds
Weight to grass as yearlings May 1	: 612.67	: 537.00
Weight July 31	: 689.00	: 650.50
Gain per steer on grass - 90 days	: 76.33	: 113.50
Daily gain per steer on grass	: .85	: 1.26
Steer cost plus pasture at \$8 per head for entire season	: \$ 60.47	: \$ 53.76
Necessary selling price per cwt. to break even July 31, 1927	: 8.78	: 8.26

Phase III - Full feeding - July 31 to November 8, 1927 - 100 days		
Daily ration per steer:	: Pounds	: Pounds
Ground corn	: 14.05	: 14.94
Cottonseed meal	: 1.00	: 1.00
Alfalfa hay	: 5.49	: 5.87
Weight per steer July 31	: 689.00	: 650.50
Weight per steer November 8	: 942.00	: 932.00
Gain per steer July 31 to November 8, 1927	: 253.00	: 281.50
Daily gain per steer July 31 to November 8, 1927	: 2.53	: 2.82
Feed cost July 31 to November 8, 1927 - 100 days	: \$ 29.93	: \$ 31.62
Total cost at home December 16, 1927 to November 8, 1927	: 90.40	: 85.38
Necessary selling price to break even November 8, 1927	: 9.60	: 9.16
Selling price per cwt. less 75¢ per cwt. to cover shrinkage and shipping expenses November 8, 1927	: 15.25	: 15.25
Margin per cwt.	: 5.65	: 6.09
Margin per steer	: 53.22	: 56.76
Dressing per cent	: 61.30%	: 59.70%

FEED PRICES: Phase I - Corn 77 cents a bushel; cottonseed meal \$35 a ton; alfalfa hay \$15 a ton; cane silage \$5 a ton. Phase III - Corn first 60 days \$1.05 a bushel; corn last 40 days 92 cents a bushel; cottonseed meal \$45 a ton; alfalfa hay \$10 a ton.

Table II. Wintering well; grazing without grain to approximately August 1; and full feeding in a dry lot for 100 days.

Phase I - Wintering - December 16, 1927 to May 1, 1928 - 137 days		
Lot number	: 1	: 2
Steer calves per lot	: 10	: 10
Daily winter ration:	: Pounds	: Pounds
Shelled corn	: 5.00	: ....
Cottonseed meal	: 1.00	: 1.00
Cane silage	: 18.75	: 24.30
Alfalfa hay	: 2.01	: 2.01
Initial weight per steer December 16, 1927	: 345.67	: 344.67
Weight to grass as yearlings May 1, 1928	: 630.50	: 537.00
Gain per steer during winter - 137 days	: 284.83	: 192.33
Daily gain per steer during winter	: 2.08	: 1.40
Initial cost per steer December 16, 1927 at \$11 per cwt.	: \$ 38.02	: \$ 37.91
Feed cost per steer during winter	: 22.20	: 13.82
Feed cost plus steer cost May 1, 1928	: 60.22	: 51.73
Necessary selling price to break even when steers went to grass	: 9.55	: 9.63
Appraised value per cwt. May 1, 1928 less 75¢ per cwt. to cover shrinkage, shipping expenses, etc.	: 12.00	: 12.50
Margin per cwt.	: 2.45	: 2.87
Margin per steer	: 15.45	: 15.41

Phase II - Grazing without grain May 1, 1928 to July 30, 1928 - 90 days		
	: Pounds	: Pounds
Weight to grass as yearlings May 1, 1928	: 630.50	: 537.00
Weight July 30, 1928	: 711.00	: 656.00
Gain per steer on grass - 90 days	: 80.50	: 119.00
Daily gain per steer on grass	: .89	: 1.32
Steer cost plus pasture at \$8 per head for entire season	: \$ 68.22	: \$ 59.73
Necessary selling price per cwt. to break even	: 9.59	: 9.11
July 30, 1928		

Phase III-Dry lot full feeding July 30, 1928 to Nov. 6, 1928 - 100 da.

Average daily ration:	: Pounds	: Pounds
Ground corn	: 15.14	: 15.03
Cottonseed meal	: 1.00	: 1.00
Alfalfa hay	: 7.15	: 7.17
Weight per steer July 30, 1928	: 711.00	: 656.00
Weight per steer November 6, 1928	: 997.00	: 931.67
Gain per steer July 30, 1928 to November 6, 1928	: 286.00	: 275.67
Daily gain per steer July 30, 1928 to Nov. 6, 1928	: 2.86	: 2.76
Feed cost July 30, 1928 to Nov. 6, 1928 - 100 days	: \$ 34.86	: \$ 34.68
Total cost at home Dec. 16, 1927 to Nov. 6, 1928	: 103.08	: 94.41
Necessary selling price to break even November 6, 1928	: 10.34	: 10.13
Selling price per cwt. less 75¢ per cwt. to cover shrinkage and shipping expenses, November 6, 1928	: 15.50	: 15.00
Margin per cwt.	: 5.16	: 4.87
Margin per steer	: 51.47	: 45.34
Dressing percentage	: 60.58%	: 60.56%

FEED PRICES: Phase I - Shelled corn 84 cents per bushel; cottonseed meal \$50 per ton; alfalfa hay \$15 per ton; cane silage \$5 per ton.  
Phase III - Ground corn 98 cents per bushel; cottonseed meal \$60 per ton; alfalfa hay \$15 per ton.



Table III. Wintering well; grazing without grain to approximately August 1; and full feeding in a dry lot for 100 days.

Phase I - Wintering - December 17, 1928 to May 1, 1929 - 135 days			
Lot number	:	1	: 2 : 3
Age of steers	:	Calves	: Calves: Calves: Calves
Number of steers per lot	:	9	: 10 : 10
Daily winter ration:	:	Pounds	: Pounds: Pounds: Pounds
Shelled corn	:	4.00	: . . . : 2.38
Cottonseed meal	:	.92	: .92: . . .
Cane silage	:	17.65	: 22.32: . . .
Alfalfa hay	:	1.99	: 1.99: 10.98
Initial weight per steer December 17, 1928	:	372.22	: 373.67: 373.50
Weight to grass as yearlings, May 1, 1929	:	578.33	: 520.00: 535.50
Gain per steer during winter	:	206.11	: 146.33: 162.00
Daily gain per steer during winter	:	1.53	: 1.08: 1.20
Cost per hundred pounds gain	:	\$ 9.03	: \$ 8.63: \$ 9.63
Cost per steer into experiment at \$13	:	48.39	: 48.58: 48.56
Feed cost per steer during winter	:	18.61	: 12.63: 15.60
Steer cost plus feed cost	:	67.00	: 61.21: 64.16
Necessary selling price per cwt. to break even	:	:	: : :
when put on pasture	:	11.59	: 11.77: 11.98
Appraised value per cwt. May 1, 1929 less 75¢	:	:	: : :
for shrinkage, shipping, etc.	:	12.75	: 13.75: 13.25
Margin per cwt.	:	1.16	: 1.98: 1.27
Margin per steer	:	6.74	: 10.29: 6.79

Phase II-Grazing without grain May 1, 1929 to July 30, 1929 - 90 days			
Weight to grass as yearlings, May 1, 1929	:	578.33	: 520.00: 535.50
Weight July 30, 1929	:	715.50	: 658.00: 690.00
Gain per steer on grass - 90 days	:	137.23	: 138.00: 155.10
Daily gain per steer on grass	:	1.52	: 1.53: 1.72
Steer cost plus pasture at \$8 per head for entire season	:	\$75.00	: \$69.21: \$72.16
Necessary selling price per cwt. to break even	:	:	: : :
July 30, 1929	:	10.48	: 10.52: 10.45

Phase III-Dry lot full feeding July 30, 1929 to Nov. 7, 1929-100 days			
Average daily ration:	:Pounds:	Pounds:	Pounds
Ground corn	: 14.26:	14.02:	14.21
Cottonseed meal	: 1.05:	.99:	.99
Alfalfa hay	: 5.59:	5.62:	5.72
Weight per steer July 30, 1929	:715.56:	658.00:	690.60
Weight per steer November 7, 1929	:944.44:	888.17:	920.17
Gain per steer July 30, 1929 to Nov. 7, 1929	:228.88:	230.17:	229.57
Daily gain per steer July 30, 1929 to November 7, 1929	: 2.29:	2.30:	2.30
Feed cost July 30, 1929 to November 7, 1929 - 100 days	:\$31.75:	\$31.23:	\$31.61
Total cost at home December 17, 1928 - November 7, 1929	:106.75:	100.44:	103.77
Necessary selling price to break even November 7, 1929	: 11.30:	11.31:	11.28
Selling price per cwt. less 75¢ to cover shrinkage and shipping expenses, Nov. 7, 1929	: 14.00:	13.50:	13.75
Margin per hundred	: 2.70:	2.19:	2.47
Margin per steer	: 25.47:	19.46:	22.75

FEED PRICES: Phase I - corn 77 cents per bushel; cottonseed meal \$50 per ton; cane silage \$5 per ton; alfalfa hay \$15 per ton. Phase III-ground corn 98 cents per bushel; cottonseed meal \$50 per ton; alfalfa hay \$15 per ton.



Table IV. Wintering steer calves with and without grain; grazing without grain to approximately August 1; and full feeding in a dry lot for 100 days.

(Three Year Average 1927-1928-1929)

Phase I - Wintering - December 16 to April 30 - 136 days		
Lot number	: 1	: 2
Age of steers	: Calves	: Calves
Number of steers per lot	: 10	: 10
Daily winter ration:	: Pounds	: Pounds
Shelled corn	: 4.55	: . . . .
Cottonseed meal	: .97	: .97
Cane silage	: 18.40	: 24.04
Alfalfa hay	: 2.00	: 2.00
Initial weight per steer December 16	: 349.56	: 348.65
Weight per steer April 30	: 607.17	: 531.33
Gain per steer during winter (136 days)	: 257.61	: 182.68
Daily gain per steer during winter (136 days)	: 1.89	: 1.34
Initial cost per steer Dec. 16 at \$11.33 per cwt.	: \$ 39.61	: \$ 39.50
Feed cost per steer during winter (136 days)	: 20.06	: 13.15
Feed cost plus steer cost April 30	: 59.67	: 52.65
Necessary selling price per cwt. at home to break even April 30	: 9.83	: 9.91
Appraised value per cwt. April 30, Kansas City basis less 75¢ per cwt. to cover shrinkage and shipping expenses	: 11.17	: 11.83
Margin per cwt.	: 1.34	: 1.92
Margin per steer	: 8.14	: 10.20

Phase II - Grazing without grain May 1 to July 29 - 90 days		
Weight to grass as yearlings May 1	: 607.17	: 531.33
Weight off grass July 29	: 705.19	: 654.67
Gain per steer on grass - 90 days	: 98.02	: 123.34
Daily gain per steer on grass (90 days)	: 1.09	: 1.37
Steer cost including pasture at \$8 per head (entire season)	: \$ 67.67	: \$ 60.65
Necessary selling price per cwt. at home to break even July 29	: 9.59	: 9.26

Phase III - Dry lot full feeding July 30 to November 6 - 100 days

Average daily ration:	: Pounds	: Pounds
Ground corn	: 14.48	: 14.66
Cottonseed meal	: 1.01	: 1.00
Alfalfa hay	: 6.08	: 6.22
Weight per steer July 30	: 705.19	: 654.67
Weight per steer November 6	: 961.15	: 917.28
Gain per steer July 30 to November 6 (100 days)	: 255.96	: 262.61
Daily gain per steer July 30 to Nov. 6 (100 days)	: 2.56	: 2.63
Feed cost July 30 to November 6 (100 days)	: \$ 32.18	: \$ 32.51
Steer cost plus feed cost December 16 to November 6 (326 days)	: 99.85	: 93.16
Necessary selling price per cwt. at home to break even November 6	: 10.39	: 10.16
Appraised value per cwt. November 6, Kansas City basis less 75¢ per cwt. to cover shrinkage and shipping expenses	: 14.92	: 14.58
Margin per cwt.	: 4.53	: 4.42
Total gain per steer December 16 to November 6 (326 days)	: 611.59	: 568.63
Total corn consumed per steer - (326 days)	: 36.9 bu.	: 26.2 bu.
Margin per steer	: \$ 43.54	: \$ 40.54

FEED PRICES: Phase I - Corn \$.7933 per bushel; cottonseed meal \$45 per ton; cane silage \$5 per ton; alfalfa hay \$15 per ton. Phase III - Corn \$.9833 per bushel; cottonseed meal \$51.67 per ton; alfalfa hay \$13.33 per ton.

## GENERAL OBSERVATIONS ON THREE YEAR AVERAGE

1. The calves that were fed a light feed of corn during the winter period gained an average total of 611.59 pounds per head during the 326 days of the test, and consumed an average of 36.9 bushels of corn per head. They made 16.6 pounds of gain for each bushel of corn consumed.

2. The calves that received no corn during the winter gained an average total of 568.63 pounds per head during the 326 days of the test, and consumed an average of 26.2 bushels of corn per head. They made 21.7 pounds of gain for each bushel of corn consumed.

3. The calves that made only 16.6 pounds of gain per bushel of corn consumed, returned a greater margin in the end than the calves that made 21.7 pounds of gain per bushel of corn consumed. This emphasizes the fact that the cheapest gains do not necessarily produce the greatest profit.

4. This three-year test indicates that on the average it is more profitable to feed a limited amount of grain during the winter to calves that are to be grazed on bluestem grass until August 1 and then full fed in a dry lot for 100 days than it is to feed no grain. This is due

to the fact that the market is usually sufficiently discriminating to pay enough more for the fatter cattle to more than pay for the corn consumed during the winter period.

5. This method demands the use of well bred calves possessing good type and quality. Plain bred calves, lacking in type or quality will not usually prove satisfactory.

#### OBSERVATIONS BY PHASES FOR THREE YEAR AVERAGE

##### Wintering Phase

1. The calves in lot 1 that were fed some corn, made a gain of 75.85 pounds per head more than calves in lot 2 that received no corn. In other words, at the end of the wintering phase there was 75 pounds difference in the average weights of the two lots of calves in favor of those receiving the limited corn ration.

2. At the end of this phase the calves that had been fed corn were apparently too fat to sell to the best advantage as stockers, as they were appraised at 50 cents under the appraised value per hundredweight of the calves that had received no corn.

3. Had both lots of calves been sold at the end of this phase of the test, lot 2 that received no corn, would have returned \$2.06 more margin per head than the calves in lot 1 that were fed corn.

4. The gain of 1.34 pounds per head per day for 136 days made by the calves in lot 2 that received 1 pound of cottonseed meal, 2 pounds of alfalfa hay and an average of 24.04 pounds of cane silage per head per day, emphasizes the value of this combination of feeds as a winter ration for stock calves.

5. Attention should be directed to the fact that the calves in both lots had cost approximately \$1.50 per hundredweight less in the spring than they cost in the fall, besides furnishing a market at good prices for a large amount of rough feed.

#### Grazing Phase

1. The lighter yearlings (by this phase all the calves were yearlings), in lot 2 that had been fed no grain, made greater gains while on grass than did the heavier corn-fed steers. This is in keeping with the results of previous tests and it indicates that the gains cattle make on grass are determined in the main by the

amount of fat that they carry when they go to grass rather than by the nature of the feed consumed the previous winter.

2. At the end of the grazing period there was only 50 pounds difference in the average individual weights in favor of the corn-fed calves.

### Full Feeding Phase

1. The yearlings fed no grain during the previous winter not only made more gain during the grazing phase but also during the full feeding phase.

2. At the end of the wintering phase the calves in lot 1 which had been fed some grain, weighed 75 pounds more per head than those in lot 2, which had been fed no grain; at the end of the grazing phase 50 pounds more per head; and at the end of the full feeding period only 43 pounds more per head.

### CONCLUSIONS

This three-phase method of handling cattle offers an opportunity to dispose of them advantageously at three different times - as fleshy feeders at the end of the wintering season, as fleshy feeders off grass any time after August 1, and as well finished light cattle any time after November 1.



By practicing the three-phase method of beef production, a product that has a good market demand can be produced with a minimum amount of grain and a maximum amount of roughage. Furthermore, this method of beef production can economically and conveniently be applied to Kansas conditions.

As a whole the beef producing section of Kansas has an abundance of roughages and a relative small amount of grain feeds. The three-phase system offers a means of marketing these feeds advantageously.

Another advantage of producing beef in this manner is to the farmer feeder. During the summer season when his farm work demands all of his time, the cattle are out on the grass and consequently require very little attention at the time when the farmer's time is most valuable.

#### ACKNOWLEDGMENT

The author is deeply indebted to his major instructor Dr. C. W. McCampbell, for his advice and able assistance in the preparation of this thesis, to Prof. B. M. Anderson for his helpful instruction in carrying out this feeding test, and to Prof. M. A. Alexander for his assistance in keeping the records.



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