

UTILIZING GRASS IN PATTENING
YEARLING HEIFERS FOR MARKET

by

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INTRODUCTION

Nature has richly provided man with many natural resources, and among those of greatest importance are the vast areas of native grasses. From the beginning of civilization to the present time the native grasses and their cultivated relatives have been largely responsible for the development of agriculture.

A satisfactory livestock industry is dependent upon the grasses as all of the most useful farm animals are grass feeders - consuming either pasture, hay, or grain produced by the grass family.

Too often the native grasses have been under-valued as to their economic and social benefits to mankind. They are the cheapest source of feed, the preservers of soil fertility, and a first line defense against soil erosion. Various attempts have been made to replace the grasses with other crops, but the results in most cases have proved unsatisfactory.

The majority of our modern breeds of beef cattle originated in Western England. One of the chief reasons was an abundance of luxuriant grasses. The western plains of the United States are one of the world's largest cattle

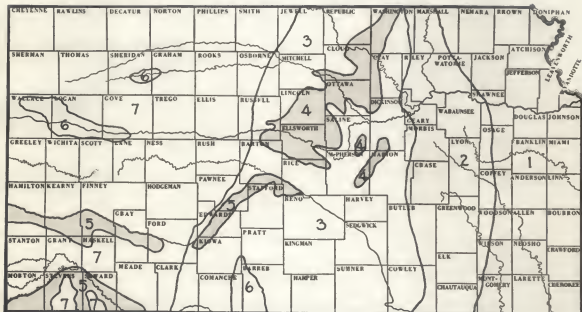
producing regions because of the vast areas of grass found there.

Within recent years Argentina has made rapid progress in beef cattle production and this expansion can be attributed largely to the vast areas of range grass and favorable climatic conditions for the production of alfalfa pasture.

The total land area of the United States is approximately 1,903,216,000 acres. The area devoted to pasture amounts to 1,056,000,000 acres of 55 per cent of the total land area. In the arid and semi-arid region of our own western plains, there are approximately 587,000,000 acres of range pasture (7).

In some areas grass is more abundant and of greater value than in others. There are about 5,000,000 acres of land in the central and southern portions of the eastern half of Kansas, commonly called the Bluestem area, which produce a luxuriant growth of Bluestem grass noted for its fattening qualities.

Thin aged steers from Texas were formerly grazed in large numbers in the Bluestem area of Kansas. These older steers, if thin at the start of the growing season, often made 300 to 400 pounds gain. They were marketed in the



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| <input type="checkbox"/> 3. MIXED BLUESTEM AND SHORT GRASSES | <input type="checkbox"/> 7. SHORT GRASSES (BUFFALO AND GRAMA GRASSES) |
| <input type="checkbox"/> 4. DAKOTA SANDSTONE (BLUESTEM GRASSES) | |

AREAS IN WHICH NATIVE GRASSES ARE FOUND IN KANSAS

Fig. 1

fall without having had any grain

This method of fattening three-year-old and older steers on grass alone was an important phase of the beef cattle industry in Kansas for many years. Changing economic conditions brought about two situations that created an interest in the possibility of utilizing grass in fattening younger cattle, particularly yearlings. These two situations were: (a) A constantly decreasing supply of three-year-old and older steers; and (b) A constantly increasing demand for lighter carcasses.

Several agricultural experiment stations have studied this problem from various angles. The first attempt of the Kansas Station to help solve this problem consisted of full feeding yearling steers on Bluestem grass (McCampbell, Anderson, and Marston, 2). These steers were roughed through the previous winter and full fed during the entire grazing season. This method produced well-finished, lightweight cattle but at a rather high cost.

The next year two lots of steer calves were wintered well, receiving approximately five pounds of grain per head daily. One lot was then full fed 180 days on Bluestem grass and the other grazed 90 days without grain and

then full fed 90 days on Bluestem grass. The second group proved to be decidedly more profitable than the first.

The results of this test attracted considerable attention, but cattle feeders generally preferred older cattle, so yearling steers were used in the next test which had for its purpose a comparison of wintering well, grazing, then full feeding in a dry lot with wintering well, grazing, then full feeding on Bluestem grass (McC Campbell, Anderson, and Marston, 3). The yearling steers full fed in a dry lot proved to be more profitable.

The next step was a comparison of yearling steers and steer calves (McC Campbell, Anderson, and Marston, 4). One lot of each was wintered well, grazed, and full fed in a dry lot, and one lot of each was wintered well, grazed, and full fed on Bluestem grass. In each instance the group full fed in a dry lot after being grazed 90 days proved to be more profitable, and the calves more profitable than the yearlings.

By this time cattle feeders in Kansas were becoming more reconciled to calves and it was decided to use steer calves in future studies of this problem. It was also decided that no attempt would be made to draw conclusions

from results secured until at least three tests had been made of a particular phase of the problem.

The work up to this point prompted many questions which had not been answered. Four that persisted as this work progressed and until an answer was found were;

(a) How well should calves be wintered that are to be fed in accordance with this general plan?

(b) Might it not be better to full feed 100 days on Bluestem grass rather than in a dry lot after grazing the first half of the pasture season?

(c) Might it not be possible to full feed 60 days on Bluestem grass and 40 days in a dry lot after grazing the first half of the pasture season?

(d) Might it not be better to discontinue the winter allowance of grain gradually or not at all rather than to discontinue it abruptly when the cattle go to grass?

These questions have been answered rather conclusively by experiments conducted at the Kansas Station. The answer may be summarized as follows; When one starts with steer calves, they should be wintered well, producing from 200 to 250 pounds of gain, then grazed 90 days without feed other than grass; and then full fed 100

days in a dry lot.

Another very important question remained unanswered and that question was - What modifications, if any, would be necessary if one started with heifer instead of steer calves? A series of tests were started by the Kansas Station in the fall of 1937-38 for the purpose of finding an answer to this question (McC Campbell and Weber, 5).

Four lots of good quality calves were used in this test, one of steers and three of heifers. The one lot of steers and two lots of heifers were wintered well, receiving approximately 5 pounds of corn, 1 pound of cottonseed meal, and one-tenth of a pound of ground limestone per head daily and all the Atlas Sorgo silage they would eat. One lot of heifers was fed no grain but otherwise wintered the same as the other three lots.

At the end of the wintering phase the two lots of heifers that had been fed grain were too fat to turn on grass without other feed so it became necessary to change the program that previously had been found to be satisfactory for steers. It was decided to full feed one group of these heifers in a dry lot until they reached a satisfactory market finish, which proved to be 50 days, and to full feed the second group the same length of time

on Bluestem pasture.

The heifers that were wintered well and then full fed 50 days on grass showed a loss of \$1.55 per head, while those wintered well and then full fed 50 days in a dry lot showed a profit of \$5.69 per head. The steers wintered well, grazed 90 days, and then full fed 100 days in a dry lot made a profit of \$25.25 per head. The heifers fed no grain during the winter, grazed 90 days and full fed 100 days in a dry lot made a profit of \$23.72 per head.

These results would seem to indicate that the most profitable method of utilizing Bluestem grass in fattening yearling heifers for market would be to feed all the good silage they will eat during the winter, plus 1 pound daily of a suitable protein supplemental feed; graze 90 days, and full feed 100 days in a dry lot.

However, conclusions should not be drawn on the basis of one test, particularly in the case of methods as involved as these. This being true, it was decided that no definite conclusions could be drawn until these methods had been tried at least twice and then only if relatively the same results were secured in each lot. The second of these tests was conducted by the author and is used as the basis of this thesis.

STUDIES AT OTHER STATIONS

A survey of the literature shows that very little study has been given the problem of utilizing grass in fattening yearling heifers for market. In fact, only three states have reported any investigations in this field and their efforts along this line have been quite limited.

The Illinois Agricultural Experiment Station has conducted a number of experiments over a period of years on the relative value of various kinds of pasture for fattening yearling cattle, (Rush and Snapp 6). In most of these experiments the cattle were fed grain from the time they were turned on grass until they were marketed in the fall. Steers were used in the majority of tests.

In the summer of 1934 an experiment was conducted at the Illinois Station on the relative value of pasture mixtures for fattening yearling heifers. Instead of feeding grain during the entire grazing period of 147 days, no grain was fed for the first 56 days.

Four lots of choice yearling Hereford heifers were purchased in Texas the latter part of April. Their average initial weight into the experiment on May 4 was 438 pounds.

The more important results of this experiment are summarized in Table 1. Before definite conclusions should be drawn, further tests should be conducted. However, this test does indicate certain possibilities for utilizing alfalfa, brome grass, and bluegrass in fattening yearling heifers for market.

Table 1. Pasture mixtures for fattening yearling heifers - May 4 to September 20, 1934 - 147 days (From Rush and Snapp, 6).

1. Lot number	: 1	: 2	: 3	: 4
2. Kind of pasture	: Alfalfa	: Brome and Blue-Grass	: Alfalfa and Blue-grass	: Blue-grass
3. Date turned on grass	: May 4	: May 4	: May 4	: May 11
4. Average initial weight	: Pounds 437	: Pounds 438	: Pounds 438	: Pounds 445
5. Final weight - Sept. 28	: 678	: 723	: 714	: 694
6. Total gain	: 241	: 285	: 276	: 249
7. Average daily gain -				
First 56 days - pasture	: 1.70	: 2.48	: 1.82	: 1.95
Last 91 days - pasture and grain	: 1.60	: 1.61	: 1.91	: 1.69
Entire 147 days	: 1.64	: 1.94	: 1.88	: 1.78
8. Average daily grain ration (last 91 days)				
Shelled corn	: 8.60	: 9.00	: 8.50	: 8.50
Cottonseed meal	: .80	: .90	: .80	: .80
9. Feed cost per cwt. gain	: \$5.43	: \$4.74	: \$4.46	: \$5.81
10. Selling price per cwt. - Chicago	: \$6.05	: \$6.25	: \$6.25	: \$6.15
11. Return per head over initial cost plus feed cost	: -\$2.28	: \$1.06	: \$1.77	: -\$2.57
12. Dressing percentage (less 2 per cent)	: 58.40	: 58.40	: 57.30	: 57.70

During the years 1929, 1931, and 1932 experiments were conducted at the Nebraska North Platte Experiment Substation in an effort to determine the value, if any, of full feeding yearling heifers on alfalfa pasture as compared with the usual practice of feeding shelled corn and alfalfa hay in a dry lot (Baker, 1).

Two lots of high-grade, yearling Hereford heifers were purchased in Lincoln County, Nebraska each year about May 15. In each of three trials the heifers had been wintered on carbonaceous roughages without supplemental feed and were quite thin when brought to the Experiment Station. For the three years the heifers averaged approximately 375, 390, and 450 pounds respectively when started on test.

Each year the heifers were first brought to a full feed of shelled corn and alfalfa hay before being started on official trials. Lot 1 was full fed shelled corn on alfalfa pasture for an average of 116 days and finished in a dry lot on shelled corn and alfalfa for an average of 24 days, and Lot 2 was full fed shelled corn and alfalfa hay in a dry lot for the entire period of 136 days.

The heifers fed grain on alfalfa pasture consumed an average of 14.85 pounds of corn per day for the three trials and made an average daily gain of 2.64 pounds per head.

The heifers fed in the dry lot consumed an average of 15.42 pounds of corn and 6.29 pounds of alfalfa hay, and made an average daily gain of 2.60 pounds per head.

The heifers were sold by lots each year at the same price, and there was only a slight difference in finish or quality shown by either lot.

The results of this experiment indicated that fattening yearlings heifers on alfalfa pasture and shelled corn was a satisfactory and practical method of beef production under the conditions of this experiment.

In 1937, the West Virginia Agricultural Experiment Stations conducted an experiment in which steer calves and heifer calves were wintered well and then finished on grass supplemented with grain the following summer. The real object of this experiment was to obtain a reasonably

Private correspondence with C. V. Wilson, University of West Virginia.

high degree of finish on young cattle by utilizing a maximum of pasture and a minimum of grain.

This method of utilizing grass in fattening young cattle for market is somewhat similar to the work conducted at Kansas which constitutes the basis of this thesis.

Two lots of good quality calves were used, one of steers and one of heifers. The steers averaged 490 pounds and the heifers 414 pounds per head at the beginning of the experiment.

During the wintering phase which extended from December 3, 1937 to April 22, 1938, a period of 140 days, both lots were fed the same daily ration. This ration consisted of 2.8 pounds shelled corn, .5 pounds cottonseed meal, 13.8 pounds corn silage, and 3.2 pounds alfalfa hay per head per day. The average daily gains for the steers were 1.17 pounds, and for the heifers 1.26 pounds per head.

The grazing period extended from April 22 to August 12, a period of 112 days. The summer ration consisted of bluegrass and white clover pasture plus 5.8 pounds shelled corn per head per day. The average daily gains for the steers were 1.99 pounds and for the heifers 1.67 pounds per head.

In 1938, this experiment was repeated in a very similar manner with the exception that approximately 25 per cent more grain was fed during the winter phase. Complete data based upon this test has not been published but the author received a summary of results in letter form.

The results seem to indicate that this method of utilizing grass to obtain maximum gains is more desirable for heifers than for steers. The weight and finish of the heifers, both alive and in the carcass, proved to be almost ideal from the packer's standpoint. The steers did not carry enough finish to make their carcasses as desirable as the carcasses of the heifers.

*Private correspondence with C. V. Wilson, University of West Virginia.

EXPERIMENTAL DATA

Plan of the Experiment

The plan of procedure as approved for conducting this second test follows:

Four lots of 12 calves each were to be used; one lot of steers and three lots of heifers. The one lot of steers and two lots of heifers were to be fed identically the same ration during the winter. This ration was to consist of 4 pounds shelled corn, 1 pound cottonseed meal, and one-tenth of a pound of ground limestone per head daily and Atlas Sorgo silage ad. lib. One lot of heifers was to be fed no grain but otherwise wintered the same as the other three lots. The wintering phase of this test was to extend over a period of 142 days, beginning December 15, 1938, and ending May 6, 1939. The calves were to be fed twice daily in sheds open on the south and were to be allowed free access to salt and water at all times.

The calves were to be handled in the following manner during the grazing and full feeding phases.

Lot 1. Steer calves grazed on Bluestem grass without grain from May 6 to July 29, a

period of 84 days; then full fed in a dry lot from July 29 to November 6, a period of 100 days, on ground shelled corn, cottonseed meal, alfalfa, and prairie hay.

Lot 2. Heifer calves full fed in a dry lot on ground shelled corn, cottonseed meal, Atlas Sorgo silage, and ground limestone from May 6 to June 26, a period of 50 days.

Lot 3. Heifer calves to be full fed on Blue-stem pasture on shelled corn and cottonseed cake from May 6 to June 26, a period of 50 days.

Lot 4. Heifer calves grazed without grain from May 6, to July 29, a period of 84 days; then full fed in a dry lot from July 29 to November 6, a period of 100 days, on ground shelled corn, cottonseed meal, alfalfa, and prairie hay.

At the beginning and end of each phase of the test, weights were to be taken on three consecutive days and an average of these weights used as the official initial and

and final weights. Weights were also to be taken every 28 days except during the grazing phase.

At the end of each phase of the test the cattle were to be appraised by a representative of the John Clay Commission Company, Kansas City, Missouri. These appraised values were to be used in computing the value and margin above calf cost plus feed cost at the end of the test. Seventy-five cents per cwt. was to be deducted from the appraised value to cover shrinkage, shipping, and selling expense.

Description of the Cattle

The cattle used in this test were high-grade Hereford steer and heifer calves which graded from good to choice. They were purchased from the Matador Land and Cattle Company of Denver, Colorado, but were raised in the Panhandle of Texas. These calves arrived at the Station approximately one month before the experiment was started and were allowed to become acclimated to conditions existing here. During the early part of December the calves were divided into four lots of twelve head each. The selections were made upon the basis of uniformity in size, weight, quality, and general conformation to make the lots

as nearly uniform as possible. The initial weight of the cattle used in this test averaged approximately 440 pounds per head.

Results of the Experiment

In the previous test and in this second test the heifers in Lots 2 and 3 were too fat at the end of the wintering period to turn on pasture without feed other than grass so Lot 2 was full fed 50 days in a dry lot and Lot 3, 50 days on pasture. Lot 2 utilized no grass and Lot 3 did not produce satisfactory returns. Therefore, neither lot lent itself to a solution of the problem under consideration. However, the results secured from these two lots will be discussed first for whatever interest they may hold; then Lots 1 and 4 which did offer a solution to the problem will be presented as the major portion of this discussion.

The results secured from Lots 2 and 3 are given in detail in Table 2.

Table 2. Records of wintering well; then full feeding 50 days in a dry lot, versus 50 days on pasture.

Phase 1. Wintering - December 15, 1938 to May 6, 1939			
Lot number	:	2	3
Age of cattle used	:	Calves	Calves
Sex of calves	:	Heifers	Heifers
Calves per lot	:	12	12
Daily ration per calf	:	Pounds	Pounds
Shelled corn	:	4.84	4.84
Cottonseed meal	:	1.00	1.00
Cane silage	:	27.30	27.30
Ground limestone	:	.09	.09
Initial weight per calf	:	440.97	439.86
Weight per calf at end of wintering phase	:	678.33	676.67
Gain per calf - wintering phase	:	237.36	236.81
Daily gain per calf - wintering phase	:	1.67	1.67
Cost of 100 pounds gain - wintering phase	:	\$ 6.51	\$ 6.52
Initial cost per calf @ \$8.00 per cwt.	:	\$35.28	\$35.19
Feed cost per calf - wintering phase	:	\$15.44	\$15.44
Calf cost plus feed cost to May 6	:	\$50.72	\$50.63
Necessary selling price per cwt. at home at end of wintering phase to cover calf cost plus feed cost	:	\$ 7.48	\$ 7.48
Appraised value per cwt. Kansas City basis, less \$0.75 per cwt. to cover shrinkage, shipping, and selling expenses	:	\$ 8.00	\$ 8.00
Margin per cwt. over calf cost plus feed cost - May 6	:	\$ 0.52	\$ 0.52
Margin per calf over calf cost plus feed cost to May 6	:	\$ 3.53	\$ 3.53
Corn consumed per calf during wintering phase	:	12.28 bu.	12.28 bu.

Table 2 (cont.)

Phase 2. Full feeding - May 6 to June 26, 1939			
Where full fed	Dry Lot	Pasture	
Daily ration	Pounds	Pounds	
Ground shelled corn	13.46	*None	
Cottonseed meal	1.01	"	
Cane silage	13.56	"	
Ground limestone	.10	"	
Bluestem pasture	----	Ad. 1lb.	
Maximum daily corn consumption per heifer	16.00	None	
Weight per heifer at beginning of full feeding phase	678.33	676.67	
Weight per heifer at end of full feeding phase	770.20	728.75	
Gain per heifer - full feeding phase	91.90	52.08	
Daily gain per heifer - full feeding phase	1.84	1.04	
Cost of 100 pounds gain - full feeding phase	\$ 9.30	\$ 9.23	
Feed cost per calf - full feeding phase	\$ 8.56	\$ 4.00	
Heifer cost plus feed cost - end full feeding phase	\$59.28	\$54.63	
Necessary selling price per cwt. at home at end of full feeding phase to cover initial cost per head plus feed cost	\$ 7.70	\$ 7.49	
Value per cwt. at home at end of full feeding phase (appraised price per cwt. Kansas City basis less \$0.75 per cwt. to cover shrinkage, shipping, and selling expenses).	\$ 8.50	\$ 8.00	
Margin per cwt. over initial cost per head plus feed cost	\$ 0.80	\$ 0.51	
Margin per heifer over initial cost per head plus feed cost	\$ 6.16	\$ 3.72	
Total gain per heifer for both phases	Pounds 329.26	Pounds 288.89	
Corn fed per heifer during the wintering phase	12.28 bu.	12.28 bu.	
Corn fed per heifer during the full feeding phase	12.02 bu.	-----	
Corn fed per heifer both phases	24.30 bu.	12.28 bu.	

*Grain offered but none eaten by Lot 3 heifers while on pasture.

Discussion of the Experiment

During the winter phase the daily feed consumption of Lots 2 and 3 was 4.84 pounds shelled corn; 1 pound of cottonseed meal; 27.30 pounds silage, and .09 pounds of ground limestone per head.

Each lot made an average daily gain of 1.67 pounds per head for 142 days. The feed cost during this period amounted to \$15.44 per head for the two lots.

In this test, as in the previous one, the heifers fed grain during the winter seemed to be too fat to turn on pasture at the end of the wintering phase without feed other than grass. Lot 2 was full fed 50 days in a dry lot and made an average total gain of 91.90 pounds per heifer, an average daily gain of 1.84 pounds. Lot 3 was turned on pasture and grain was kept before them but they refused to eat any during the entire 50 days, probably because of the abundance and succulence of the grass at this particular stage of growth. The average total gain per heifer for this lot was 52.08 pounds, an average daily gain of 1.04 pounds.

The heifers full fed 50 days in a dry lot made 33 per cent more gain during the full feeding period than

the heifers on pasture that refused to eat grain. The cost of gains was practically the same for each group.

The appraised value per cwt. of the heifers in Lot 2, less \$0.75 per cwt. to cover shrinkage, shipping, and selling expenses, was \$8.50 per cwt., while in Lot 3 it was \$8.00 per cwt.

The heifers in Lot 2 dressed 59 per cent and graded good to choice, while those in Lot 3 dressed 57.6 per cent and graded medium to good. There was a distinct difference in the degree of finish of the two lots. The carcasses from Lot 2 carried more fat on the outside of the carcass, more fat on the inside of the ribs, and showed considerably more bloom, while those from Lot 3 were somewhat rangy and lacking in uniformity.

The heifers full fed 50 days in a dry lot made a margin over initial cost plus feed cost of \$6.16 per heifer. The heifers on pasture that refused to eat grain made a margin over initial cost plus feed cost of \$3.72 per heifer.

The results secured from Lots 1 and 4 - steers fed grain during the winter and heifers fed no grain during the winter, grazed 90 days, then full fed 100 days in a dry lot are given in detail in Table 3.

Table 3. Records of wintering without grain; then grazing 84 days; then full feeding 100 days.

Phase 1. Wintering - Dec. 15, 1938 to May 6, 1939 - 142 days.		
Lot number	1	4
Age of cattle used	Calves	Calves
Sex of calves	Steers	Heifers
Calves per lot	10	10
Daily ration per calf	Pounds	Pounds
Shelled corn	4.84	None
Cottonseed meal	1.00	1.00
Cane silage	27.30	35.64
Ground limestone	.09	.09
Initial weight per calf	435.70	448.70
Weight per calf at end of wintering phase	703.70	621.00
Gain per calf - wintering phase	268.00	172.30
Daily gain per calf - wintering phase	1.89	1.21
Cost of 100 pounds gain - wintering phase	\$ 5.76	\$ 5.73
Initial cost per calf -		
Steers @ \$9 per cwt.	\$39.29	
Heifers @ \$8 per cwt.		\$35.90
Feed cost per calf - wintering phase	\$15.44	\$ 9.85
Calf cost plus feed cost to May 6	\$54.65	\$45.75
Necessary selling price per cwt. at home at end of wintering phase to cover calf cost plus feed cost	\$ 7.77	\$ 7.37
Appraised value per cwt. Kansas City basis less \$0.75 per 100 pounds to cover shrinkage, shipping, and selling expenses	\$ 9.00	\$ 7.75
Margin per cwt. over calf cost plus feed cost to May 6	\$ 1.23	\$ 0.38
Margin per calf over calf cost plus feed cost to May 6	\$ 8.66	\$ 2.36
Corn consumed per calf during wintering phase	12.28 bu.:	None

Table 3 (cont.)

Phase 2. Grazing - May 6 to July 29, 1939 - 84 days.

Amount of grain consumed per head during grazing phase - 84 days	:	:
	None	None
Weight per head to grass on May 6	:	:
	Pounds 703.70	Pounds 621.00
Weight per head at end of grazing phase - July 29	:	:
	787.50	712.50
Gain per head during grazing phase - May 6 to July 29	:	:
	83.80	91.50
Daily gain per head during grazing phase May 6 to July 29	:	:
	1.00	1.09
Initial cost per head plus feed cost to July 29 including full season's grazing cost	:	:
	\$58.65	\$49.75
Necessary selling price per cwt. at home at end of grazing phase (July 29): to cover cost per head plus feed cost	:	:
	\$ 7.45	\$ 6.98

Phase 3. Full feeding - July 29 to Nov. 6, 1939 - 100 days.

Where full fed	:	:
	Dry Lot	Dry Lot
Average daily ration per head	:	:
Ground shelled corn	Pounds 14.03	Pounds 11.41
Cottonseed meal	1.00	1.00
Prairie hay	5.01	5.25
Alfalfa hay	2.02	2.04
Maximum daily ground shelled corn consumption per head	:	:
	17.50	14.17
Weight per head at beginning of full feeding phase - July 29	:	:
	787.50	712.50
Weight per head at end of full feeding phase - November 6	:	:
	1008.20	912.70
Gain per head - full feeding phase - 100 days	:	:
	220.70	200.20
Daily gain per head - full feeding phase - 100 days	:	:
	2.20	2.00
Cost per 100 pounds gain - full feeding phase	:	:
	\$ 8.09	\$ 7.56

Table 3 (cont.) Phase 3 - Full feeding.

Feed cost per head - full feeding phase	\$17.85	\$15.13
Initial cost per head plus feed cost at end of full feeding phase - November 6	\$76.50	\$64.88
Necessary selling price per cwt. at home at end of full feeding phase (Nov. 6) to cover initial cost plus feed cost per head	\$ 7.59	\$ 7.11
Value per cwt. at home at end of full feeding phase (appraised price per cwt. Kansas City basis less \$0.75 per cwt. to cover shrinkage, shipping, and selling expenses	\$10.00	\$ 9.75
Margin per cwt. over initial cost per head plus feed cost	\$ 2.41	\$ 2.64
Margin per head over initial cost per head plus feed cost	\$24.30	\$24.10
Total gain all three phases	572.50 lbs.	464.00 lbs.
Corn consumed per head - wintering phase	12.28 bu.	None
Corn consumed per head - grazing phase	None	None
Corn consumed per head - full feeding phase	25.32 bu.	20.37 bu.
Corn consumed per head - all three phases	37.06 bu.	20.37 bu.

Table 4. Feed prices.

Feed	Wintering Phase	Grazing and full feeding
Corn	\$ 0.60 bu.	\$ 0.56 bu.
Cottonseed meal	30.00 ton	30.00 ton
Silage	3.00 ton	3.00 ton
Alfalfa hay	----	9.00 ton
Prairie hay	----	5.00 ton
Ground limestone	20.00 ton	20.00 ton
Bluestem pasture	----	4.00 per head

The steer calves in Lot 1 that were fed 4.84 pounds of shelled corn during the winter made an average daily gain of 1.89 pounds per head for the 142 days. The heifer calves that were fed no shelled corn made an average daily gain of 1.21 pounds per head for 142 days. The steer calves gained 95.7 pounds per head more than the heifer calves, but the heifer calves carried about as much finish as the steer calves at the end of the wintering phase of this test. The gains made by both lots during this phase are considered satisfactory. The wintering cost for the steers which received 12.28 bushels of corn was \$15.44 per head and for the heifers that received no corn \$9.85 per head. The attractive feature of the wintering phase is the fact that the heifers consumed a large amount of comparatively cheap roughage and no grain, but carried about as much finish as the steers that were fed grain in addition to roughage.

At the end of the wintering phase on May 6, both lots were turned on Bluestem grass and grazed without grain until July 29, a period of 84 days. The steers in Lot 1 made an average gain of 83.80 pounds per head, or an average daily gain of 1 pound per head. The heifers in Lot 4 made an average gain of 91.50 pounds per head, or

an average daily gain of 1.09 pounds per head.

These two lots did not make heavy gains on grass which result was to be expected since it is a well-known fact that gains on grass are dependent upon the amount of finish that cattle are carrying at the beginning of the grazing season. The thinner cattle gain faster on grass but require a longer feeding period to reach a desirable market finish.

During the full feeding phase of 100 days, the daily feed consumption of the heifers was somewhat less than that of the steers. The feed cost of the heifers was \$2.72 per head less than the feed cost of the steers.

The daily gain of the steers was slightly greater than that of the heifers. The steers made approximately 20 pounds more gain per head during the full feeding phase than the heifers.

At the end of the full feeding phase the average weight per steer was 1008.20 pounds. The average weight per heifer in Lot 4 was 912.70 pounds.

The appraised value at the close of the test, less \$0.75 per cwt. to cover shipping, shrinkage, and selling expenses was \$10.00 per cwt. for the steers, and \$9.75 per cwt. for the heifers.

The price necessary to break even at the end of the test was \$1.41 per cwt. less than the original cost per cwt. for the steers, and \$0.89 less for the heifers.

Explanation of Plate I

Fig. 2. Steer from Lot 1 making highest gain - all three phases.

Fig. 3. Heifer from Lot 4 making highest gain - all three phases.



Fig. 2



Fig. 3

Explanation of Plate II

Fig. 4. The steers of Lot 1 at end of full feeding phase.

Fig. 5. The heifers of Lot 4 at end of full feeding phase.



Fig. 4



Fig. 5

Explanation of Plate III

- Fig. 6. Lot 1. Steers in dry lot at end
of full feeding phase November 6.
- Fig. 7. Lot 4. Heifers in dry lot at end
of full feeding phase November 6.



Fig. 6



Fig. 7

Marketing Data

In this test, as in the previous one, the appraised value was used as a basis for working out the financial aspects of the test instead of the actual prices received at the central market. The appraised values and market prices were quite uniform. The steers in Lot I were appraised at \$10.75 per cwt. and sold on the market at \$10.60. The heifers in Lot 4 were appraised at \$10.50 and sold on the market for \$10.35 per cwt.

The steers dressed 60.4 per cent and the heifers 61.6 per cent. The heifer carcasses showed more finish on the average than did the steer carcasses. The heifers as a whole carried more covering over the round, on the inside of the ribs, and along the chine bone. (Figs. 8 and 9).

The steer carcasses were fuller in the round and smoother in conformation. The steers could have carried more finish to a good advantage, while very little more finish would have been detrimental to the carcass value of the heifers. (Figs. 6 and 7).

These two lots of cattle were graded both on foot and on the rail. The grades and an explanation of grade designation are given in detail in Table 5.

Table 5. Live weight grades and carcass grades.

Ear tag number	: foot*	: U.S. Grade	: Packer	: Williams	: Mackintosh
Carcass Grades**					
Lot 4 - Heifers					
487	: 14 - TG	: LC	: TG	: LC	: TG
494	: 16 - G	: G	: G	: TG	: G
495	: 12 - LC	: LC	: TG	: LC	: LC
491	: 16 - G	: LG	: G	: G	: LG
486	: 16 - G	: G	: G	: LC	: LG
488	: 16 - G	: TG	: TG	: TG	: TG
492	: 16 - G	: LG	: LG	: G	: LG
496	: 14 - TG	: TG	: G	: G	: LC
489	: 16 - TG	: TG	: TG	: G	: TG
490	: 14 - TG	: TG	: TG	: LC	: LC
	: :	: :	: :	: :	: :
Average	: 14.8 TG	: 15.4 G	: 15.2 G	: 14 TG	: 14.8 TG
Lot 1 - Steers					
476	: 12 - LC	: G	: G	: LG	: TG
482	: 14 - TG	: TG	: TG	: TG	: TG
483	: 12 - LC	: G	: TG	: G	: TG
484	: 16 - G	: G	: G	: TG	: G
479	: 16 - G	: G	: G	: TG	: LG
485	: 14 - TG	: TG	: TG	: TG	: LC
477	: 16 - G	: TG	: TG	: LC	: G
481	: 12 - LC	: TG	: TG	: TG	: TG
478	: 14 - TG	: G	: G	: G	: G
480	: 14 - TG	: TG	: TG	: G	: TG
	: :	: :	: :	: :	: :
Average	: 14 - TG	: 15 G	: 14.8 TG	: 15.4 G	: 14.8 TG

* 2-6, Prime; 8-12, Choice; 14-18, Good; 20-24, Medium, etc.

**P= Prime; G = Choice; G = Good; M = Medium; TG = Top Good;
and LC = Low Choice.

Explanation of Plate IV

Fig. 8. Heifer carcass showing outside and inside finish. Note the degree of finish as compared to steer carcasses in Fig. 9.



Fig. 8

Explanation of Plate V

**Fig. 9. Steer carcass showing outside
and inside finish. Compare
with Fig. 8.**



Fig. 9

Explanation of Plate VI

- Fig. 10.** Heifer carcasses showing conformation and finish. Compare with steer group in Fig. 11.



Explanation of Plate VII

Fig. 11. Steer carcasses showing conformation and finish.



SUMMARY AND CONCLUSIONS

The heifers that were wintered well and then turned on Bluestem grass 50 days (with grain offered and none eaten) made a profit of \$3.72 per head.

The heifers that were wintered well and then full fed in a dry lot made a profit of \$6.16 per head.

The steers that were wintered well, grazed 90 days, and then full fed 100 days in a dry lot made a profit of \$24.30 per head.

The heifers that were fed no grain during the winter, grazed 90 days and full fed 100 days in a dry lot made a profit of \$24.10 per head.

These results indicate that feeding good quality heifer calves all the good silage they will eat during the winter plus one pound of cottonseed meal or similar protein supplemental feed per head daily, plus one-tenth of a pound of finely ground limestone per head daily; then grazing the first half of the grazing season; then full feeding 100 days in a dry lot is a highly satisfactory way to utilize grass in fattening yearling heifers for market.

The major conclusions just stated may be supplemented with the following statements:

(1) It is not necessary to feed grain to good quality heifer calves during the wintering period if they are to be grazed the first half of the pasture season and then full fed.

(2) Wintering good quality 400 pound heifer calves in such a manner that they will gain 175 to 200 pounds, grazing them 90 days, and full feeding 100 days in a dry lot is the best method indicated in this test for utilizing grass in fattening yearling heifers for market.

(3) Heifer calves wintered with grain and full fed 50 days in a dry lot are more profitable than those wintered with grain and full fed 50 days on pasture. Neither method is as satisfactory as wintering without grain; grazing 90 days, and then full feeding in a dry lot.

(4) It requires a shorter feeding period for yearling heifers to reach a desirable market finish than for yearling steers.

(5) Wintering good quality heifer calves well but without the use of grain, then grazing the first half of the grazing season, then full feeding 100 days in a dry

lot has at least three distinct advantages.

- (a) It produces handy weight, well-finished, good quality cattle for which there exists a strong demand.
- (b) It produces a maximum of gain from a minimum of grain.
- (c) It utilizes large quantities of roughages including Bluestem grass.
- (d) It utilizes Bluestem grass when it is at its best.

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