

PROFIT FACTORS IN MARKETING AND MANAGEMENT
OF KANSAS DEFERRED FED STEERS
AND HEIFERS

by

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B. S., Kansas State University, 1937

A THESIS

submitted in partial fulfillment of the

requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY
OF AGRICULTURE AND APPLIED SCIENCE

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INTRODUCTION

This thesis is an analysis of profit factors in the marketing and management of Kansas deferred fed steers and heifers. The purpose is to determine the effect of various marketing and management practices on cattlemen's returns above costs. Comments and questions from Kansas stockmen have indicated a high level of interest in the best and latest information available on field results from these practices. Some of the common questions have involved the most desirable months to market, the most desirable weight calves to buy, the optimum amount of gain to be secured in the program, what month to buy, whether to graze heifers before finishing, and whether steers or heifers are best under various circumstances. Information contained in this thesis was obtained from records secured from Kansas stockmen by Kansas county agricultural agents. They had been summarized by Extension Livestock Specialists, Lot Taylor, Wendell Moyer and V. E. McAdams. They are assembled by years into special reports, which are available to the public through the various county extension offices in Kansas, or through the Distribution Center, Umberger Hall, Kansas State University, Manhattan, Kansas.

PROCEDURE

The records were already available; therefore, they were checked for completeness. All which were complete enough for use were analyzed.

REVIEW OF THE LITERATURE

Wintering, Grazing and Fattening Heifers¹

This experiment was designed to study the effect of different management systems on the grazing and fattening performance of beef heifers.

Heifers were wintered on dry bluestem pasture plus 1.31 pounds cottonseed cake, and compared with heifers wintered in dry lot on Atlas sorgo silage and given 1 pound cottonseed cake and 2 pounds ground milo per head per day. The heifers wintered on pasture had lower total gains, dressing percentages, carcass grade, and selling prices. They were wintered at lower cost, however, and made higher gross gains in the summer. They returned as much money above feed costs as did the heifers wintered in dry lot.

The third year's experiment ended in 1954. A brief three year summary follows:

Wintering, Grazing and Fattening Heifers
Three-year Summary²

Management	Wintered on dry bluestem pasture	Wintered in dry lot
No. heifers per lot per year	10	10
Initial weight, average	428#	428#
Winter gain, average	85#	200#
Gross gain, average	151#	67#

¹F. H. Baker, et. al., "Wintering, Grazing, and Fattening Heifers," Kansas Agricultural Experiment Station, Circular 320, May 7, 1955, pp. 59-61.

²Ibid., Table 58, p. 61.

Three-year Summary (continued)

Management	Wintered on dry bluestem pasture	Wintered in dry lot
Feed lot gain, average	249#	250#
Final weight, average	913#	945#
Total gain, average	485#	517#
Feed cost per cwt. gain	\$19.79	\$22.77
Dressing per cent	59.1	61.1
Carcass grade: average		
choice	5	9
good	5	1
Selling price per cwt.	\$24.67	\$25.75

Effect of Plane of Winter Nutrition
on Quality of Beef¹

This study was designed to determine if a low level of winter nutrition would have any effect on carcass quality in cattle to be grazed the following summer and full fed following the grazing period.

Yearling Hereford steers were used in this study. Purchased in October, 1952, they were all fed together until Dec. 4, 1952. Their wintering period ran from Dec. 4, 1952, to April 10, 1953. One lot of cattle was wintered on a low nutritional plane, and lost .4 pound per head per day. Three lots were wintered at levels resulting in winter gains varying from 1 pound to 1.5 pounds gain per head per day.

From April 10 to July 23, the cattle were grazed on fescue-ladino, wheat, and lespedeza pastures. On July 23 all four lots

¹D. E. Brady, "The Effect of Plane of Winter Nutrition on Quality of Beef," University of Missouri, Columbia, Missouri, Agricultural Experiment Station, Bulletin 652, April, 1955, pp. 26-28.

were placed in dry lot and fed to choice grade. The well-wintered cattle reached this grade and were slaughtered in the period, Nov. 23 to Dec. 15. The lot on low level wintering reached choice grade and was slaughtered Jan. 11, 1954. The full feed ration consisted of ground ear corn, soybean meal and timothy hay.

Pictures of the 12th rib section from representative carcasses from all four lots are published in Bulletin 652. The ribs from the well-wintered cattle show larger eye muscle, less external fat, and more fat deposited within the eye muscle than does the rib representing the poorly-wintered cattle. Rib sections were separated into fat, meat, and bone and chemically analyzed for crude fat and moisture. The cattle wintered on a low level showed a higher percentage of both crude fat and separable fat, a lower percentage separable lean, and a lower percentage protein than the well-wintered cattle.

Carcass grades of the well-wintered cattle were choice to low choice, while the poorly-wintered cattle graded top-good.

Fattening Comparisons Steers versus Heifers¹

This is a Missouri Experiment Station summary of two years' work, comparing the performance of steers versus heifers under three beef production systems.

¹A. J. Dyer and L. A. Weaver, "Fattening Comparisons, Steers Versus Heifers," University of Missouri, Columbia, Missouri, Agricultural Experiment Station, Bulletin 646, February, 1955.

The first system involves winter full feeding for about 180 days, when both steers and heifers are sold together. They were sold at 700 to 750 pounds. The second system involves wintering the cattle well on roughage plus limited amounts of concentrates, then finishing with concentrates on pasture in the summer. The third system involves wintering well, grazing without other feed until October, then full feeding.

In the third system, the heifers weighed 938 pounds and the steers 1,154 pounds at sale. They had weighed 462 pounds and 577 pounds, respectively, to begin the experiment. In the latter system the heifers gained slightly more than their initial weight, weighing 462 pounds to start and gaining 481 pounds. The steers just doubled weight, starting at 577 pounds and gaining 577 pounds. The heifers put on 72.5% of their gain with roughage and pasture, while 68% of the steer gain came this way.

General Conclusions from these Studies

1. Heifers slightly excelled steers, everything considered, when both were full fed in dry lot during winter and marketed at light weights and choice grade (first system). It required 26 bushels of corn to finish the cattle.
2. When heifers and steers were wintered liberally and then full fed for 168 days on bluegrass pasture to choice grade, steers had an advantage over heifers (second system). Heifers did have the advantage, pricewise, over steers, however, when each group had been full fed for 86 days on pasture. From 45 to 47 bushels of corn were used during the entire test.
3. Neither sex nor difference in initial weight affected

significantly the rate and economy of gain of steers and heifers that were wintered, grazed one full season and then finished in dry lot to low choice and good grade (third system). Steers gave greater net returns, dollarwise, than heifers. If equal amounts of money had been invested in both, the net returns would have been about equal. From 17 to 25 bushels of shelled corn were used.

4. From 68 to 72 per cent of the total gain required to finish yearling steers and heifers was made from roughage and pasture, materially reducing the grain required.
5. Heifers seem best adapted to short feeding periods and marketing at light weights.

Producing Fat Yearling Cattle¹

This was a wintering, summering, and finishing experiment from January 3 to November 1, 1957.

During the wintering phase the effects of "hormone" implants were studied. Part of the calves were wintered at a medium nutritional level and part at a high level. Of those on a high level, part were implanted with 12 mg. Hexestrol, part with 24 mg. Hexestrol, and part were not implanted. The high nutritional ration consisted of 33 to 36 pounds corn silage plus 2 pounds soybean meal per head per day; the medium nutritional

¹A. J. Dyer, et. al., "Producing Fat Yearling Cattle," University of Missouri, Columbia, Missouri, Agricultural Experiment Station, Bulletin 704, April, 1958, pp. 12-14.

ration consisted of 28 pounds corn silage and 3/4 pound soybean meal per head per day. All received salt and bonemeal.

Results of the wintering study were:

1. Corn silage, properly supplemented, produced gain at low cost.
2. All lots at high level made very good gains of 1.82 to 2.15 pounds per head per day. Those at the medium level made 1.2 pounds per head per day, which was considered satisfactory for cattle to be grazed.
3. Implants increased the rate of gain slightly, and the 24 mg. implant was more valuable than the 12 mg. Economy of gain was improved by the 24 mg. implant.
4. The cattle on the medium level required more feed per hundred weight gain.

For the summer period, the cattle were redistributed. One lot, without implants, was carried on a liberal silage ration. One lot, also without implants, was grazed on orchard grass and lespedeza pasture. A third lot, on the same pasture, received 24 mg. Hexestrol implants. The implanted pasture steers gained 1.1 pounds per head per day. Those on pasture without implants gained 1.2 pounds, so there was no advantage in these implants at the time. The silage-fed steers outgained those on summer pasture 1.52 pounds per head per day to 1.23 pounds per head per day, and they carried more finish at the end of the summer grazing period.

The fattening phase ran from July 10 to Nov. 1. The two pasture lots remained on pasture except for the last 20 days.

Ground ear corn and 1.5 pounds soybean meal was the ration. The dry lot cattle now received alfalfa hay instead of silage. The dry lot cattle now received 36 mg. implants, and the pasture cattle in one lot received additional implants to bring their total to 36 mg. One pasture lot still received no implants.

Observations on the fattening phase were:

1. Steers implanted with 36 mg. Hexestrol and fed grain on pasture gained 14% faster, ate 9% more corn, but required 4% less corn per 100 pounds gain than the non-implanted steers.
2. Implanted steers fed in dry lot made slightly less gain, but required 6% less grain per cwt. gain than the implant pasture lot. They appeared smoother and sold \$1.00 per cwt. higher.

Summary for all three periods:

1. Dry lot fed steers produced from 5.4% to 10% more gain than steers fed on pasture.
2. Hexestrol implants increased gains during the fattening period.
3. Wintering steers liberally on corn silage made it possible to market these yearlings earlier and at lighter weights and normally at a more favorable time.
4. The lot with no implants made the cheapest gains for the entire period. However, the lot summer fed silage without going to grass made the largest total gains, sold \$1.00 per cwt. higher, and made the greatest net returns.

Nutritive Value of Forages as Affected
by Soil and Climatic Differences;
Limestone Pasture vs. Sandstone Pasture¹

This report is a summary of the results obtained in the first trial of a study designed to determine differences in the nutritive value, for beef cattle, of forages grown on limestone or sandstone soils.

In a study of this sort there are many variables which cannot be completely controlled or eliminated. Therefore, several trials extending over a number of years must be carried out before definite conclusions can be made. This report is reviewed here, even though it is a single study, because it is a topic of considerable interest in beef cattle management in central Kansas, where both soil types are common.

Spayed Hereford heifers were used in this trial extending over a period of 18 months. Throughout this trial, animals in each group received roughage grown either on sandstone or limestone soil.

Observations:

At the end of the overall study those cattle receiving forage grown on limestone soil had made an average total gain that was 58 pounds greater than similar cattle receiving forage grown on sandstone soil. All of this extra gain occurred during the two wintering phases of the study.

¹B. A. Koch, et. al., "Nutritive Value of Forages as Affected by Soil and Climatic Differences; Limestone Pasture vs. Sandstone Pasture," Kansas Agricultural Experiment Station, Circular 358, May 3, 1958, pp. 51-54.

The phases included wintering, Dec. 5, 1955, to April 15, 1956; grazing, April 15, 1956, to Oct. 8, 1956; wintering, Oct. 8, 1956, to March 8, 1957; and full feeding, March 8, 1957, to June 8, 1957. The limestone forage heifers weighed 553 pounds at the start of the period, gained 520 pounds and sold at 1,073 pounds. The sandstone forage heifers weighed 558 pounds at the start, gained 462 pounds and sold at 1,020 pounds. The advantage in gains favored heifers grazed and fed on limestone forage, by 58 pounds.

Winter Management for Steer Calves
on a Wintering, Grazing and Fattening Program¹

This is a brief summary of three years' work in comparison of wintering steer calves on the deferred feeding program in the dry lot versus wintering on bluestem pasture. Dry lot calves received sorghum silage as their principal roughage ration. Those in the winter pasture received the same grain, four pounds to 4.8 pounds ground sorghum grain, and the same protein supplement, 1 pound soybean oil meal, as those wintered in dry lot. Management, except for the wintering period, was the same.

Average total gain for the three phases of the program for calves wintered in dry lot was 598 pounds; for those wintered on

¹E. F. Smith, et. al., "Winter Management for Steer Calves on a Wintering, Grazing and Fattening Program," a three year experiment: 1955-56, Kansas Agricultural Experiment Station, Circular 349, May 4, 1957, pp. 48-50; 1956-57, Kansas Agricultural Experiment Station, Circular 358, May 3, 1958, pp. 40-41; 1957-58, Kansas Agricultural Experiment Station, Circular 371, May 2, 1959, pp. 26-27.

bluestem pasture, 586 pounds. The average daily gain was 1.70 pounds compared to 1.66 pounds; feed cost per cwt. gain, \$18.99 compared to \$16.81; and selling price necessary to pay for the cattle plus the feed, \$20.89 compared to \$19.71.

The dry lot wintered calves substantially outgained those wintered on grass, during the wintering phase. Most of this advantage was lost by the end of the grazing period, however. Final carcass grades reported show only a moderate advantage for the dry lot calves the second and third years, while the lot wintered on grass showed a slight grade advantage the first year.

Actual sale prices of the cattle are not reported in all cases. There is enough advantage in the economy of gain for the pasture wintered calves to indicate that probably the net returns slightly favor this group all three years.

Three Year Summary, Self Feeding Grain to Yearling Steers on Bluestem Pasture Compared with Self Feeding Grain in Dry Lot¹

The purpose of this study was to compare the self feeding of grain to yearling steers during the final phase of the deferred feeding program on bluestem pasture with self feeding grain in dry lot starting about August 1 and feeding until the cattle graded good to choice.

Each year the steers self fed on grass had the lowest cost

¹E. F. Smith, et. al., "Self Feeding Grain to Yearling Steers on Bluestem Pasture Compared with Self Feeding Grain in Dry Lot," Kansas Agricultural Experiment Station, Circular 335, May 5, 1956, pp. 27-29.

per 100 pounds gain, sold for an average of \$1.00 less per hundred, and tended to grade slightly lower. For some reason, there was much more difference the third year than either of the other years.

The first two years of this experiment a third lot of steers was handled in the same manner as the lot self-fed grain in dry lot except that trace minerals were added to the ration of this lot, both in the wintering phase and in the dry lot phase.

In both years there was no significant difference in performance of the calves in the wintering phase. During the full feeding phase the first year, gains were higher for the trace mineral lot by .58 pound per day. The cost was also higher, and they sold for the same price per hundred. There was a slight financial advantage shown for the trace mineral fed lot.

The second year the trace mineral fed steers gained .05 pound less per day in dry lot than those not receiving the minerals. They also graded lower in the cooler. However, for some reason, they sold on foot at a higher price, so showed a financial advantage. The years and the length of feeding periods were: 1952, Aug. 1 to Dec. 6, 127 days; 1953, July 31 to Nov. 7, 99 days; 1955, Aug. 1 to Nov. 12, 104 days. The following is a three year summary:

Management	Self fed in dry lot	Self fed on pasture
Daily gain, lbs.	2.52#	2.33#
Lbs. daily ration, ground milo or corn	17.7#	15.8#
Cottonseed or soybean pellets	1.6#	1.4#
Prairie hay	5.8#	-

Three year summary (continued)

Management	Self fed in dry lot	Self fed on pasture
Ground limestone	.1#	.1#
Salt	.04#	free choice
Cost feed per 100 lbs. gain	\$23.57	\$21.42
Sale price per cwt.	\$23.17	\$22.17
Average carcass score ¹	11.8	11.4

The Influence of the Level of Winter Nutrition
on the Performance of Heifer Calves²

This summarizes results of experiments conducted by the Department of Animal Husbandry, Kansas State College, over a nine year period, beginning in 1946. Three general experiments are involved in this report. All involve the wintering program for heifer calves on a wintering, grazing and full feeding plan.

In Experiment #1, which ran for three years, heifers wintered with 2 pounds ground corn per head per day were compared with heifers which received no grain during wintering. Both lots received sorghum silage, prairie hay and 1 pound of protein concentrate per head per day. These heifers were full fed on pasture. The heifers receiving the 2 pounds corn per head per day outgained the other lot on an average of 37 pounds per head for the wintering period. Over half this advantage had been erased by the end of the 82 day grazing period, and after the 97 day full feeding period, only 1 pound per head of the gain

¹The following numbers were assigned the carcass grades: high choice, 15; average choice, 14; low choice, 13; high good, 12; average good, 11; low good, 10; high commercial, 9.

²E. F. Smith, et al., "The Influence of the Level of Winter Nutrition on the Performance of Heifer Calves," Kansas Agricultural Experiment Station, Bulletin 418, 1960.

advantage remained. The financial summary favored the heifers wintered without grain.

Experiment #II was the same as #I, except that the full feeding phase was in dry lot in #II. Four trials were involved. Total gains for the entire period favored the group which received the 2 pounds grain per head per day, by 17 pounds per head. Very little difference was noted in the financial returns or the carcass grades between the two treatments. The use of 2 pounds grain per day in the wintering of heifer calves might be termed optional, on the basis of this experiment, but there appeared to be no particular advantage for its use.

Experiment #III was conducted following completion of the first two experiments, and was designed to test a lower level of winter nutrition in wintering heifer calves. One lot was wintered on dry bluestem pasture with limited supplemental feed; the other lot was wintered in dry lot on good roughage and limited supplemental feed. Both lots were then summered and fed out identically, except that the pasture period for the pasture wintered heifers started about April 15, and for the dry lot wintered heifers, about May 1.

This experiment ran for three years. Cottonseed or soybean meal was used for the protein concentrate, at $1\frac{1}{2}$ pounds per head per day for those wintered on pasture, and 1 pound for those in dry lot on sorghum silage and prairie hay.

The dry lot heifers outgained those wintered on grass, by 115 pounds, for the wintering period; but the thinner heifers outgained the dry lot heifers by 86 pounds, on grass. The well

wintered heifers had a slightly better dry lot gain, so that total gain for the well wintered heifers showed 33 pounds per head advantage. They sold for an average of \$1.08 per hundred higher; but there was an advantage of \$1.42 per head, in margin above feed and initial cost, for the heifers which had been wintered on dry bluestem pasture.

The concluding summary paragraph of this publication states,

From observations made in these experiments, grain was not necessary in the winter ration of heifer calves on a wintering, grazing and fattening program. Heifers may be successfully wintered on a low plane of nutrition on low quality roughage in this type of program, if its cost is sufficiently low.

Selection of a Beef Cattle System for an Individual Farm¹

The author states that, because Kansas is in an intermediate position between the stocker and feeder producing area of the Southwest and the full feeding area of the corn belt, emphasis has been placed on developing beef production programs which are intermediate between the stocker and feeder, and full feeding program. The combination of production of large amounts of grass and roughage, and relatively smaller amounts of feed grain, is typical in varying degrees in all parts of Kansas.

In the thesis, beef production systems adapted in one or more parts of Kansas are analyzed and their general areas of

¹Lot F. Taylor, "Selection of a Beef Cattle System for an Individual Farm". Unpublished master's thesis, Kansas State College, Dept. of Agricultural Economics, 1948.

adaptation are pointed out. The ten systems discussed are:

1. Producing stocker and feeder calves
2. Wintering and summering calves
3. Wintering and summering yearlings
4. Producing creep fed calves
5. Deferred feeding steer calves
6. Deferred feeding heifer calves
7. Deferred feeding yearling steers
8. Full feeding good quality steers
9. Full feeding plain steers
10. Wintering calves or yearlings

The analysis is approached with the assumption that the value of a beef enterprise on a Kansas farm is, to a great degree, in furnishing a market for rough feed and grass. For this reason, instead of calculating net income the author calculates returns for rough feed and grass, for various systems, for the areas in which each is adapted.

The state of Kansas is divided into six areas for the purpose of this study. These areas are based on the types of grass, rough feed and feed grain production which is typical of the area. These six areas are:

- I. The northeast Kansas area, generally corn belt type counties where grass is relatively scarce
- II. Southeast Kansas, general farming area with grass limited
- III. The Flint Hills pasture area, where bluestem grass is the greatest income producer, with corn and sorghum the principal crops
- IV. A small south central Kansas area, with less grass than Area III, the grass being some bluestem and some short grasses and wheat being the principal crop
- V. The buffalo grass area centered on Comanche County on the Kansas-Oklahoma border
- VI. An area covering nearly one-half the Kansas area from north central Kansas west across the state and differing from Area V in that it has less grass, while wheat is the more important crop in both areas. Short grasses predominate in the area, the bluestem found in the better-managed pastures in the eastern part.

The deferred feeding program is recommended in all six of these areas. The only other program recommended for all areas is the production of creep fed calves.

The following recommendations for the Kansas deferred feeding system are listed:

1. It uses young, light-weight quality cattle which provide the most efficient use of feed.
2. It requires a comparatively small investment.
3. Cattle more than double their weight in a year.
4. It provides a regular annual turnover.
5. It produces a medium-weight carcass of beef which meets the normal consumer's demand for retail cuts.
6. It uses a maximum amount of silage, hay, some pasture, and a minimum amount of grain. This fits Kansas conditions.

It is estimated that steer calves handled on this system will require 35 bushels grain, 2 tons silage, $\frac{1}{2}$ ton alfalfa hay, 100 pounds protein supplement, plus the grass needed until about August 1.

A comparison of systems adapted to each area is made on the basis of expected returns for rough feed and grass. Feed requirements for the various systems are included.

In comparing the intensity of the general types of systems, winter full feeding is listed as the most intensive, since large numbers can be handled in a small area; deferred feeding ranks second; creep feeding, third; wintering and summering, fourth; stocker and feeder calves, fifth; wintering, sixth; and simply leasing pastures, seventh.

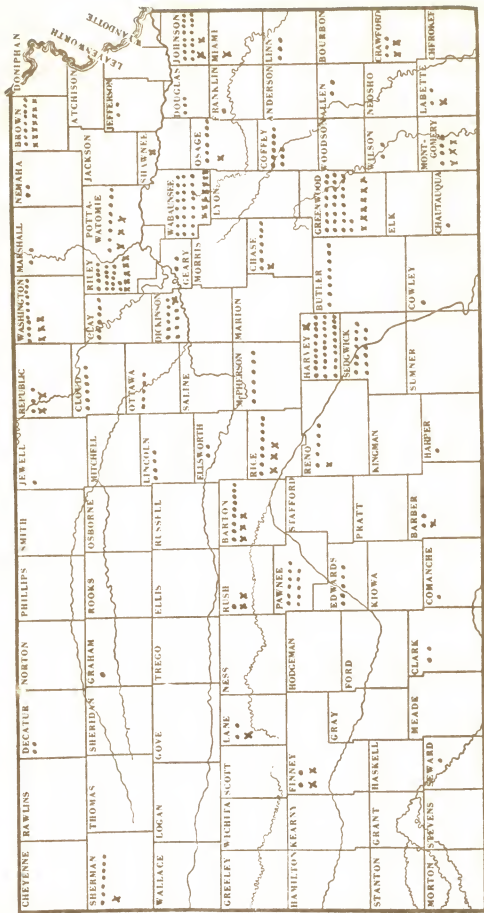
SECTION I. STEERS

There were over five times as many steer records as heifer records available for this study. Steer feeding is, likewise, of greater importance than heifer feeding in Kansas. Consequently, a large proportion of the material developed in this thesis concerns deferred fed steers. Records are from 54 counties, as shown in Fig. 1.

General Scope of the Steer Records

The general comparisons of the deferred fed steer records included in this study contain 316 records, with a total of 19,700 steers. The period includes all years from 1949 through 1958. Some additional available records were omitted from the study because they were incomplete in major items of information needed for the comparisons. No records were omitted because of exceptionally high or low returns or for high or low cost figures, since it is recognized that on occasion very wide fluctuations in these figures do, in fact, occur. Data were incomplete for some items in the 316 records. For this reason, for some analyses a number of the 316 records were not satisfactory. Some tables, therefore, contain less than 316 records, in which case the number used is indicated, i.e. 295, 312, 313, etc.

It should be noted in reference to this study that the returns above all costs are essentially the labor income from the project. Furthermore, most of the cattlemen whose records are included used home grown hay and silage. A fair market price



Legend: • Steer record
✱ Heifer record

Fig. 1. Distribution of the steer and heifer feeding records used in this thesis, in 54 Kansas counties.

for this roughage is included in the costs. So this project has provided a market for feeds which in many cases would otherwise have had to seek another outlet.

Gain in weight exceeded the purchase weight of the steers in nine of the ten years studied. For the ten year period, gains were 117% of the purchase weight of the steers. Therefore, economy of gains had slightly more influence on the total cost of producing the finished steers than did the purchase costs. It must be noted, however, that purchase costs are a more widely fluctuating cost than feed costs; consequently, there is more chance of a feeder getting into financial trouble from cattle bought too high than from too high feed costs.

In comparing the returns in Table 1 by years, it is useful to note that in four of the ten years, sale prices averaged lower per cwt. than purchase prices. Specifically, the 1949 sales were \$2.75 below the original cost of these cattle; in 1952, sale prices were \$9.93 per cwt. below original costs; in 1953, the sales were \$2.57 per cwt. below original costs; and in 1955, sales were \$0.80 per cwt. below original costs. Only in the year, 1952, did this negative sales margin result in a cash loss to the feeder. In each of these four cases there was a cost of gain which was below the sales price. In fact, cost of gain in all ten years was below sales price.

Effect of Price Level on Minus Margins. Another useful comparison concerns the effect which the cattle price level had on these returns. The year, 1949, serves as a good example of a

Table 1. Steer record general summary, giving by years, number records, number steers and average per record; comparison of purchase weight and gain in weight; & comparison cost of gain, purchase cost, sale price, & returns.

Year	No. of Steers	Average Purchase Weight	Gain per head	Cost cwt.	Purchase cost	Sale Price	Average returns per head
1949	33	2034	461 #	539 #	\$15.86	\$23.01	\$26.26
1950	53	3044	456 #	546 #	\$15.85	\$23.94	\$30.58
1951	21	1250	451 #	560 #	\$19.51	\$23.31	\$33.67
1952	34	1761	460 #	570 #	\$22.25	\$27.14	\$27.21
1953	36	2408	466 #	581 #	\$20.16	\$25.42	\$22.85
1954	39	2165	468 #	573 #	\$19.36	\$18.61	\$24.44
1955	31	2002	470 #	611 #	\$17.37	\$20.50	\$19.70
1956	25	1447	507 #	511 #	\$17.96	\$19.08	\$21.79
1957	20	1892	551 #	519 #	\$17.39	\$18.78	\$23.77
1958	24	1696	541 #	543 #	\$14.85	\$23.91	\$24.96
Totals							
& averages	316	19700	477 #	558 #	\$17.99	\$24.91	\$25.65

¹Number steers not given for one record in 1952; so 1952 average is for 33 records; and 10-year average is for 315 records. The 10-year average number steers is 19,700/315. Average purchase weight, gain, costs, sale price and returns, computed from adding totals for each year, then dividing by 316.

²Gain for entire period, i.e. wintering, grazing and full feeding.

moderately high price level, where the finished cattle sold for a materially lower price than their original cost. The adequate feed supplies available kept costs of gain relatively low, and the returns above costs are near the ten year average.

The price level effect on returns for some typical years was studied. For uniformity, in each case the ten year average original weight, gain and feed cost is computed against the actual cattle price comparisons for specific years.

The year, 1949, was one when rather high-priced cattle sold materially below their original cost - in this case, \$2.75 per hundred below. Multiplying the ten year average purchase weight of 477 pounds by \$2.75 loss in value on this weight shows a value loss of \$13.12. Subtracting the ten year average cost of gain, \$17.99, from the 1949 sale price of \$26.26, gives an advantage of \$8.27 per hundred on a ten year average gain of 558 pounds. Multiplying 558 pounds by \$8.27 gives a value increase of \$46.15 on this gain. Subtracting the \$13.12 value loss on original weight from the \$46.15 value gain on the gains of these cattle would leave \$33.03 per head above costs at this price level.

In 1953 the cattle costs and sale prices were at approximately \$3.50 per cwt. lower level. In 1953 the cattle sold for \$2.57 per hundred below original costs. Again, computing \$2.57 loss on ten year average purchase weights, multiplying 477 pounds by \$2.57 shows \$12.26, the value loss per head on purchase weight. Subtracting the ten year average cost of gain, \$17.99, from the 1953 sale price of \$22.85 gives a value increase of \$4.86 per hundred on the ten year average gain of 558. So, 558

times \$4.86 gives a value increase of \$27.12 on this gain. Subtracting the \$12.26 loss from the \$27.12 gain, leaves \$14.86 returns above costs at this price level.

There is no lower price level year with about this loss from purchase cost to sale price. However, at the lower levels, smaller losses would probably be more typical; so 1955, with cattle costs \$4.92 lower than in 1953 and sale prices \$3.15 lower, gives a useful comparison.

In 1955 cattle sold at \$0.80 below original cost. This figure times the ten year average purchase weight of 477 shows \$3.82 value loss. Sale price was \$1.71 above cost of gain. So, \$1.71 times ten year average gain of 558 gives \$9.54 value gain on the ten year average gain. Subtracting the \$3.82 loss from the \$9.54 gain shows \$5.72 per head above costs on cattle at this price level. Table 2 summarizes these comparisons.

Table 2. Effect of price level on cattle feeding margins.

Year:	istic	character-	Ave. : cattle:	Ave. : sale :	Minus : margin:	Value ¹ : loss on:	Value ¹ : gain on :	Returns at this price level
1949	Moderately high price level		\$29.01	\$26.26	\$2.75	\$13.12	\$46.15	\$33.03
1953	Moderate price		\$25.42	\$22.85	\$2.57	\$12.26	\$27.12	\$14.86
1955	Lower price level		\$20.50	\$19.70	\$0.80	\$ 3.82	\$ 9.54	\$ 5.72

¹For purpose of uniformity of comparisons, the ten year average purchase weight of the cattle, 477 pounds, and ten year average gain per head, 558 pounds, and ten year average cost of gain, \$17.99, were used.

Conclusions to be drawn from these comparisons confirm the observations of cattle feeders and research men¹ that "minus margins" at high price levels can be offset with the lower cost of gains; but as the price level drops to near the cost of gains, "minus margins" will cause serious financial difficulties.

In considering the effect of negative or minus price margins it is useful to check the market prices over a longer period of years, to notice how frequently in the recent past feeders probably would have faced serious minus margins. This is based on cost of feeder calves the previous October, and slaughter steer prices when these calves should have been ready for market in the following November, both from the Kansas City Market Report. Table 3 gives this comparison.

Ten times in the 37 comparisons from the fall of 1923 through the fall of 1959, these comparisons show a minus margin. Of these, six are less than \$1.00, while four are from \$1.70 to \$11.05. All of the four, plus one of the smaller minus margins, have come in the past eight years.

Now, turning to the ten years of actual production records included in this study, they are compared with the market reports, both as to price level and margins. Table 4 gives these comparisons. There are four minus margin years in each comparison; however, in 1949 the market shows a fairly strong plus margin of \$2.60, while actual records show a minus margin of \$2.75. In

¹Cf. O'Mary, C. C., State College of Washington. "How to Figure Profit or Loss on Fed Cattle," National Livestock Producer, May, 1959.

1958 the market reports show a minus margin of \$0.45, while the actual records show a plus margin of \$1.05. Except for 1949, the records either show a larger plus margin or a smaller negative margin than the market report.

Comparison of Purchase and Sale Prices from Records in the Study, with Kansas City Market Price Quotations. Some practical inferences may be drawn from Table 4, comparing costs of the steers purchased by these cattle feeders with top prices quoted for choice stocker calves under 500 pounds at Kansas City. In all cases the calves were purchased for less than the Kansas City top prices. Except for the first year in the study, purchase costs averaged from about \$2.00 per hundred to over \$6.00 per hundred under the Kansas City top figure. This averaged \$3.57 under the quoted Kansas City top. Sales likewise averaged under the quoted Kansas City top, averaging \$3.08 below for the ten years. (These averages are averages of the ten year average margins.)

In nine of the ten years the farmers keeping these records either had a larger plus margin between purchase cost and sale price than the Kansas City quotations, or in the cases where they sold fat cattle for less per hundred than the original costs, the minus margins were less than those shown at Kansas City. One possible reason for this consistently better showing is that those farmers keeping better records understood their operations more adequately as a result, and that they were therefore able to do enough better to show this better than average result.

Table 3. Monthly averages of 10-day top prices at Kansas City.¹

Choice stocker calves under 500#		:	Good butcher steers ² 900 - 1100 #		:	Margin
Year	October	Year	November			
1922	7.70	1923	10.40		\$	2.70
1923	7.35	1924	11.05		\$	3.70
1924	7.50	1925	12.20		\$	4.70
1925	8.60	1926	10.95		\$	2.35
1926	8.80	1927	16.10		\$	7.30
1927	10.85	1928	15.00		\$	4.15
1928	13.80	1929	13.95		\$	0.15
1929	13.15	1930	12.35		-	0.80
1930	9.25	1931	10.50		\$	1.25
1931	6.95	1932	6.60		-	0.35
1932	6.30	1933	5.50		-	0.80
1933	5.40	1934	7.65		\$	2.25
1934	5.25	1935	10.90		\$	5.65
1935	8.85	1936	9.10		\$	0.25
1936	7.40	1937	12.20		\$	4.80
1937	9.30	1938	10.25		\$	0.95
1938	9.50	1939	10.30		\$	0.80
1939	10.70	1940	12.25		\$	1.55
1940	11.85	1941	11.55		-	0.30
1941	13.65	1942	15.35		\$	1.70
1942	14.75	1943	14.45		-	0.30
1943	13.90	1944	15.60		\$	1.70
1944	13.40	1945	16.80		\$	3.40
1945	14.80	1946	26.85		\$	12.05
1946	18.85	1947	30.05		\$	11.20
1947	23.45	1948	32.45		\$	9.00
1948	29.35	1949	31.95		\$	2.60
1949	27.00	1950	32.25		\$	5.25
1950	35.35	1951	36.60		\$	1.25
1951	43.35	1952	33.24		-	10.11
1952	30.60	1953	25.17		-	5.43
1953	20.72	1954	26.44		\$	5.72
1954	23.50	1955	21.80		-	1.70
1955	23.50	1956	24.65		\$	1.15
1956	23.00	1957	25.40		\$	2.40
1957	28.05	1958	27.60		-	0.45
1958	38.05	1959	27.00		-	11.05

¹Source: B.A.E., Kansas City Daily Market Report.

²Change in U.S. Grade designations moved most "U.S. Good" steers up to "U.S. Choice" in 1951 and later years. "U.S. Choice" is used here beginning in 1951.

Table 4. Comparison of purchase cost and selling price of cattle in study, with Kansas City Market quotations of choice stocker calves under 500# and choice slaughter steers 900 - 1100#; monthly average of 10-day tops.¹

Year ²	Oct. K.C. price : choice stocker : calves : under 500# :	Initial cost : calves : in study :	Nov. K.C. : price choice : slaughter : steers ³ :	Sale price : cattle : in study :	Margin : K.C. : prices :	Margin : study : prices :
1949	\$ 29.35	\$ 29.01	\$ 31.95	\$ 26.26	\$ 2.60	\$ 2.75
1950	\$ 27.00	\$ 23.94	\$ 32.25	\$ 30.58	\$ 5.25	\$ 6.64
1951	\$ 35.35	\$ 32.31	\$ 36.60	\$ 33.67	\$ 1.25	\$ 1.36
1952	\$ 43.35	\$ 37.14	\$ 33.24	\$ 27.21	\$ 10.11	\$ 9.93
1953	\$ 30.60	\$ 25.42	\$ 25.17	\$ 22.85	\$ 5.43	\$ 2.57
1954	\$ 20.72	\$ 18.61	\$ 26.44	\$ 24.44	\$ 2.72	\$ 5.83
1955	\$ 23.50	\$ 20.50	\$ 21.80	\$ 19.70	\$ 1.70	\$ 0.80
1956	\$ 23.50	\$ 19.08	\$ 24.65	\$ 21.79	\$ 1.15	\$ 2.71
1957	\$ 23.00	\$ 18.78	\$ 25.40	\$ 22.77	\$ 2.40	\$ 3.99
1958	\$ 28.05	\$ 23.91	\$ 27.60	\$ 24.96	\$ 0.45	\$ 1.05

¹Source: B.A.E., Kansas City Daily Market Report.

²K.C. prices for stocker calves are for the October of previous year.

³A change in specifications of "U.S. Good" and "U.S. Choice" beef carcasses, beginning in 1951, moved most formerly "U.S. Good" grade carcasses up to "U.S. Choice". Therefore, price quotations in this column are those for U.S. Good for 1949 and 1950, and U.S. Choice for 1951 and later years.

Importance of Cost of Gains on Margins. Total gains in the deferred feeding program are typically greater than the purchase weight of the cattle. As pointed out earlier in this report, they averaged 117% of the purchase weight for the 316 records under consideration. Therefore, cost of gains has an extremely important bearing on the financial outcome of any deferred feeding program. It must be recognized, however, that even though this is true, cost of gains is a more stable cost than purchase cost of the cattle.

Examination of the yearly summary, Table 2, shows that the cost of gain in all ten years was less than the sale price; and in nine of ten years, cost of gain was less than the purchase cost of the cattle. In 1954, cost of gain was \$19.36 per hundred; while the cattle had been purchased for \$18.61. This is the one case where purchase cost was below average cost of gain for the cattle.

The ten year average cost of gain is \$6.92 per hundred under purchase costs, and \$7.66 per hundred below sale price of the cattle.

Comparison with Illinois Records. No study comparable to this one has been reviewed. However, Mueller¹ reports on cattle feeding systems in Illinois, based on data obtained through the

¹A. G. Mueller, Assistant Professor of Farm Management, Dept. of Agricultural Economics, University of Illinois College of Agriculture, Urbana, Ill., University of Illinois College of Agriculture, "Feeder Cattle Guide for 1959-1960," AE-3463, August, 1959.

cooperation of thirty fieldmen and cooperating farmers in the Illinois Farm Bureau Farm Management Service. One Illinois system reported is "Long-fed Good-to-choice Steer Calves". This seems to be somewhat similar to the Kansas deferred feeding plan. This Illinois system is a wintering, grazing and full feeding system, which averaged about eleven and one-half months duration for the 1954-1958 averages reported. While there were differences in the weights, costs, gains and returns, the similarity is close enough to merit mention as a comparison of farmers' reports from the state of Illinois with those from Kansas. The Illinois figures are for 1954-1958; Kansas figures are for 1949-1958.

The Illinois calves were bought averaging 52 pounds lighter than Kansas steer calves, 425 pounds for Illinois and 477 pounds for Kansas. The Illinois calves gained 41 pounds more than the Kansas calves, 599 pounds compared to 558 pounds. The Illinois cost of gains was \$0.48 per hundred lower, \$17.51 per hundred compared to \$17.99 per hundred. (Kansas costs for the last five years of the period were lower than the Illinois costs, however.) Kansas "returns above all costs" were \$5.08 per head higher, \$46.98 for Kansas compared to \$41.90 for the Illinois "returns above feed per head".

Effect of Month of Sale on Returns

Analysis of Number of Sales, Days Managed, Sale Weights, Total Gain, Average Returns per Head, Cost of Gains and Selling Price, by Month of Sale. Table 5 summarizes the characteristics of the results by months of sale. It shows that nearly 57%

of the cattle were sold in November and December; 16% in October; with the balance mainly in August, September, January and February.

It is useful to note that the number of days managed, sale weights, total gain and average returns per head, all increase almost directly in relation to later sales. It must be pointed out that while profits are shown to be higher for the heavier cattle sold in later months, these cattle average well within the handy weight range. Examination of the individual records shows only a few records (11) where sale weights ran as high as 1,200 pounds; and comparatively few (25) weighing 1,150 to 1,200 pounds. There were no records with weights as high as 1,300 pounds.

The steers sold in August and September had been managed a considerably shorter period of time than those sold later. These two groups had less average gain per head than their purchase weight. All other groups had greater weight gains than their purchase weights.

Average returns per head and selling price per hundred advanced each month through January. Cattle sold in February reversed this trend, with both a lower sale price per hundred and lower returns per head than those sold in January.

This trend, toward higher average returns from December and January marketing of deferred fed steers, should be noted as an evidence of a shifting in the steer marketing structure. Evidently, more fat cattle are now being marketed during the early fall months from deferred feeding operations and commercial feed

lots. Therefore, Kansas stockmen who wish to take more complete advantage of the grazing season to secure lower cost gains on their cattle have a better opportunity to do so and still market the steers to good advantage, than was true in earlier years. The exception which still holds is that in years of declining prices, selling by November is more desirable.

Table 5. Steer sales by month; with relationships of days managed, weight, gain, returns per head, cost of gains and selling price.

Month	: no. : sales	: Ave. : days : managed	: Ave. : sale : wt. : total	: Ave. : gain : per day	: Ave. : returns : per head	: Ave. : cost : of gain	: Ave. : selling : price
Aug.	11	300	995# 414#	1.38#	\$29.69	\$17.55	\$23.27
Sept.	27	319	974# 418#	1.31#	\$37.44	\$17.74	\$23.54
Oct.	49	350	1003# 516#	1.47#	\$40.12	\$18.05	\$24.79
Nov.	91	376	1034# 570#	1.52#	\$45.18	\$18.10	\$25.54
Dec.	86	400	1054# 598#	1.50#	\$53.52	\$17.87	\$26.56
Jan.	25	434	1064# 628#	1.45#	\$58.97	\$18.28	\$27.28
Feb.	14	458	1056# 636#	1.39#	\$49.51	\$18.34	\$25.67
Mar. through July	9						
Total	312						

Inspection of monthly average sale prices of choice fed steers at Kansas City for the ten years involved in this study, shows that they were normal in showing slightly lower prices in January and February than in the fall months of October and November. Therefore, considering that the cattle had been owned longer and were being sold at heavier weights, it appears quite probable that the cattle sold at higher prices in December and January because they carried a higher finish.

For the ten years of this study, the monthly average of ten day average top prices for choice 900-1100 pound steers at Kansas City moved through a narrow range for the seven months under discussion. In five of the years, December and January prices were below October and November; and in five, they were higher. Average differences were too small to form a basis for management decisions. Table 6 and Fig. 2 show these figures by months, compared with average sale prices of the cattle in the study.

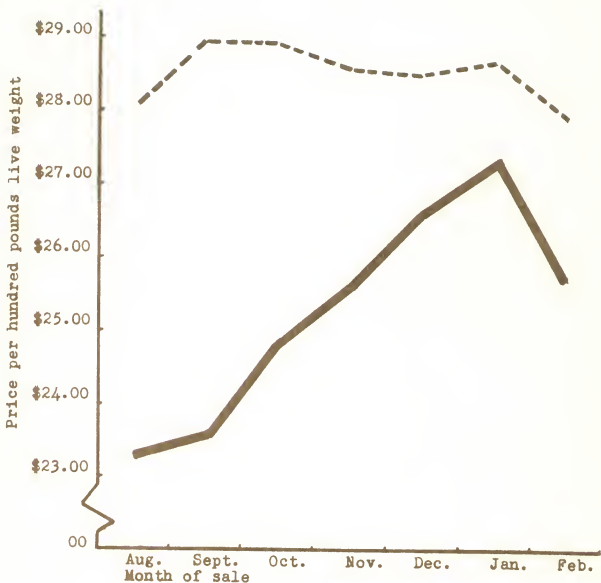
Table 6. Ten year monthly average, ten day average tops, choice¹ butcher steers, 900-1100 lbs.², 1949-1958, and sale prices of study cattle, same periods.

	: Aug. :	: Sept. :	: Oct. :	: Nov. :	: Dec. :	: Jan. :	: Feb. :
K.C. market quotations	\$28.09	\$28.85	\$28.75	\$28.51	\$28.32	\$28.57	\$27.78
Sales, study cattle	\$23.27	\$23.54	\$24.79	\$25.54	\$26.56	\$27.28	\$25.67

The slightly higher cost of gain for cattle sold in January and February probably also reflects the longer dry lot feeding period. However, the economy of gains introduced into these

¹Beginning 1951, specifications changed so that most of former U.S. Good carcass grade changed to U.S. Choice. Prices quoted here for 1949 and 1950, therefore, are U.S. Good quotations; since that date, U.S. Choice.

²B.A.E., Kansas City Daily Market Report, 1949 through Mar., 1956; U.S.D.A. Livestock Detailed Quotations, Kansas City, April, 1956, through 1958.



Legend: Steer sale prices 
 Kansas City choice steer price quotations 

Fig. 2. Average sale prices by month of sale, steers in this study; and Kansas City market quotations, monthly average of 10 day average tops, choicel butcher steers, 900-1100 pounds.²

¹Beginning 1951, specifications changed so most former U.S. Good carcass grade changed to U.S. Choice. Prices quoted for 1949 and 1950 are U.S. Good quotations; since then, U.S. Choice.

²BAE, Kansas City Daily Market Report, 1949 through Mar., 1956; U.S.D.A. Livestock Detailed Quotations, Kansas City, April, 1956, through 1958.

lots of cattle by a longer grazing period resulted in total gain costs only slightly higher than steers sold earlier.

The fact that the cattle sold in December and January sold for the highest average prices and returned the largest net returns above costs, is of particular interest, especially in view of the fact these are not normally the months of highest sale prices for the grades of slaughter cattle involved. Facts are not available to prove that it would or would not have been economical to have put the heavier cattle sold in December and January on the market earlier in the fall. It is certain, however, that to have done so under Kansas farm conditions would have necessitated putting the cattle on feed earlier, thus reducing utilization of grass. It is also certain that this would have involved hot weather feeding and required more farm labor during the weeks when most Kansas farmers are busy with wheat seeding, silo filling and final hay-making operations.

Some comments by Fowler¹ seem very much to the point in this regard. He states,

It is apparent that cattle producers do not market the bulk of their animals when the highest prices are being paid for them.The question might arise as to whether this situation is actually a case of poor management. In some cases.....it is not. In other cases, however, it is.

Much² of the seasonal variation in the volume of livestock marketed is caused by differences in the cost of producing livestock at different times of the year. This means, of course, that it is not necessarily true that a producer would make more money by shifting his operations so as to

¹Stewart H. Fowler, "The Marketing of Livestock and Meat," p. 148.

²Ibid., p. 465.

have livestock ready for market at the seasons of normally high prices.

Table 7 analyzes the variations in average returns per head, by month of sale.

Table 7. Analysis of average returns per head, on basis of standard deviation by months of sale, for the ten year period; and same analysis for seven years, with exceptionally high profit years of 1950 and 1951, and exceptionally low year of 1952, removed.

	10-year period			7-year period		
	No. records	returns	Standard deviation	No. records	returns	Standard deviation
Aug.	11	\$29.69	\$20.93	9	\$34.50	\$19.89
Sept.	27	\$37.44	\$24.47	24	\$34.80	\$13.00
Oct.	49	\$40.12	\$38.35	37	\$32.00	\$30.27
Nov.	91	\$45.18	\$40.92	59	\$34.57	\$31.85
Dec.	86	\$53.52	\$54.30	49	\$40.96	\$40.11
Jan.	25	\$58.97	\$70.46	12	\$45.43	\$37.03
Feb.	14	\$49.51	\$55.75	9	\$49.63	\$34.17

The ten years involved in this study include some high profit years, and one poor year. It was felt that a better comparison of the variations in individual cattle feeders' returns would be secured by consideration of the standard deviations for all ten years; and for the seven years which showed less drastic variation from the average.

The average returns for the seven year period are mostly lower than for the ten year period. But the same general trend of higher returns for the winter marketings is evident.

Standard deviations appear large for both studies; but they are lower, as should be expected, when the high and low years are removed. It is characteristic of the cattle-feeding business

that profits have been good in some years, and low or negative in others. Doubtless this characteristic is involved in the variations shown here.

Effect of Increasing and Decreasing Price Levels on Results from Early or Late Marketing. The ten years in this study were divided into years when fat steers sold for more than they had cost as stocker calves the previous fall, and years when they sold for less than they had cost. The trend of sale prices and returns above costs for these years were then studied by month of sale as individual years; and each group was then totaled and the averages of the totals for each year were computed. Table 8 summarizes these averages. In four years the steers sold at minus margins, or below their cost as stocker calves; these were 1949, 1952, 1953 and 1955. In the other six years the steers sold above their original cost per pound; these were 1950, 1951, 1954, 1956, 1957 and 1958. In each of these years the cattle also sold either below or above the price received for fat steers the previous fall. For example, the calves cost more in the fall of 1952 than they sold for as steers in 1953; and the steers sold, in the fall of 1952, for more per hundred than the steers brought in the fall of 1953. Thus, the classification used here was one of declining prices or increasing prices, whether stocker or finished cattle were considered.

In the four years of declining prices there were two years, 1949 and 1953, when there was no decided trend in sale prices from August through February, either up or down. But in the

other two years a definite down trend is evident. This trend is definite enough that it carried average sales prices from about \$24.50 per hundred for the month of August, September and October, down to about \$23.00 per hundred for the January and February sales. The effect on returns above costs was essentially the same. The cattle sold during the first three months of the period returned above \$15.00 per head above costs. The cattle sold during the last two months of the period just failed to break even. During four of the six years of increasing prices the sale prices showed an upward trend from August through January. These years were 1950, 1954, 1957 and 1958. In 1951 there was no definite trend either up or down. In 1956 there was a slight downward trend. The average for the six years was a strong upward trend from August through January. This moves from an average in the neighborhood of \$23.50 for August, September and October, to above \$29.00 sales price per hundred for January and February. Returns above costs moved in the same fashion. They averaged in the neighborhood of \$45.00 per steer for the first three months of the period; they more than doubled this return per head above costs for January and February sales, which averaged about \$95.00 per steer.

A look at the summary in Table 8, which follows, indicates the danger in staying with the cattle too long in years of declining prices; and the advantage of holding in years when prices are going up. The steers sold in January averaged a loss of \$10.40 for the four declining years; and January sales averaged \$105.23 above costs for the six years of increasing prices. Thus, the

cattleman who can correctly identify the years of increasing and decreasing price levels and plan his timing of feeding and marketing has a tremendous advantage. No one, of course, can expect to identify these movements with complete accuracy. Careful attention to the best information available, however, should enable the feeder to do a better than average job of working with the market changes.

Table 8. Comparison of sale prices and returns per steer above costs, by month of sale; for four years of declining prices,¹ and for six years of increasing prices.²

	: 4 declining price years :		: 6 increasing price years :	
	sale	returns	sale	returns
	prices	above costs	prices	above costs
August	\$24.63	\$11.80	\$22.59	\$25.90
September	\$24.17	\$24.01	\$23.29	\$42.21
October	\$24.52	\$13.75	\$24.64	\$58.83
November	\$24.24	\$16.20	\$27.16	\$74.80
December	\$23.87	\$ 1.32	\$28.16	\$84.49
January	\$23.36	-\$10.40	\$29.90	\$105.23
February	\$22.65	\$ 9.75	\$28.69	\$89.28

Relationship of Purchase Weight of Steers to Returns above Costs

For this comparison the returns above costs were computed, for each of the 316 records, on the basis of the percentage of first cost. For instance, the record number one shows a return of \$35.26 per head; and these calves cost \$148.19. This record shows 24% returns on this basis.

¹Four years declining prices - 1949, 1952, 1953, 1955.

²Six years increasing prices - 1950, 1951, 1954, 1956, 1957, 1958.

Table 9 shows the summary, when these percentages were distributed on the basis of the purchase weight of the steers. In the very light calves, three unusually profitable records throw the results for that rather small number high. The noticeable characteristic of this summary is that the cattle falling into typical calf weights show substantially higher average returns for the dollars invested than do the heavier weights, which would include both the big, fat steer calves and the yearling steers.

Now, to apply these results in general to a stockman going out to buy replacement cattle for the next year's feeding operation, calves weighing 401 to 500 pounds show returns of 55% and 46% for the two weight classes. Steers weighing 551 to 650 pounds show 28% and 37%. For purposes of illustrating the point, assume a comparison of 450 pound calves with 50% returns on the original cost; and 600 pound steers with returns 33% on the original cost.

Supposing the stockman has \$10,000 available to invest in cattle, calves costing \$30 per hundred and steers \$25 per hundred, he can buy 74 calves or 66 steers at these prices; at 25¢ for calves and 21¢ for steers he could buy 89 calves or 83 steers; and at 20¢ for calves or 17¢ for steers he could buy 111 calves or 98 steers. Whether he was buying cattle at the higher or the lower price levels, the same general tendency would hold, since the greater percentage weight gains and the higher feed efficiency of the cattle would always favor the lighter cattle. In the case of the assumptions of the general average returns shown

above, he would have about \$5,000 above costs, if he handled the 450 pound calves, and \$3,300 above costs, if he handled the steers.

This would be an advantage of \$1,700 above costs for handling calves rather than steers, with the assumptions of prices taken here and based on the records in this study.

It should be kept in mind that steers may have a less unfavorable relationship than shown here, where comparatively large tonnages of hay and silage and large acreages of grass are available at favorable price relationships. Even so, the economy of gains for feed consumed is strongly in favor of the younger cattle, especially where a feeding program involving a long period such as the deferred feeding system is involved.

Table 9. Relationship of purchase weight of steers to returns above costs. This relationship was computed as the percentage which returns above costs, are of the original cost of the steers.

Weight range at time of purchase :	Number of records included :	% returns above costs are of purchase cost of steers
under 350#	14	84%
351 - 400#	42	44%
401 - 450#	87	55%
451 - 500#	85	46%
501 - 550#	36	30%
551 - 600#	13	28%
601 - 650#	13	37%
651 - 700#	12	34%
701 - 750#	11	31%
751# & up	3	24%

Table 10 lists averages of results of 17 experiments conducted prior to 1948. While these experiments were concerned with substantially shorter feeding periods, there does not appear

to be any reason that the relationships, as far as feeding efficiency, would vary substantially. Actually, the period owned, in the deferred feeding system, is longer than the average in these experiments, while the finishing period in dry lot is shorter. The period involved in the experiments averaged 197 days for calves, 174 days for yearlings, and 162 days for two-year-old steers.

Table 10. Comparison of economy of gains for calves, yearlings and 2-year-olds, using a fixed ration of grain, supplement, hay and silage.¹

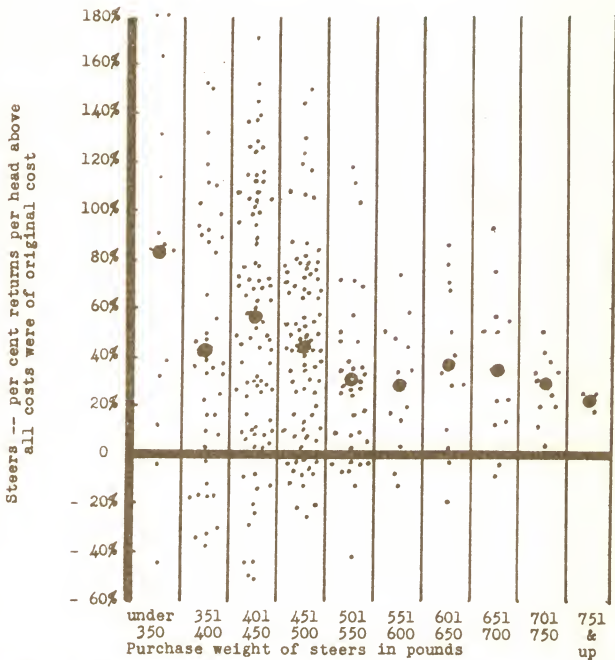
Age of cattle	:Initial weight	:Feed required for 100# gain :Grain	:Supple- ment	:Hay	:Silage	:Ave. :daily gains	:Feed costs :per 100# gain
Calves	414#	462#	47#	198#	186#	2.19#	\$ 9.14
Yearlings	638#	536#	45#	241#	258#	2.26#	\$10.98
2-yr.-olds	340#	667#	41#	246#	308#	2.40#	\$12.07

A study of the records shows that the steer calves weighing 401 to 500 pounds were bought at an average cost of \$25.80 per hundred; and the calves and steers weighing 551 to 650 pounds cost \$22.63 per hundred.

Fig. 3 shows the distribution of returns above all costs, as a percentage of the purchase costs. It is distributed here by 50-pound weight brackets.

The wide spread of these returns is indicative of the wide variations in returns in the cattle business. Points which are

¹Frank B. Morrison, "Feeds and Feeding," 21st Edition, p. 799. Costs and prices used are averages of 17 experiments conducted prior to 1948.



Legend: Average returns for weight group ●
Returns for one record •

Fig. 3. Steer returns per head above all costs, as per cent of original cost by weight groups.

particularly noticeable from this graphic presentation are:

1. A very wide dispersion in results from the "pee-wee" calves, bought at weights under 350 pounds.
2. The good thrifty calf weights, 401 to 500 pounds at purchase date, show a higher average return on this basis than the heavier calves and yearlings.
3. Fewer heavy losses are shown, proportionately, among the calves weighing 401 to 500 pounds than for either lighter calves or heavier calves and yearlings.

It will be noted, in the corresponding discussion of purchase weights of heifer calves as related to returns, that the indication is even more strongly in favor of the lighter weight calves than is shown in the study directly above. It must be born in mind that this information is based on obviously "good-doing" calves. Extra care must be exercised in purchasing light weight calves, to avoid getting calves which are light because they are "hard-doers" or because they are sick. Calves which are light because they are young, or because they are only in moderate flesh, are in general the ones to be desired.

A Comparison of Returns above Costs, Based on Various Amounts of Gain in Each Phase of the Deferred Feeding Program; and on Total Gain for the Entire Program

Winter Gain. Records which did not separate the gains for each of the three phases, and also include total gain for the entire program, were not used in this study. Of the 316 records, 295 included all this information and were summarized. Table 11 gives this information in detail.

First, a comparison was made of returns above costs for steers making various levels of gain for the winter period. This study was based on gain from the time the steers were purchased until they went to grass the following spring. Since most of the steers were purchased in the period from Sept. 20 to Dec. 1 and went to grass about May 1, the wintering period averaged in the general neighborhood of 180 days. It varied from over 200 days for some steers to less than 60 days for a few lots which were bought late.

The results were grouped by 50-pound differences in winter gain and returns summarized. Only four records showed less than 50 pounds winter gain. These were included in the group, "0 to 100 pounds". Only three records showed over 350 pounds gain and these are included in the group, 301-400 pounds.

No clear-cut recommendation as to how much winter gain is desirable can be made with certainty, based on the study. It is noticeable that the two middle groups, which averaged 180 and 226 pounds gain, gave substantially higher returns than the second group which made only 134 pounds gain and slightly higher returns than the next higher-gaining group, which averaged 274 pounds. However, the highest-gaining group, which gained 329 pounds during the wintering phase, showed the highest returns above costs.

Based on results of this part of the study, it would appear that it would be a sound recommendation to try for above 150 pounds winter gain; and that possibly to go beyond 200 pounds winter gain, if this can be done without substantial increases

in the cost of that gain.

Grazing Gain. A study of summer gains, related to returns above costs, was made. This was similar to the study of winter gains. There were three records showing slightly under 50 pounds gain and included in the group, "0 to 100 pounds gain"; two records showing 340 pounds gain each and shown in the group, "301 to 350 pounds gain".

Pasture gains are typically the most economical gains made in this type of cattle feeding program. Consequently, it should be anticipated that cattle making substantial summer gains at comparatively low costs have the best chance to show a good return. This study substantiates this expectation to a marked degree. Each step to higher summer gains, up through the group gaining 201 to 250 pounds in the summer, shows an increase in returns above costs. A total of only six records is included in the two groups with above 250 pounds gain, so little confidence can be placed in results shown. With this weight and flesh of steers, it would be improbable that summer gains above 250 pounds could often be secured in a normal grazing season.

Based on this study, a recommendation to attempt to secure from 150 to 250 pounds summer gain appears to be justified. Table 11 summarizes this study.

Dry Lot Gain. A study was made of dry lot gains related to returns above costs. This was similar to the wintering and summering studies reported above. Since the gains varied more widely, it was necessary to include seven groups. Included in

the group, "0 to 100 pounds gain", are four records showing gains under 50 pounds.

The dry lot phase is normally the highest cost phase, as far as cost per pound of gain is concerned. Therefore, it would appear reasonable to expect that cattle which go to dry lot with weight and flesh enough that a moderate feeding period will put them into the desired slaughter grade should show an advantage over cattle which require a long period in dry lot. The group which gained 151 to 200 pounds in dry lot (averaging 181 pounds per head dry lot gain) showed the highest returns above costs. These returns, \$56.04, were substantially above the returns from all groups with over 251 pounds gains in dry lot. Table 11 summarizes these results.

Based on this study, a general recommendation can be made that a dry lot feeding period be planned to produce up to 250 pounds gain.

Total Gain. The results of the three combined phases were brought together in the study of total gains related to returns above costs.

Total gains ran as low as 302 pounds, with seven records showing less than 350 pounds gain, and five records between 351 and 400 pounds gain. Two records showed between 751 and 800 pounds gain and were summarized in the group, "701 to 800 pounds gain".

With one exception, each move into a greater total gain group shows an increase in returns above costs, through the nine weight groups or divisions. The group gaining 551 to 600 pounds

is the one exception and shows a slightly lower return than the group just lower in gains. Examination of the records included in this group discloses that 20 of the 66 records happen to have been from the two years, 1952 and 1953, which were the two years of lowest returns in the study. This would account for a poor showing in this particular weight group.

A statistical analysis of the relationship between total gains and returns above costs shows that 94.1% of the returns above costs, as shown in Table 11, are explained by total gains. This was calculated by the formula,

$$r^2 = 1 - \frac{\text{Standard error of estimate for } y^2}{\text{Standard deviation of } y^2}$$

where X is calculated as total gains; Y as returns above costs; and r^2 as coefficient of determination.

Bringing together the recommendations which seem justified on the basis of this study of gains as related to returns above costs, we find:

1. Planning for total gains above 600 pounds per steer seems justified.
2. Going back to the three separate phases, planning for the following seems justified:
 - Wintering phase, above 150 pounds
 - Grazing phase, 150 to 250 pounds
 - Dry lot phase, up to 250 pounds
3. A careful comparison of the results from the dry lot phase and the results from the three phases combined emphasizes these important points:

Returns above costs increased quite consistently with increases in total gains.

Returns above costs decreased noticeably in the groups with over 250 pounds dry lot gain.

Therefore, a practice of planning for weight gains of above 600 pounds, but planning for about 400 pounds of that gain to be winter and pasture gain combined, and less than 250 pounds dry lot gain, gives the greatest opportunity for profit.

Table 11 summarizes this study by phases and for the entire program. Figure 4 gives the graphic presentation of the relationship for the entire program.

Effect of Month of Purchase on Returns above Costs

The steer records were classified by month of purchase and average returns were computed on this basis. No definite trend favoring any particular buying season can be identified from this sample. Approximately 75% of the steers were purchased in the two month period of October and November. (232 of 311 records for which purchase dates were available)

Because of this grouping the records were also divided into the first, second and third ten day periods in each month and average returns per head computed. Of the periods with more than ten purchases per ten days, highest returns came from the steers purchased the last ten days of September, the first ten days of October and the first ten days of November. There are

Table 11. Steer gains as related to returns above costs.

Range of gains	No. of records	Ave. gain per head	Ave. returns per head above costs
Winter gain			
Less than 100#	18	72 #	\$ 46.30
101 - 150#	37	134 #	\$ 38.21
151 - 200#	76	180 #	\$ 50.28
201 - 250#	98	226 #	\$ 47.88
251 - 300#	48	274 #	\$ 44.36
301 and more	18	329 #	\$ 60.54
Summer gain			
Less than 100#	78	86 #	\$ 32.91
101 - 150#	117	127 #	\$ 43.13
151 - 200#	66	179 #	\$ 59.56
201 - 250#	28	229 #	\$ 76.53
251 - 300#	4	274 #	\$ 64.96
301 and more	2	340 #	\$ 15.91
Dry Lot gain			
Less than 100#	25	73 #	\$ 43.36
101 - 150#	32	132 #	\$ 47.93
151 - 200#	62	181 #	\$ 56.04
201 - 250#	80	225 #	\$ 51.73
251 - 300#	61	273 #	\$ 43.02
301 - 350#	22	321 #	\$ 25.81
351 and more	13	368 #	\$ 42.78
Total gain			
Less than 350#	7	322 #	\$ 33.99
351 - 400#	5	372 #	\$ 35.52
401 - 450#	24	422 #	\$ 37.74
451 - 500#	34	475 #	\$ 45.84
501 - 550#	52	528 #	\$ 47.56
551 - 600#	66	575 #	\$ 44.85
601 - 650#	53	621 #	\$ 50.60
651 - 700#	32	674 #	\$ 53.81
701 and more	22	725 #	\$ 57.36

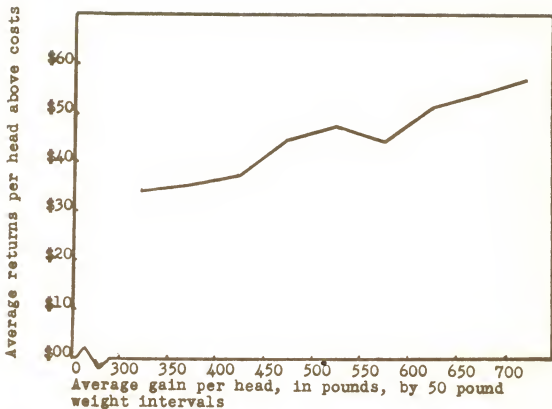


Fig. 4. Total steer gains per head for wintering, grazing and full feeding phases combined, grouped by 50 pound gain intervals and related to average returns per head above costs.

no great differences shown and no definite pattern of differences; therefore, these data would indicate that the best time to buy the cattle is when the weight, flesh and quality of cattle desired are available in sufficient numbers to permit good selection of the cattle. Normally, October and November offer the best possibilities for selection and have the further advantage of being early enough to permit use of a full wintering period for securing moderate cost gains. There are no indications from this study, however, that there were major disadvantages to purchases in September, December, January, or February. Table 12 lists the average returns by month of purchase.

Table 12. Average returns per steer, by month of purchase.

Month	Number of Records	Average return per steer
August	6	\$64.63
September	26	\$44.83
October	131	\$44.35
November	101	\$49.72
December	17	\$43.04
January	19	\$48.62
February	6	\$54.51
March	4	\$ 3.74
April	1	\$94.05

Steer Gains per Head per Day for All
Phases of Program Combined

The steers averaged 1.47 pounds daily gain for all phases of the program combined. Table 13 lists this gain by years. It will be noted that daily gains averaged 1.39 pounds for 1949 through 1952; 1.55 pounds for 1953 through 1955; and dropped

back to 1.48 for 1956 through 1958.

These differences are not large enough to be of great concern. The most plausible explanation for the three higher years seems to be that they occurred during the middle of the drought years. Due to shortage and high price of roughage, the tendency for substituting more grain for roughage would push daily gains up. While pastures were shorter during those years, the available forage would have been of good quality as long as it lasted, in contrast to the more abundant but more washy forage in the more humid years such as 1951. "Stilbestrol" was first used commercially in 1955, so could account for none of the higher gains in 1953 and 1954. If it increased average gains in 1955 and later years, other factors must have offset these increased daily gains after 1955.

Table 13. Gains per head per day for all phases of program combined.

	: Year	: Number Records	: Gains per head per day
Steers	1949	31	1.35 #
	1950	53	1.42 #
	1951	20	1.35 #
	1952	33	1.43 #
	1953	36	1.53 #
	1954	39	1.55 #
	1955	31	1.58 #
	1956	25	1.50 #
	1957	20	1.47 #
	1958	24	1.46 #
	Total records	312	
	Average gain		1.47 #

SECTION II. HEIFERS

A total of 61 heifer records are included in the analysis. Two of these records do not list the number of heifers in the lot; 59 records include 4,706 heifers. This averages 79 heifers per record.

Results when Heifers were Grazed Before Full Feeding, Compared with Results when Heifers Went on Full Feed Directly from the Wintering Phase

The heifer records were divided into those which were wintered, grazed and then fed out; and those which went to the feed lot directly from the wintering phase without going to grass. Table 14 gives comparisons of the results.

Table 14. Comparison of results when heifers were grazed before finishing, with results when heifers went directly to dry lot from wintering phase.

	: 35 lots heifers, : wintered, grazed, : then fed out	: 26 lots heifers, : wintered and : then full fed
Total gain	431 #	386 #
Cost of gain per cwt.	\$16.30	\$19.22
Days heifers owned	336 days	263 days
Price received per cwt.	\$23.00	\$24.10
Average date marketed	Oct. 21	July 12
Returns per head above costs	\$38.34	\$33.13

The heifers which were full fed directly after wintering had two advantages. They were owned a shorter time, by about two and one-half months, than those which were grazed before finishing. They also sold at \$1.10 per hundred more. However, the heifers which were grazed before finishing had three

advantages. They averaged 45 pounds per head more gain; the cost of gain was \$2.92 per hundred less; and the returns above all costs were \$5.21 per head greater.

On the basis of this comparison, it would appear that both methods have useful places under certain Kansas farm conditions. For those farmers without convenient access to sufficient grass to graze the heifers, going to the feedlot directly after the wintering phase should work out well. For those in position to choose between using grass or not using grass, the choice could well be made on the basis of which season is most favorable from the labor standpoint, weight and condition of the heifers toward the end of the wintering phase, and market expectations. Where grass is owned or for any other reason needs to be used in the cattle operation, the greater gains and lower cost of gains secured when grass is used are recommendations for use of this method. However, because of the possibility of getting heifers too heavy for desirable market weights, they will usually need to go to the feed lot before the end of the full grazing season.

Brome grass pasture, where adapted to soil and climatic conditions, fits exceptionally well in the deferred feeding of heifers. It can be heavily grazed in May and early June, the period grazing fits best in the heifer program. In much of the brome grass area of Kansas, brome grass does not furnish desirable grazing in normally hot and dry summer weather. For this reason it is not as well adapted to the steer program, since most farmers wish to take advantage of most of the normal grazing season for the steer program. It does provide good fall grazing

in most years and thus can be utilized to advantage in starting the replacement calves in the fall.

Relationship of Purchase Weight of Heifers
to Returns above Costs

The heifer records were divided into 50-pound weight brackets, based on purchase weights, and the returns above all costs were compared on the basis of their percentage of the original cost of the heifers. For example, the first heifer record showed a return of \$32.06 per head above all costs. This lot of heifers was purchased for \$119.77 per head. Returns above all costs, therefore, were 27% of the original cost. As this lot of heifers was purchased weighing 413 pounds, the lot was tabulated in the group, 376-425 pounds. Dollar returns per head above all costs and purchase costs for all heifers in each weight bracket were totaled. The percentage for each bracket was then computed from these totals.

Table 15 and Figure 5 show the results in tabular and graphic form. A decided advantage for the light weight heifer calves is indicated by this rather small sample of 61 heifer records. Heifers in the lightest group, which weighed less than 325 pounds at purchase time, showed returns per head above all costs, which were 78% of the purchase cost.

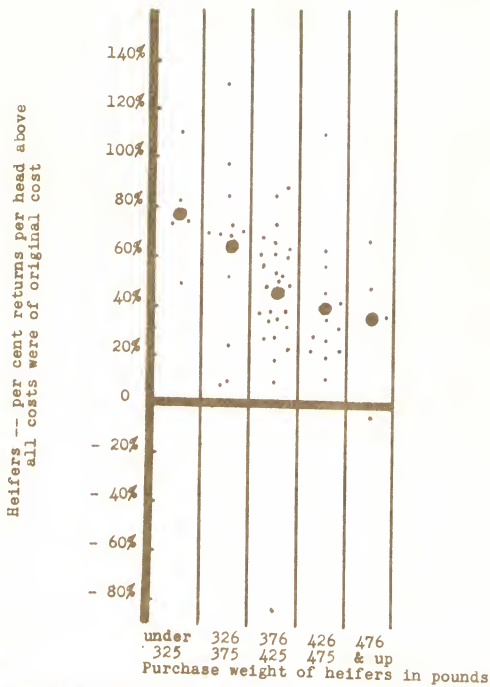
The next heavier weight bracket, consisting of heifers weighing 326-375 pounds at purchase time, showed returns per head above all costs which were 62% of the original cost. There were twelve lots of heifers in this group.

There were 27 lots of heifers which weighed between 376 and 425 pounds at purchase time. These heifers returned above all costs 42% of the original cost. The fourth weight bracket consisted of 13 lots of heifers weighing 426 to 475 pounds at purchase time. The return above all costs from this group averaged 39% of the original cost. The heaviest group of heifers consisted of 4 lots of heifers which weighed above 476 pounds; they averaged 499 pounds at purchase and returned above all costs 34% of the original cost.

A similar study of steer records, which appears in Section I, includes over five times the number of observations shown here. The analysis of steer records does not indicate this strong an advantage for the light weight cattle. However, the general tendency is in the same direction as shown by the heifers - lower returns on the heavier cattle.

Since many stockmen are somewhat limited in the capital available for investment in feeder cattle, this study indicates that limited funds may be invested to somewhat greater advantage in calves not beyond 425 pounds weight, in the case of heifers, and 500 pounds in the case of steers.

Extra care must be exercised in purchasing light weight calves, to avoid getting calves which are light because they are "hard doers" or because they are sick. Calves which are light because they are young are in general the ones to be desired.



Legend: Average returns for weight group ●
Returns for one record .

Fig. 5. Heifer returns per head above all costs, as per cent of original cost by weight groups.

Table 15. Relationship of purchase weight of heifers to returns above cost.

Weight range, time of purchase :	Number of records included :	% returns above costs are of purchase cost of heifers :
Less than 325 #	5	78%
326 - 375 #	12	62%
376 - 425 #	27	42%
426 - 475 #	13	39%
476 # and up	4	34%

Returns and Gains from Heifers Wintered at a High Level, Compared with Those Wintered at a Moderate Level

Comparisons made were (1) weight gains per day for the wintering period, (2) total gains for the entire period managed, (3) length of time the heifers were owned and (4) returns above costs.

In dividing high level wintering from moderate level wintering, heifers receiving a full feed of silage, hay or cereal pasture (singly or in combination), plus the equivalent of over two pounds grain or over one pound of protein supplement daily (singly or in combination), are classed as high level. All those wintered below this level are classed as wintered at a moderate level.

The breaking point for dividing the winter rations into "moderate" and "high" level wintering was determined in consultation with Lot F. Taylor, Extension Specialist in Animal Husbandry, Kansas State University. It is believed that heifers wintered with over two pounds grain, in addition to a full feed of

good roughage, will normally end the wintering period with too much flesh to warrant going to grass with them. Rations below this level will usually put the heifers in condition to use some grass to good advantage, if that seems desirable for any reason.

Table 16 gives the comparisons.

Table 16. Comparison of results from heifers wintered at a moderate nutritional level, with results from heifers wintered at a high nutritional level.

	: 15 lots heifers : wintered at a : moderate nutri- : tional level	: 36 lots heifers : wintered at a : high nutrition- : al level
Average daily winter gain	.91 #	1.06 #
Average total gain, all phases	443 #	403 #
Number of days to complete all phases	339 days	298 days
Average returns per head, above costs	\$40.72	\$36.48

In this study, information from ten records was insufficient for accurate determination of the level of wintering; therefore, only 51 records were used.

Heifers wintered at a high nutritional level had two advantages. These were .15 pound per day faster gains during the wintering phase and 41 days less ownership of the cattle. However, total gains for those wintered at a moderate level averaged 40 pounds more; and the returns above all costs were \$4.24 per head in their favor.

Based on these records, the management decision as to whether to winter heifer calves at a moderate or high nutritional level, evidently should be made on the basis of whether the

heifers are to be grazed for a period before full feeding. If they are to be grazed, the moderate level of wintering would have the advantage of less wintering cost. If they are to be full fed directly from the wintering phase, the level of winter nutrition could well be decided on the basis of the time the heifers are to be marketed. High level wintering will shorten the time necessary to finish the heifers.

These on-the-farm results tie in fairly closely with nine years of research work done in the Department of Animal Husbandry at Kansas State University.¹ Over 200 heifers were used in experiments where part of the heifers were wintered with two pounds of grain, protein supplement and high quality roughage; part were wintered with protein supplement and high quality roughage; and part were wintered on dry bluestem pasture and protein supplement. In general, the increased gains from feeding grain in the winter were erased during the pasturing and full feeding phases that followed. Smith states, "After 9 years of study, we've concluded at Kansas State that grain is not necessary in the wintering ration for heifer calves on a wintering-grazing-fattening program, if the heifers get good quality roughage and a protein supplement."²

¹E. F. Smith, Department of Animal Husbandry, Kansas State University, Kansas Agricultural Situation, October, 1959, p. 6.
"Are You Shoveling Away Your Profits?"

²Ibid.

SECTION III

COMPARISONS BETWEEN STEER AND HEIFER RECORDS

Included in this study were 316 steer records and 61 heifer records. There were 19,700 steers and 4,706 heifers in the records which listed the number of cattle involved. Thus, a total of 377 records involving 24,406 steers and heifers, over a ten year period, are included.

Comparison between Steer and Heifer
Daily Gain, and Cost of Gain

Average gains per head per day were computed for 312 steer records and for 60 heifer records.

For the entire group, the steers averaged 1.47 pounds gain per day throughout all phases of the program; and the heifers, 1.35 pounds. The heifers which went directly to full feeding from the wintering phase gained 1.48 pounds. Those heifers which were more comparable to the steers, in that they were grazed for a period before going to dry lot, gained 1.28 pounds. This shows .19 pound per day greater gain for the steers.

The heifers were purchased at an average weight of 401 pounds, and sold averaging 813 pounds for the 61 lots; the 26 lots which went to grass averaged 405 pounds at purchase and 824 pounds sale weight. This compares with a purchase weight of 477 pounds average for all steers, and sale weight of 1,035 pounds. Considering that the heifers were lighter than the steers, both at purchase and at time of sale, no advantage in rate of gain, in

comparison to the size of the cattle, can be given to the steers.

Table 17 gives the comparisons.

Table 17. Gains per head per day for all phases of program combined and cost of that gain.

	: : Number records :	: Gains per : head per day :	: Cost per : cwt. gain :
Steers	312	1.47 #	\$17.99
Heifers grazed before finishing	35	1.28 #	\$16.30
Heifers finished without grazing	26	1.48 #	\$19.22

Regarding the cost of gain comparisons, only 1 heifer record for 1952 and 1953 is included in those 26 which were grazed and then finished, while 60 steer records for these two years are included. These were the two years of highest costs of gains. This difference in the number of observations in those high years accounts for much of the \$1.69 per hundred difference in costs between the steer records (\$17.99 per hundred) and the comparable heifers (\$16.30 per hundred). The value of grass in reducing cost of gains is well illustrated by the fact the heifers which were finished without going to grass had a cost of gain of \$19.22 per hundred, or \$2.92 per hundred more than the heifers which were grazed.

Comparison of Death Losses Reported From Steers and from Heifers

Death losses are a factor to be considered. They are reported for the years, 1949 through 1954, but were not reported for the last four years of the study. No information is avail-

able as to when the losses actually occurred, i.e. whether shortly after purchase, or later in the feeding period.

Since there are only 19 heifer records used during the first six years of the study, any conclusions based on this small sample should not be taken too seriously. The death loss reported among the steers was .75%; and among the heifers, 1.06%. This was 95 steers, out of 12,672 reported in 219 herds; and 13 heifers, of 1,224 reported in 19 herds. Of the 108 losses, 40 were single head losses, while 68 occurred as losses of 2 to 7 head in 23 herds.

Comparison of Steer and Heifer Returns above Costs as Per Cent of Purchase Costs

Operating capital is frequently a limiting factor of production for Kansas cattlemen. For this reason, there is interest in selecting types of projects which return as high a labor income as possible for the dollars invested. Therefore, returns for both the steer and heifer projects were computed on the basis of returns above all costs, as a per cent of the purchase cost, for each year. These percentages were totaled and compared between steers and heifers. Table 18 lists the comparisons.

Variations on this basis were wide. In the steers, those marketed in 1950 showed a labor income of 105% of the original cost. In other words, they returned more above all costs than the original cost of the cattle. Two years later, those sold in 1952 averaged a net loss which amounted to 12% of the original cost of the calves. For the ten year period, they returned

above all costs 46% of their purchase cost.

High year for the heifers was also 1950, when they returned above all costs, 89% of the purchase price. In 1953 the heifers showed 39% loss on this basis. However, only three records are included in 1950 and only two in 1953. For the ten year period the heifers returned above all costs, 48% of their purchase price.

Since the steers' average return on this basis, 46%, is so near the heifers' 48%, no basis for a management decision between the two classes is apparent, from this point.

Table 18 lists the comparisons by years.

Table 18. Comparison of returns from heifers and from steers, on the basis of the per cent return on the original investment.

Year	No. of steer records	% returns are of original cost	No. of heifer records	% returns are of original cost
1949	33	36 %	5	17 %
1950	53	105 %	3	89 %
1951	21	61 %	2	60 %
1952	34	-12 %	1	7 %
1953	36	7 %	2	-39 %
1954	39	70 %	6	60 %
1955	31	15 %	9	35 %
1956	25	39 %	6	54 %
1957	20	57 %	15	59 %
1958	24	54 %	12	53 %
Ave. of all records ¹	316	46 %	61	48 %

¹Average used here was computed as the sum of the total per cent by years, divided by 316 for steers and 61 for heifers.

SUMMARY

This thesis is an analysis of the effect of some fundamental marketing and management practices on returns from steers and heifers handled on the Kansas deferred feeding system. Data were secured from 316 steer feeding records and 61 heifer feeding records secured from Kansas stockmen by county agricultural agents; and summarized by Extension Livestock Specialists, Lot Taylor, Wendell Moyer and V. E. McAdams. The records include 24,406 cattle and were from 54 widely scattered counties, from all over Kansas. Heaviest concentrations of records were from south central through central and northeast Kansas counties. Ten years, 1949 through 1958, are included.

Data for some items were incomplete in some records; therefore, the number of steer records analyzed for different items varies from 295 to 316, and heifer records vary from 51 to 61.

"Returns", as used throughout the thesis, refers to returns per head above all costs for cattle, feed, equipment, interest, veterinary, selling costs, etc. The term is thus essentially the labor income per head.

The thesis includes separate analyses of steer and heifer records, and a comparison of some items between steer and heifer records. These are discussed under Sections I, II, and III.

Section I. Steers

The steers were purchased at an average weight of 477 pounds and sold averaging 1,035 pounds. Thus, gains were 117% of the

purchase weight. As a result, cost of gains had a slightly larger total effect on returns than did purchase costs. Cost of gains averaged \$17.99 per hundred for the ten years, and in each year was below the sale price of the steers. Even though sale price was below the purchase costs in four of the ten years, the cost of gain was low enough to prevent actual dollar losses on the steers in all years except 1952, for the average of all records for the year. Losses that year averaged \$18.45 per head; the high year was 1950, with returns of \$109.23 per head. Ten year average returns were \$46.98 per steer; the records averaged 63 steers each; thus, labor income averaged \$2,959.74 per record.

A study of the effect of price level on minus feeding margins, i.e. having to sell fat cattle for less than they had cost as feeders, showed that at high price levels, considerably more minus margin could be absorbed by cost of gains than at moderately low price levels. For example, steers sold in 1949 at \$26.26 average per hundred and had cost, as calves the previous fall, \$29.01 per hundred. This is \$2.75 per hundred minus margin. The steers returned \$33.03 per head. With \$2.57 minus margin in 1953, but approximately \$3.50 per hundred lower price level, the steers returned \$14.86 per head. In 1955, at a relatively low price level, fat steers averaged \$19.70 per hundred sale price. This was only an \$0.80 per hundred minus margin, but at this price level the steers only returned \$5.72 per head.

In the years, 1923 through 1959, a study of Kansas City market price quotations shows that cattle feeders faced the probability of minus feeding margins on this type of cattle, in ten

of the thirty-seven years.

A comparison of records in the study with Kansas City market price quotations, shows four minus margins in the market reports and four in the records used in this study, three of these being identical years and one different in each case. For the ten years, in nine cases the records show either a larger plus feeding margin than the market reports showed, or if the margin was minus, it was by a smaller amount than the market reports. This indicates that the record-keeping cattle feeders were able, by thus better understanding their problems, to do a better than average job in nine of the ten years.

Variations by month of sale were of particular interest. The number of days managed, sale weights, total gain and returns all increased almost directly in relation to later sales, starting with August and running through January. There was a wider variation in returns in December and January, indicating that while returns averaged higher in December and January, October and November still had less probability of serious losses.

A further study of the ten years was made, dividing them into four years of declining prices and six years of increasing prices. Selling the steers not later than November was especially desirable in years of declining prices, while holding them into December or January increased returns substantially in years of increasing prices.

This trend, toward higher average returns from December and January marketing of deferred fed steers, should be noted as an

evidence of a shifting in the steer marketing structure. Evidently, more fat cattle are now being marketed during the early fall months from deferred feeding operations and commercial feed lots. Therefore, Kansas stockmen who wish to take more complete advantage of the grazing season to secure lower cost gains on their cattle have a better opportunity to do so and still market the steers to good advantage, than was true in earlier years. The exception which still holds is that in years of declining prices, selling by November is more desirable.

Steer calves weighing 401 to 500 pounds at purchase time paid higher returns, when calculated as per cent return on their original cost, than did calves and steers weighing 551 to 650 pounds at purchase time. This averaged about 50% for the 401 to 500 pound calves; about 33% for the 551 to 650 pound calves and steers. This is an advantage in the ratio of about 3 to 2 for the calves. Actual purchase cost of the 401 to 500 pound calves was \$25.80 per hundred; and for those in the 551 to 650 pound range, \$22.63 per hundred.

Total gain was of more importance to returns than when the gain was secured, according to the comparison of winter, pasture, dry lot, and total gain to returns. Of the three separate phases, the larger gains in the pasture phase evidently were of more importance than large gains in the other phases. Returns increased quite consistently with total gains. The statistical r^2 , or coefficient of determination, for this relationship, shows

94.1% of returns is explained by total gains secured. Returns decreased in groups with above 250 pounds dry lot gain. Based on this study, the following recommendations seem justified:

1. Plan to secure over 600 pounds gain per steer.
2. Plan for about 400 pounds of this gain to be winter and pasture gain combined, and less than 250 pounds dry lot gain.

The month of purchase showed no definite trend favoring buying at any certain time, though approximately 75% were purchases in October and November. Therefore, buying when the weight, quality and flesh of cattle desired are available in sufficient numbers to permit good selection of the cattle, seems most desirable.

Steer gains per head per day for all phases combined averaged 1.47 pounds, and varied from 1.35 pounds in 1949 and 1951 to 1.58 pounds in 1955.

Section II. Heifers

The heifers were purchased averaging 401 pounds, averaged 412 pounds gain and sold averaging 813 pounds.

The heifer records were divided into 35 records where the heifers were wintered, grazed and then fed out; and 26 records where they were fed out directly following the wintering phase.

The advantages from full feeding directly from the wintering phase were that the cattle were owned a shorter time and marketed

two and one-half months earlier; and sold at \$1.10 per hundred higher. They returned \$33.13 per head above costs.

The advantages for those grazed before selling were that they gained more - 386 pounds for those going directly to dry lot, and 431 pounds for those grazed first. This is 45 pounds more gain. Cost of gain was \$2.92 per hundred less. Returns above costs were \$38.34, or \$5.21 per head higher.

Since there were advantages each way, a management decision as to which method is most desirable, may be based on whether grass needs to be utilized by the heifers, and whether early marketing seems most desirable.

The light weight heifer calves had a distinct advantage over the heavier ones on the basis of the per cent returns above costs were of the purchase cost. Heifers weighing 276 to 325 pounds at purchase time returned above all costs 78% of the purchase costs. By 50-pound increases in weight brackets, the per cent returns dropped to 62, 42, 39 and 34 per cent.

The heifer records were divided into those wintered at moderate nutritional levels, and those wintered at high nutritional levels. Basis of division was that heifers receiving above the equivalent of two pounds grain per day (or one pound protein supplement per day), in addition to a full feed of hay, silage or cereal pasture, alone or in combination, were considered wintered on a high nutritional level. All others included received less grain or protein supplement but did receive a full feed of hay, silage or cereal pasture.

The heifers wintered at a high nutritional level outgained the others .15 pound per head per day (1.06 pounds to .91 pound) during the wintering phase; and were owned 41 days less (298 days to 339 days). However, the heifers wintered on a moderate level outgained them for the entire period by 40 pounds per head (443 pounds to 403 pounds) and showed \$4.24 per head higher returns (\$40.72 to \$36.48).

A management decision on which is the most desirable level for wintering, again appears to be directed to whether grass is to be used in the program, and whether early marketing is important. If grass is to be used, and if there is no particular urgency toward early marketing, wintering at a moderate level appears to have a slight advantage.

Section III. Comparisons Between Steer and Heifer Records

Average gains per head per day for the entire program were 1.47 pounds for steers and 1.35 pounds for heifers. For the heifers which were more comparable to the steers in that they were grazed before full feeding, gains were 1.28 pounds per head per day, or .19 pound less than the steers.

Since the steers were purchased averaging 477 pounds and heifers purchased averaging 401 pounds, and steers sold averaging 1,035 pounds and heifers sold averaging 813 pounds, this apparent advantage of the steers in gain per day has little or no meaning, based on the differences in weight of the two classes of cattle.

Cost of steer gains averaged \$17.99 per hundred. For

heifers which were grazed before finishing, cost was \$16.30 per hundred, and for those finished without grazing, \$19.22. The lower average cost for heifers which went to grass is primarily because only 1 heifer record is included for the two highest cost-of-gain years, 1952 and 1953; while 60 steer records are included for these two years. The value of grass in reducing cost of gains is reflected in the \$2.92 per hundred higher cost for the heifers fed out without going to grass.

Death losses were reported for only the first six years of the study. Out of 12,672 head in 219 steer records, 95 steers were reported lost; 13 heifers were reported lost out of 1,224 head in 19 heifer records. This is .75% loss in steers, 1.06% loss in heifers. Due to the small size of the heifer sample, no definite conclusions should be drawn from this study, beyond the obvious fact that death losses are a real factor to be considered.

Steers returned above all costs 46% of the purchase cost, and heifers returned 43% on the same basis. No management decision can well be made between the two classes on this basis. Rather, the amount of grass to be utilized (with steers using far more than heifers), time to market the cattle (with heifers normally selling earlier), and personal preference of the operator are more useful criteria for this decision.

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation to his major instructor, Associate Professor John H. McCoy of the Department of Economics and Sociology, for his helpful suggestions, counsel and guidance in the preparation of this thesis.

Appreciation is expressed to the following faculty members, who also made useful suggestions at various points in preparation of the thesis: from the Department of Animal Husbandry, Professors Lot F. Taylor and Draytford Richardson, Associate Professors Wendell A. Moyer and Edgar F. Smith, and Assistant Professors Berl A. Koch and V. E. McAdams; and from the Department of Economics and Sociology, Professor Milton L. Manuel, Associate Professor Paul L. Kelley, and Assistant Professor Frank Orazem.

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PROFIT FACTORS IN MARKETING AND MANAGEMENT
OF KANSAS DEFERRED FED STEERS
AND HEIFERS

by

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B. S., Kansas State University, 1937

AN ABSTRACT OF A MASTER'S THESIS

submitted in partial fulfillment of the
requirements for the degree

MASTER OF SCIENCE

Department of Economics and Sociology

KANSAS STATE UNIVERSITY
OF AGRICULTURE AND APPLIED SCIENCE

1960

This thesis is an analysis of the effect of some fundamental marketing and management practices on the returns from steers and heifers handled on the Kansas deferred feeding system. Data were secured from 316 steer feeding records and 61 heifer feeding records. A total of 24,406 cattle are reported in the records. The ten years, 1949 through 1958, are included. The records are from 54 counties.

"Returns" refers to returns per head above all costs for cattle, feed, equipment, interest, veterinary, selling costs, etc. The term is thus essentially the labor income per head.

Section I. Steers

The steers weighed 477 pounds average at purchase, gained 558 pounds, and sold weighing 1,035 pounds on the average. Cost of gains averaged \$17.99 per hundred, and in each year was below the sale price of the steers. Sale price was below purchase price in four of the ten years, but actual cash losses occurred in only one year, 1952, when the steers failed to pay out for all costs other than operators' labor, by \$18.45 per head. Labor income per head for the ten year period, averaged \$46.98.

At a high price level, a negative feeding margin of \$2.75 per hundred was absorbed and satisfactory returns of \$33.03 per head realized; but at low price levels, a negative margin of only \$0.60 per hundred between purchase and sales price reduced the returns to \$5.72 per head.

The number of days managed, sale weights, total gain and returns increased almost directly in relation to later sales, starting with August and running through January; but in the four years of declining prices it paid to sell not later than November. The average advantage of holding these steers for December or January sale is evidently a change in market trends in recent years.

Steer calves weighing 401 to 500 pounds at purchase paid 50% returns on their original cost; those weighing 551 to 650 pounds paid 33%. This is an advantage in the ratio of 3 to 2 for the lighter weight calves, which cost \$25.80 per hundred, compared to \$22.63 for the heavier group quoted.

Total gain was related closely with profits. The statistical r^2 , or coefficient of determination, for this relationship shows that 94.1% of profits was explained by total gains. On the basis of this study, it is recommended that feeders plan to secure over 600 pounds gain on steers in this program, with about 400 pounds of this gain to be winter and pasture gain combined.

Data did not indicate any particular advantage for any one month of purchase.

Steer gains per head per day averaged 1.47 pounds for the wintering, grazing and full feeding phases combined.

Section II. Heifers

Thirty-five records showed heifers were wintered, grazed and then full fed; twenty-six records showed they were fed out directly following the wintering phase.

Heifers which were grazed were owned about two and one-half months longer, cost \$2.92 less per hundred gain, gained 45 pounds more, and returned \$38.34 per head above costs. Those full fed directly sold at \$1.10 per hundred higher, but returned only \$33.13 per head above costs.

The light weight heifer calves had a distinct advantage over the heavier ones on the basis of returns as a per cent of the original cost. This varied from 78% and 62% for the groups weighing 275 to 325 pounds and 326 to 375 pounds at purchase, down to 39% and 34% for the groups weighing 426 to 475 pounds and 476 pounds and up.

Heifers wintered at a high nutritional level outgained those wintered at a moderate level, .15 pound per head per day during the wintering phase, and were owned 41 days less. But those wintered at moderate levels outgained them 40 pounds per head for the entire period and showed \$4.24 per head greater returns.

Thus, management decisions concerning whether to winter heifers at moderate or high nutritional levels, as well as whether to feed directly after the wintering phase or to graze them for a period before feeding, appear directed to whether grass needs to be marketed through the heifers, and whether early marketing seems most desirable.

Section III. Comparisons of Steers with Heifers

Average gains per head per day for the entire program were 1.47 pounds for steers and 1.35 pounds for heifers. Steers weighed 477 pounds to start, and heifers weighed 401 pounds. The

steers weighed 1,035 pounds at sale, and heifers, 813 pounds.

Death losses were reported for only the first six years of the study. Reported losses were 0.75% in steers, 1.06% in heifers.

Steers returned above all costs, 46% of the original cost; heifers, 43%. This does not give a basis for a management decision between the two classes.