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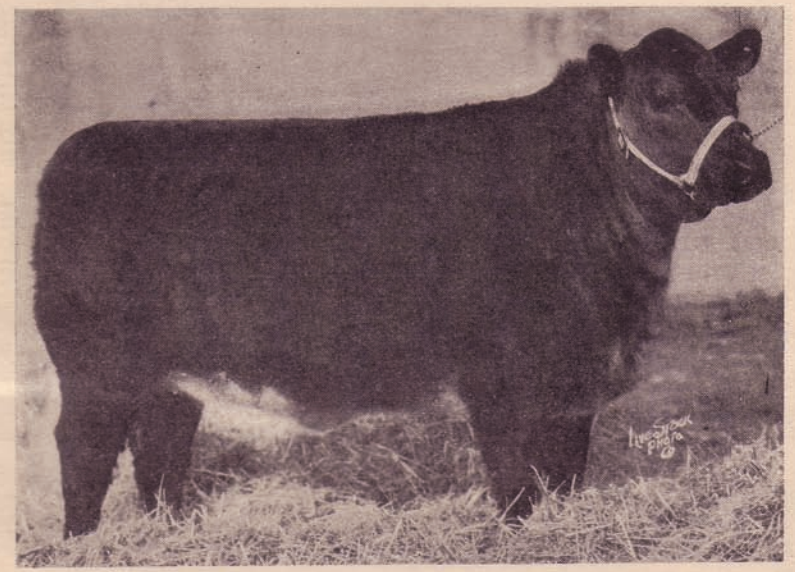

BLUE CLOVA, SPAYED HEIFER, CHAMPION SHORTHORN AND RESERVE GRAND CHAMPION AT THE NATIONAL WESTERN FAT STOCK SHOW, DENVER, 1929. BRED AND SHOWN BY THE UNIVERSITY OF NEBRASKA.

THE UNIVERSITY OF NEBRASKA
COLLEGE OF AGRICULTURE
EXPERIMENT STATION
LINCOLN
W. W. BURR, Director

CONTENTS

GENERAL SUMMARY

1. Two-year-old steers, yearling steers, and steer calves were compared in a series of feeding trials with spayed heifers of similar ages. Also, yearling steers and steer calves were compared with open yearling heifers and heifer calves. The two-fold object was to discover any influences sex or age might have on the quality and quantity of beef produced.

2. In all cases steers made greater and more economical gains than spayed heifers. Likewise, steer calves made slightly greater gains at less cost than open heifer calves. Yearling open heifers made slightly greater and more economical gains than yearling steers.

3. In all cases open heifers made greater gains at materially less cost than spayed heifers of similar ages. There was no advantage in spaying, and the criticism often voiced against open heifers that repeated heat periods tend to inhibit the amount of beef produced was not borne out in these trials with yearlings and calves.

4. Heifers, both spayed and open, fatten faster than steers. This is due to the greater amount of skeletal growth made by the steers.

5. In most cases, the price discrimination against feeder heifers was greater than the price discrimination against fat heifers. Thus there was a wider margin between buying and selling price with the heifers than with the steers. The feeding period should ordinarily be from 50 to 75 days shorter for heifers than for steers of two-year-old and yearling ages, and from 25 to 50 days shorter for heifer calves than for steer calves. This is an important factor with heifer stock, since the deposition of fat on heifers, especially heavier ones, is so great as to become a liability, and actually lowers the value of the animal because of wastiness in cutting the carcass. In these trials yearling and two-year-old heifers produced sufficient finish to sell to best advantage after being fed from 75 to 100 days.

6. The dressing percentage of steers and heifers of the yearling and two-year-old ages varied little, but in the case of the calves both open and spayed heifers dressed considerably more than the steers.

7. The carcasses of the two-year-old steers and spayed heifers were carrying too much fat for the retail trade but produced fancy ribs and loins for hotels and restaurants. The two-year-old spayed heifers were criticized severely by the beef men because of wastiness.

8. Both steers and heifers of all ages, excepting the steer calves, produced choice carcasses that were well marbled, of good color, and of desirable shape. The steer calves graded only medium to good because of lack of finish.

9. Cutting yields of the carcasses showed that steers of all ages cut a smaller percentage of hindquarter than heifers of similar ages. The percentage of forequarter in steers was greater in the two-year-olds than in the calves. Very little difference existed between steers and heifers in the percentage of the more valuable cuts. Without exception, the steers had heavier rounds than the heifers and lighter loins.

10. The discrimination against heifers was justifiable only from the standpoint of wastiness. This applied especially to the two-year-old spayed heifers. From the beef man's standpoint, the open heifer calves produced the most desirable carcasses of the entire eight lots of cattle.

11. In a comparison of ages, the results of these trials were clearly in favor of the calves of both sexes insofar as economy of production and popularity of the carcass of the finished animal were concerned.

12. Two-year-olds made the greatest gains during the first 100 days of the feeding period and the calves during the last 100 days. The gains made by the yearlings were quite uniform thruout the 175-day periods. This was true with both heifers and steers.

13. Two-year-olds made greater gains than yearlings and the yearlings exceeded the calves.

14. The two-year-olds required more feed to produce 100 pounds of gain than the yearlings and they in turn more than the calves. The difference between two-year-olds and yearlings was considerably less than between yearlings and calves. This was true with spayed and open heifers as well as steers.

15. Because of their greater economy of gains, calves can be handled on a narrower margin between cost and sales price than older cattle.

16. Calves of both sexes produced carcasses of popular type. Retailers in most parts of the country greatly prefer handling such beeves, because they cut without waste and furthermore are the kind their trade desires.

17. In these trials the results obtained from a study of differences due to age agree in every respect with the conclusions drawn in Nebraska Bulletin 229, *Fattening Steers of Various Ages*, 1928. Age differences were similar in both sexes.

Sex and Age as Factors in Cattle Feeding

H. J. GRAMLICH AND R. R. THALMAN

Varying economic conditions and changes in the demands of the meat consuming public have been responsible for the turns that have taken place in the beef industry during recent years. Both feeder and producer must recognize and conform to these changes if they are to continue in business. Among the most important of these changes have been the turn toward the marketing of lighter cattle and the gradual disappearance from feed lots of two- and three-year-old animals. Furthermore, the cattle population of the United States is fast reaching stabilization with the resulting effect that more heifers are being marketed, since only one-fourth of the heifer crop is needed to replace worn-out breeding animals. A price discrimination against heifers of a few dollars per head affects the producer very materially. It also affects the feeder in that less profit is realized upon his operations unless he purchases on a correspondingly low basis. This prejudice against heifers is of long standing but is backed up by very little, if any, extensive experimental evidence showing that heifers are inferior to steers either in the quality or quantity of meat produced. The Englishman actually prefers heifer beef and, probably because of the same reasons or prejudices, the American prefers beef from steers.

Realizing the increasing importance of the heifer problem from the standpoint of the producer, feeder, and consumer, the Nebraska Experiment Station undertook to compare steers and heifers in a series of trials both in the feed lot and in the beef. It was hoped that these experiments would yield results which would bring out existing differences, if any, between steers and heifers both in quality and quantity of beef produced and thus prove or disprove many of the complaints against heifers. The results of these trials are summarized in this bulletin. Age as well as the sex factor has been considered, since two-year-olds, yearlings, and calves were included in these trials.

At the time these experiments were conducted the world was experiencing a period of overproduction of beef cattle. Prices of feeder and fat cattle were low. Female stock of all kinds was being unloaded on the markets in excessive numbers, and prices of all animals of this sex were relatively lower than usual. A comparison of the initial cost of heifers and steers in these trials emphasizes this point.

With each period of overproduction, there is a tendency on the part of the range man to return to the practice of spaying at least a portion of each year's heifer crop. If this practice is not resorted to, he must market his surplus female stock

as calves or yearlings with resultant low prices, or hold over and later market as twos or threes. Holding heifers open until the age of two or three years is extremely difficult under ordinary range conditions. It was virtually impossible to obtain two-year-old open heifers at the time the experiments reported herein were started. Consequently no open heifers were included in the comparisons with two-year-olds.

Where spaying is practiced, the heifers can be run with steers without the usual disturbance caused by "in heat" periods. Extra labor and pastures are not required for spayed heifers. More effective culling of the breeding herd is made possible by definitely eliminating the possibility of inferior heifers becoming pregnant. The practice of spaying shows a distinct tendency to follow the cattle cycle, increasing during periods of overproduction and decreasing as beef demand overtakes cattle supply.

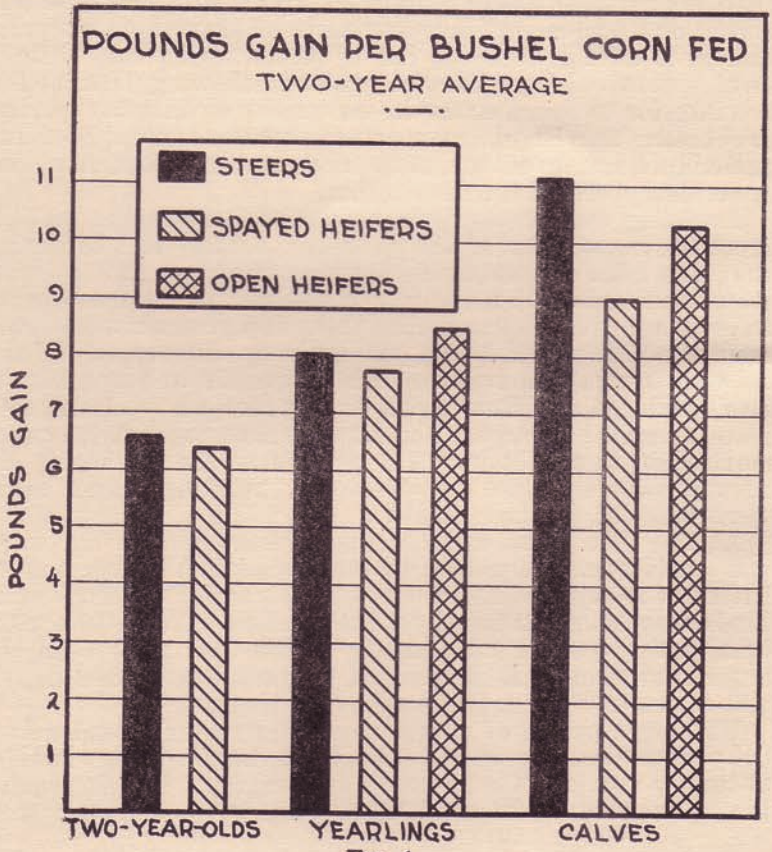

FIG. 1.

OBJECTS OF THE EXPERIMENT

During the years 1921 to 1924 inclusive, the University of Nebraska experimented with steers of various ages fed upon like rations to ascertain the effect of age upon rate and economy of gain. Similarly the age factor enters into the trials reported in this bulletin; the primary object was, however, to ascertain what results would be obtained where steers were compared with heifers, both spayed and open. Two-year-old steers, yearling steers, and steer calves were compared with spayed heifers of similar ages; also, yearling steers and steer calves with open yearling heifers and open heifer calves. In addition to the sex factor, these trials afford an age study with steers, spayed heifers, and open heifers in the two-year-old, yearling, and calf classes. A further object in these experiments was to determine, if possible, what differences exist between steer and heifer beef that would justify price discrimination against the latter.

CATTLE USED

The cattle used in each of the two experiments reported in Parts I and II were procured near Brownlee, Nebraska, and represent an average run of good-quality Sand Hill Herefords. All lots in each trial were from a single herd. They were chosen for uniformity in age, quality, and breeding.

DIVISION OF THE CATTLE

In the trial carried on during the winter of 1924-25 there were eight lots of cattle, two of two-year-olds, three of yearlings, and three of calves. The following year (1925-26) only seven lots were used, because it was impossible to obtain, that year, spayed heifer calves of the same quality and breeding. The number of animals per lot varied from eleven in the two-year-old lots to twenty in the calf lots. The lots are designated as follows:

Lot 1—Two-year-old steers,
Lot 2—Two-year-old spayed heifers,
Lot 3—Yearling steers,
Lot 4—Yearling spayed heifers,
Lot 5—Yearling open heifers,
Lot 6—Steer calves,
Lot 7—Spayed heifer calves (one year only),
Lot 8—Open heifer calves.

RATIONS FED

To facilitate comparisons between steers and heifers of various ages, it was deemed advisable to use a simple and practical ration. Shelled corn and alfalfa hay were chosen for this purpose, since they are most commonly used by Nebraska

FIG. 2.—Lot 1, two-year-old steers, 1925.

FIG. 3.—Lot 2, two-year-old spayed heifers, 1925.

cattle feeders. Inasmuch as these tests were planned to compare animals rather than rations, it was necessary to feed all lots in the same manner. Cottonseed cake was used in one of the trials reported in the Appendix.

The corn used in these trials graded No. 2 yellow. Moisture tests were taken at regular intervals, and the figures presented in tables represent a 14 per cent moisture basis corn. The alfalfa was largely of first and second cutting, quite leafy, and of good color. It would have graded as No. 2 on the market.

FEED PRICES

In the first test, 1924-25, corn was charged into the experiment at $1.25 per bushel and alfalfa hay at $15.00 per ton.

The next year alfalfa was valued at the same price and corn at 70 cents per bushel. To make the two trials directly comparable the figures given in this bulletin represent 70-cent corn and 15-dollar alfalfa. These figures have been selected since they represent nearly an average feed cost to Nebraska feeders. Anyone desiring to change the tables to represent a different feed cost may easily recalculate by multiplying the amount of feed required to produce 100 pounds of gain by the new feed price.

FEED LOT EQUIPMENT

The feeding plant consisted of an open shed facing east, with shed space approximately 20 feet square in addition to a lot 20 by 100 feet for each group of cattle. The floor of the entire lot, including the shed, was of concrete. The hay was fed in racks under the shed in all lots and grain in bunks in the open. Water and block salt were before the cattle at all times.

LENGTH OF TRIALS

Both trials reported in Parts I and II were carried over a 175-day period, or approximately six months. The first trial ran from October 23, 1924, to April 16, 1925, and the second from November 9, 1925, to May 3, 1926. The three additional trials reported in the Appendix varied in length.

FEEDING

The cattle were hand-fed both corn and alfalfa twice daily, morning and evening. It was planned to get all lots on a full feed of corn gradually and to diminish the amount of hay fed as the corn allowance was increased. This was accomplished by allowing a limited feed of corn at first and gradually in-

FIG. 4.—Lot 3, yearling steers, 1925.

FIG. 5.—Lot 4, yearling spayed heifers, 1925.

creasing the allowance until the cattle were receiving all they would clean up within one or two hours. As previously stated, all lots received the same ration, shelled corn and alfalfa.

WEIGHING, APPRAISING, AND MARKETING

Initial and final weights were based on individual weights taken upon three consecutive days. Period weights were taken every 25 days. The animals were driven to the scales at the same time of the day each time and handled under as nearly the same conditions as possible. The initial value of the cattle represents an appraisal made by a commission man at the time the experiments were started. The values given at that time were representative of what similar animals in carload lots were selling for on the Omaha market. Beginning on the seventy-fifth day, appraisals were made at the end of every 25-day period until the end of the trials.

Following the official close of the test the cattle were marketed at Omaha and the financial statement of the project based upon the price received. For 36 hours before shipping the cattle were fed oats and prairie hay to prepare them for shipment. They were not held off water at any time.

CARCASS STUDIES

The cattle used in these trials were purchased by Armour and Company and the carcasses sold thru their Jones Street Branch in Omaha. The co-operation rendered by the packers made cutting tests possible. An effort was made to select three average carcasses from each lot and cut them into the standard wholesale cuts. Insofar as possible this plan was followed thruout both years' trials. All cutting was done by an expert and extreme care was exercised so that all parts would be exactly alike. The weight of each part was recorded

FIG. 6.—Lot 5, yearling open heifers, 1925.

and, for purposes of comparison, the data obtained were calculated in percentage of the carcass weight. In addition, rib cuts from representative carcasses were sent to Washington, D. C., for quality and palatability studies. The co-operation rendered by the U. S. Department of Agriculture made possible tests of color, cooking, palatability, toughness, and chemical composition. It is planned to publish these data in a technical paper at a future date and they are therefore not included in this bulletin. Photographs of the cuts were also taken both in Omaha and in Washington, some of which are to be found on subsequent pages.

FIG. 7.—Lot 6, steer calves, 1925.

FIG. 8.—Lot 7, spayed heifer calves, 1924.

FIG. 9.—Lot 8, open heifer calves, 1925.

EXPERIMENTAL DATA

The material presented in Parts I and II of this bulletin represents two years' experiments, the second year's work being an exact duplication of the first. Since the results secured in both trials coincide quite closely, the two years' data have been thrown together and a weighted average taken. Upon the pages which follow only a two-year average will be

presented. Those who wish to study each experiment in detail may do so by referring to the tables presented in the back of the bulletin. Figure 1 and Tables 1, 6, and 11 show the complete results, based on a weighted average of the two years' work.

PART I—THE INFLUENCE OF SEX UPON QUANTITY AND QUALITY OF BEEF

TWO-YEAR-OLD STEERS VS. TWO-YEAR-OLD SPAYED HEIFERS—LOTS 1 AND 2

Lots 1 and 2 consisted of two-year-old steers and two-year-old spayed heifers. The average initial weight of the steers was 792 pounds and of the heifers 721 pounds—a difference of 71 pounds in favor of the steers. Since both groups were of the same age, quality, and breeding, the sex factor was no doubt responsible for the difference in initial weight.

AVERAGE DAILY RATION

Table 1 shows that the daily consumption of corn was approximately equal in both lots. The steers consumed 17.91 pounds of corn and the heifers 17.34. During the trial the steers consumed a total of 57.97 bushels of corn and the heifers 54.19 bushels. In addition to the corn, 5.61 pounds of alfalfa was eaten daily by the steers and 5.64 pounds by the heifers.

DAILY GAINS

While the daily ration of the two lots was practically the same, the steers gained 2.12 pounds per head daily and the heifers 1.99 pounds—a difference of .13 pound in favor of the steers. In terms of total gain, the steers outgained the heifers by 23 pounds in 175 days.

In Table 2 it will be noted that the greatest daily gain was secured during the first 100 days; this was especially true in the case of the heifers. The most noticeable drop in gain of both lots occurred during the last 25 days, with the heifers decreasing in rate of gain significantly faster than the steers. That the heifers did not continue to increase in weight as fast as the steers was due to the fact that they made less skeletal growth and fattened somewhat faster.

FEED REQUIRED TO PRODUCE 100 POUNDS GAIN

In producing 100 pounds of gain the steers consumed 844 pounds of corn and 266 pounds of alfalfa. The heifers on the other hand consumed 869 pounds of corn and 285 pounds of alfalfa. Stating it in another way, the heifers required 25 pounds more corn and 19 pounds more alfalfa than the steers to produce 100 pounds of gain. Altho the heifers were

slightly less efficient in feed utilization, the difference is hardly significant, and discrimination between two-year-old steers and spayed heifers on this score would seem to be unjustified.

COST OF 100 POUNDS OF GAIN

With corn at 70 cents per bushel and alfalfa hay at $15.00 per ton, 100 pounds of gain made by the steers cost $12.50

TABLE 1.—*Two-year average, 1924-26—two-year-olds*

	Lot 1 11 steers	Lot 2 11 spayed heifers
Average daily ration:		
Shelled corn	17.91	17.34
Alfalfa hay	5.61	5.64
Average initial weight per head	792	721
Average final weight per head	1163	1069
Average gain per head	371	348
Average daily gain per head	2.12	1.99
Selling weight per head, Omaha	1152	1058
Shrink in transit (24 hrs. Lincoln to Omaha)	28	25
Shrink in live weight, per cent	2.46	2.37
Carcass weights (shrunk 2.2 per cent)	696	639
Dressing percentage cold, based on selling wt.	60.46	60.44
Dressing percentage cold, based on final exp. wt.	59.85	59.77
Feed required per 100 pounds gain:		
Shelled corn	844	869
Alfalfa hay	266	285
Feed cost of 100 pounds gain	$12.50	$13.02
HOGS FOLLOWING		
Pounds pork produced per head cattle	50.28	50.67
Value at $11.75 per hundredweight	$5.90	$5.95
Extra feed cost per head cattle	.30	.38
Profit per head cattle	5.60	5.57
FINANCIAL STATEMENT		
Initial value per hundredweight	$7.78	$6.63
Initial cost per head	61.54	47.84
Feed cost per head	47.83	46.59
Interest on investment at 8 per cent	3.30	2.77
Cost of marketing	2.81	2.68
TOTAL COST PER HEAD	115.48	99.80
Necessary selling price per hundredweight	9.54	8.91
Value per hundredweight at market	9.83	8.68
RETURNS PER HEAD INCLUDING PORK PROFIT	118.32	97.32
PROFIT OR LOSS PER HEAD	$2.84	–$2.48

TABLE 2.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Two-year-old steers.....	2.14	2.60	1.94	2.19	1.71	2.12
Two-year-old spayed heifers....	2.18	2.16	1.99	1.93	1.34	1.99

TABLE 3.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Two-year-old steers.....	$7.78	$8.56	$8.58	$9.01	$9.90	$9.83
Two-year-old spayed heifers...	6.63	8.18	8.18	8.63	9.00	8.68

as against $13.02 for the heifers. As in the previous study [1] a difference of 52 cents per 100 pounds of gain would hardly seem significant.

HOGS FOLLOWING

The pounds of pork produced per head of cattle was approximately equal in both lots. The steers were credited with 50.28 pounds of pork and the heifers with 50.67 pounds. In terms of pork profit per head of cattle, there was a difference of only 3 cents in favor of the steers. Both lots produced approximately one pound of pork per bushel of corn fed to the cattle.

INITIAL VALUE, SALES PRICE, AND APPRAISALS BY 25-DAY PERIODS

Table 3 gives the initial value and selling price together with the appraisals by 25-day periods. The severe discrimination against heifers is brought out by the figures on initial cost. The steers were valued at $1.15 per hundredweight higher than the heifers. It is also interesting to note that the steers outsold the heifers by exactly the same amount, or $1.15 per hundredweight. Had the heifers been sold at any time prior to the 150-day period the price discrimination would have been considerably less. The spread between the steers and heifers increased rapidly during the last 50 days' feeding. This was due to the fact that the steers were fast developing sufficient finish for the packer and the heifers were becoming excessively fat and somewhat "cowy" in appearance.

[1] Gramlich, H. J. *Fattening Steers of Various Ages.* Nebr. Exp. Sta. Bul. 229. 1928.

FINAL WEIGHTS AND SHRINK IN SHIPMENT

The steers were 71 pounds heavier at the start of the trials and gained 23 pounds per head more than the heifers, hence they had a weight advantage at the close of 94 pounds per head. On the market the steers weighed 1,152 pounds and the heifers 1,058. This represents a shrink of 29 pounds for the steers and 25 pounds for the heifers; or the steers shrank 2.46 and the heifers 2.37 per cent.

PROFIT OR LOSS

It will be noted in Table 4 that the steers showed a profit of $2.84 per head and the heifers a loss of $2.48. Had the steers been marketed at the end of 150 days' feeding they would have shown a profit of $5.83 (Table 3). The difference in returns between the two periods in the case of the steers is due in part to market fluctuations and in part to decreased gains during the last 25-day period. Had the steers been marketed at any time prior to the 150-day period they would have shown a loss of from $2.25 to $3.06 per head. The heifers, on the other hand, could have been sold at any time during the 100- to 150-day period and would have returned a profit ranging from 86 cents to $4.43 per head. While both

TABLE 4.—*Estimated profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Two-year-old steers	−$2.82	−$3.06	−$2.25	$5.83	$2.84
Two-year-old spayed heifers	2.87	.86	2.83	4.43	−2.48

groups dropped in value during the last 25 days, the heifers were more affected than the steers. The spread in price between the steers and the heifers at the end of 150 days was 90 cents per hundred and at the end of 175 days, this spread had increased to $1.15. Even tho the heifers had not decreased in value 32 cents per hundredweight during the last 25 days, they would still have shown a loss. Decreased gains may be considered as responsible for excessive cost during the last 25-day period. In view of this fact it would appear doubtful that two-year-old spayed heifers should be fed longer than 150 days.

DRESSING PERCENTAGES

The percentage of beef yielded by the two lots differed so little as to give hardly any appreciable advantage to either lot when based on selling weights at the market. The steers yielded 60.46 as against 60.44 per cent for the spayed heifers. While occasional loads of two-year-old cattle dress slightly

higher, these yields are not to be regarded as disappointing for cattle fed 175 days. Shrinking the carcass weights taken on the killing floor 2.2 per cent gives a cold weight of 696 pounds for the steers and 639 pounds for the spayed heifers.

When the dressing percentage was calculated on a basis of final experimental weight, which includes shrink in transit, the yield was, of course, lowered, but the ratio between lots remained practically the same. On this basis, the steers dressed 59.85 and the heifers 59.77 per cent. A yield of slightly under 60 per cent based upon final experimental weights tends to emphasize the fact that both lots were reasonably well finished at the termination of the trials.

CUTTING YIELDS

As previously stated, cutting tests were made on carcasses from each lot. Table 5 gives the results of these tests. The discussion that follows is based upon the average of the two years' trials. However, each separate trial is included in the table in order to bring out the similarity of results obtained over two different years. The figures are expressed in per-

TABLE 5.—*Cutting yields, percentage of carcass weight—two-year average*

Cuts	Two-year-old steers Lot 1			Two-year-old spayed heifers Lot 2		
	Trial 1	Trial 2	Av.	Trial 1	Trial 2	Av.
Fore	51.94	51.32	51.63	49.67	49.71	49.69
Hind	48.06	48.68	48.37	50.33	50.29	50.31
Chuck	27.98	26.56	27.27	25.69	25.54	25.61
Rib	9.70	10.52	10.11	9.40	10.06	9.78
Plate	12.22	11.54	11.88	12.51	11.75	12.13
Shank	2.63	2.79	2.71	2.46	2.34	2.90
Lion	17.94	18.36	18.17	18.91	19.79	19.35
Round	22.63	22.85	22.74	21.43	21.72	21.57
Flank	4.78	3.95	4.37	5.54	5.46	5.50
Kidney	2.52	2.37	2.44	3.95	2.67	3.31
Hanging tender	.59	.71	.65	.....	.65	.65

centage of the carcass weight. It will be noted that all columns do not total 100 per cent. This discrepancy is due to slight variations in weighing which are almost unavoidable in work of this nature. Especially is this true where many cuts are being weighed in rapid succession. The error, however, will be found to be extremely small and does not affect the results or the conclusions.

A comparison of two-year-old steers with two-year-old spayed heifers afforded by Table 5 shows that the most noticeable difference occurred between the percentage of fore and hind quarters. The steers produced 1.94 per cent more forequarter than the heifers with a correspondingly lower percentage of hindquarter. Carrying the comparison on thru the forequarter cuts, we find that the steers produced 1.66

FIG. 10.—A, rib cut from 2-year-old steer, 1925; B, rib cut from 2-year-old spayed heifer, 1925.

per cent more chuck, .33 per cent more rib, and slightly less plate and shank than the heifers. These results are in accord with what might be expected, since steers, stags, and bulls show a tendency toward a greater development of the forequarters than females.

While the heifers showed a greater percentage of hindquarter, the percentage of round was in favor of the steers, the difference being 1.17 per cent. It is interesting to note that the percentage of loin favored the heifers by 1.18 per cent. This difference is not due entirely to kidney fat, since all loins were trimmed to a standard shape before being weighed. The heifers also showed more flank, probably due to the large amount of udder fat contained on highly finished heifers. That heifers acquire more internal fat than steers is evidenced by the difference in percentage of kidney suet, the heifers producing .87 per cent more than the steers.

GENERAL REMARKS

In general it may be said that both lots produced choice carcasses of desirable color and shape. Extensive marbling was in evidence in the carcasses of both groups, as will be noted in Figure 10. The heifers, however, excelled in this respect and carried considerably more external and internal fat than the steers. From one loin of the spayed heifers, 19 pounds of kidney suet was removed. These findings would indicate that the chief difference between the steer and heifer carcasses was in degree of finish and that the heifers should have been marketed from 25 to 50 days sooner. The price

discrimination against the two-year-old heifers was justifiable only from the standpoint of wastiness.

The loins and ribs from both groups of the two-year-old cattle were trimmed and went to fancy hotel and restaurant trade. Both steer and heifer carcasses, and especially the latter, were rather too ripe to meet the demands of the trade of the retail shops. While several cuts from these animals were very attractive, they possessed such a covering of external fat as well as fat intermixed with the lean that most buyers would have failed to appreciate their merit.

YEARLING STEERS VS. YEARLING SPAYED HEIFERS VS. YEARLING OPEN HEIFERS—LOTS 3, 4, AND 5

As in the study of the two-year-olds a comparison was made between yearling steers and spayed heifers of the same age. Yearling open heifers were also included in the comparison.

The average initial weight of the steers was 635 pounds, of the spayed heifers 589 pounds, and of the open heifers 570 pounds. In other words, the steers outweighed the spayed heifers by 46 pounds per head and they in turn outweighed the open heifers 19 pounds per head.

DAILY RATION

The daily consumption of corn per head was approximately 14 pounds for the steers. They consumed slightly more than either of the heifer lots. In spite of the fact that the spayed heifers had a slight weight advantage over the open heifers, they consumed less corn, the difference being .59 pound. In terms of bushels of corn, the steers consumed 44.73, the spayed heifers 42.38, and the open heifers 44.22. Little variation existed among the three lots in the consumption of alfalfa, each taking approximately 7¼ pounds per head daily.

DAILY GAINS

As will be noted in Table 6 the average daily gain made by the steers was 2.10 pounds for the 175-day period. The spayed heifers gained 1.89 pounds, giving the steers, in terms of total gain, an advantage of 37 pounds per head in 175 days. With the exception of slight periodic variations, the greater gain made by the steers was quite consistent thruout the 25-day periods. While the steers made a somewhat greater daily gain than the spayed heifers, they failed to gain as rapidly as the open heifers, Lot 5. Again in Table 6 it will be seen that the open heifers gained slightly more than the steers and .26 pound per day more than the spayed heifers. For the entire period the open heifers produced 376 pounds of beef as against 367 for the steers and 330 for the spayed heifers. While Lot 5 did not gain as rapidly during the first 75 days

TABLE 6.—*Two-year average, 1924-26—yearlings*

	Lot 3 14 steers	Lot 4 14 spayed heifers	Lot 5 14 open heifers
Average daily ration:			
Shelled corn	14.56	13.56	14.15
Alfalfa hay	7.23	7.21	7.41
Average initial weight per head	635	589	570
Average final weight per head	1002	919	946
Average gain per head	367	330	376
Average daily gain per head	2.10	1.89	2.15
Selling weight per head, Omaha	977	883	927
Shrink in transit (24 hrs. Lincoln to Omaha)	28	30	23
Shrink in live weight, per cent	2.88	3.44	2.51
Carcass weights (shrunk 2.2 per cent)	588	527	562
Dressing percentage cold, based on selling weight	60.17	59.78	60.67
Dressing percentage cold, based on final exp. weight	58.72	57.33	59.39
Feed required per 100 pounds gain:			
Shelled corn	702	723	665
Alfalfa hay	340	380	340
Feed cost of 100 pounds gain	$11.33	$11.53	$10.86
HOGS FOLLOWING			
Pounds pork produced per head cattle	38.28	39.71	35.29
Value at $11.75 per hundredweight	$4.50	$4.68	$4.15
Extra feed cost per head cattle	.53	.56	.72
Profit per head cattle	3.97	4.12	3.43
FINANCIAL STATEMENT			
Initial value per hundredweight	$7.89	6.39	$6.14
Initial cost per head	49.99	37.64	34.94
Feed cost per head	42.23	40.00	41.53
Interest on investment at 8 per cent	2.71	2.19	2.11
Cost of marketing	2.57	2.43	2.50
TOTAL COST PER HEAD	97.50	82.26	81.08
Necessary selling price per hundredweight	9.57	8.85	8.38
Value per hundredweight at market	9.66	8.63	8.74
RETURNS PER HEAD INCLUDING PORK PROFIT	98.37	80.33	84.32
PROFIT OR LOSS PER HEAD	$0.87	−$1.93	$3.24

TABLE 7.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Yearling steers	2.24	1.95	1.59	2.37	2.07	2.10
Yearling spayed heifers	1.94	1.96	1.68	1.95	1.84	1.89
Yearling open heifers	2.11	2.34	1.83	2.17	2.36	2.15

as Lot 3, the gains were more consistent thruout the trials, showing no significant decrease during the last 25-day period. This was not true with Lot 4, the spayed heifers, since their gains decreased even more rapidly than those of Lot 3, the steers. Apparently there was no advantage in spaying insofar as daily gain was concerned, and the criticism often voiced of open heifers, that repeated heat periods tend to inhibit the amount of beef produced, was not borne out in these trials with yearling cattle.

FEED REQUIRED PER 100 POUNDS GAIN

Altho the steers consumed a larger daily allowance of corn than the spayed heifers, they required less feed to produce 100 pounds of gain. As shown in Table 6, the steers produced 100 pounds of beef on 702 pounds of corn, while the spayed heifers required 723 pounds. The amount of alfalfa consumed was also less for the steers, 340 as against 380 pounds. In other words, the steers produced the same amount of gain as the spayed heifers on 21 pounds less corn and 40 pounds less alfalfa. While this difference is not great, it does show a slight advantage in favor of the steers over spayed heifers in economy of gain. In the case of the open heifers a greater efficiency was displayed than with either steers or spayed heifers. While the steers and open heifers required the same amount of alfalfa, 100 pounds of gain was produced by the open heifers on 37 pounds less corn. The spayed heifers, on the other hand, consumed 58 pounds more corn and 40 pounds more alfalfa in producing 100 pounds of beef. This ranks the open heifers first, the steers second, and the spayed heifers third in economy of gain.

COST OF 100 POUNDS GAIN

The cost per 100 pounds of gain measured in terms of dollars and cents was highest for the spayed and lowest for the open heifers. With alfalfa at $15 per ton and corn at 70 cents per bushel the cost of producing 100 pounds of beef was 47 cents less with open heifers than with steers and 67 cents less than with spayed heifers.

HOGS FOLLOWING

The difference in the amount of pork produced by hogs following steers, spayed heifers, and open heifers was not sufficient to deserve much consideration. The spayed heifers were credited with 39.71 pounds of pork per head, the steers with 38.28, and the open heifers with 35.29 pounds. Considering the amount of pork produced by the spayed heifers it is not surprising that more feed was required to produce 100 pounds of gain, since they consumed a smaller daily allowance of corn than either the steers or open heifers. There would appear to be a direct correlation between the amount of feed required to produce a pound of beef and the amount of pork produced. Those cattle that made the most economical gains produced the least pork.

INITIAL VALUE, SALES PRICE, AND APPRAISALS BY 25-DAY PERIODS

As in the case of the two-year-olds, there existed considerable spread in initial price between steers and spayed heifers

of equal quality. This sex discrimination was even more severe in the case of open heifers. The steers were valued into the experiment at $7.89 per hundredweight, the spayed heifers at $6.39, and the open heifers at $6.14. This represents a spread of $1.50 per hundred between steers and spayed heifers and $1.75 between steers and open heifers. With so great a spread between lots in the initial value it is rather interesting to note how rapidly the spread narrowed

TABLE 8.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Yearling steers	$7.89	$8.46	$8.46	$8.86	$9.89	$9.66
Yearling spayed heifers	6.39	8.54	8.69	8.50	9.03	8.63
Yearling open heifers	6.14	8.75	8.64	8.81	8.98	8.74

as the feeding period progressed. At the end of 75 days the open heifers in Lot 5 were valued at a higher price per hundredweight than either the steers or spayed heifers. At the end of 125 days very little difference existed between appraisals on steers and open heifers, but the spayed were 31 cents per hundred below the open heifers. Apparently another 25 days' feeding was necessary for the steers to command a premium over the heifers. This is brought out by the fact that at the end of 150 days the spread between the steers and open heifers had increased to 91 cents per hundred. It is also interesting to note that at this time all lots would have sold at higher figures than at any other time. This was due to a gradual improvement in finish up to this time and to a lower market when the cattle were sold.

The margin between initial value and selling price was $2.60 per hundredweight for the open heifers, $2.24 for the spayed heifers, and $1.77 for the steers. From the standpoint of return to the feeder, this gives both spayed and open heifers considerable advantage over steers.

FINAL WEIGHTS AND SHRINK IN SHIPMENT

On the market the steers weighed 977, the spayed heifers 883, and the open heifers 927 pounds. This represents a shrink of 28, 30, and 23 pounds per head respectively. In terms of percentage the steers shrank 2.88, the spayed heifers 3.44, and the open heifers 2.51 per cent. It will be noted that the open heifers shrank practically one per cent less than the spayed heifers and somewhat less than the steers. The shrink in shipment, however, was not great in any case.

PROFIT OR LOSS

Altho the financial results of a feeding experiment may vary from one year to another, depending upon the price of feeds and cattle, they do prove helpful to the feeder in comparing one group of cattle, or one ration, with another. In these trials it will be noted in Table 10 that the open heifers showed a profit of $3.24 per head as against 87 cents for the

TABLE 9.—*Estimated profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Yearling steers	−$2.55	−$4.36	−$4.02	$4.80	$ .87
Yearling spayed heifers	3.47	4.47	2.06	5.18	−1.93
Yearling open heifers	9.01	7.64	7.04	7.21	3.24

steers. The spayed heifers showed a loss of $1.93 per head. The difference in returns between steers and open heifers was due in part to the greater efficiency displayed by the latter, and in part to the difference in the margin between buying and selling price of the two groups. It should be remembered that the steers showed a margin of $1.97 as compared to $2.60 for the open heifers. Likewise, the spayed heifers showed a smaller margin than the open heifers by 36 cents per hundredweight. However, the failure of the spayed heifers to return a profit was due not only to the smaller margin but to their failure to make as rapid and efficient gains as the open heifers. This fact is brought out by comparing spayed heifers and steers. While the spayed heifers showed a 47-cent greater spread between buying and selling price, they returned a loss of $1.93 as compared to a profit of 87 cents per head for the steers.

A study of profit or loss by 25-day periods (Table 9) shows that the open heifers could have been sold at any time between 75 and 150 days and returned more profit than either of the other groups. Likewise, the spayed heifers would have returned more than the steers had they been sold at any time up to the 125-day period. Apparently the steers were much slower than the heifers, either spayed or open, in taking on a finish that would make them attractive to the packer.

DRESSING PERCENTAGES

Based upon market weights, all three groups of cattle yielded well (Table 10). The spayed heifers, however, were the low yielders even tho they shrank considerably more than the open heifers or steers. That the cattle were carrying

TABLE 10.—*Cutting yields, percentage of carcass weights—two-year average*

Cuts	Yearling steers, Lot 3			Yearling spayed heifers, Lot 4			Yearling open heifers, Lot 5		
	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average	Trial 1	Trial 2	Average
Fore	51.28	52.05	51.66	50.22	49.69	49.95	49.34	48.09	49.22
Hind	48.72	47.95	48.34	49.78	50.31	50.05	50.66	51.91	51.28
Chuck	27.81	27.33	27.57	26.84	24.97	25.90	25.99	24.81	25.40
Rib	9.35	10.74	10.05	9.70	10.60	10.15	9.96	9.82	9.89
Plate	12.15	11.33	11.74	11.75	12.11	11.93	11.65	11.42	11.53
Shank	2.71	2.78	2.75	2.65	2.71	2.78	2.59	2.36	2.47
Loin	18.17	18.33	18.25	18.54	18.90	18.72	18.80	19.78	19.29
Round	23.46	21.44	22.45	22.62	22.01	22.31	23.19	22.05	22.61
Flank	4.51	4.39	4.45	5.31	5.73	5.52	5.48	5.76	5.62
Kidney	2.28	2.95	2.61	2.80	3.06	2.93	2.67	3.40	3.03
Hanging tender	.....	.57	.57	.....	.79	.79	.....	.83	.83

considerable finish at the end of the trials is shown by the fact that the open heifers dressed 60.67 per cent, the steers 60.17, and the spayed heifers 59.78 per cent. The carcass weights for the three groups were 562, 588, and 527 pounds respectively.

The ratio between lots in dressing percentages was changed slightly when yield was calculated upon a basis of final experimental weight. This was due to the fact that the shrink in shipment was not the same in proportion to weight for each lot. On this basis the open heifers dressed 59.39, the steers 58.72, and the spayed heifers 57.33 per cent. Calculated thus, the spayed heifers showed a yield of 2.06 per cent less than the open heifers.

CUTTING YIELDS

As will be noted in Table 10, the steers yielded more fore and less hindquarter than either spayed or open heifers of the yearling class. Expressed in percentage of the carcass weight, the steers cut 51.66 per cent forequarter as against 49.95 for the spayed heifers and 49.22 for the open heifers. The greatest difference in the forequarter cuts between steers and heifers occurred in the chuck, the steers yielding 1.43 per cent more than the spayed and 1.93 per cent more than the open heifers. Very little difference existed between lots in the percentage of rib. The open heifers, however, showed slightly lighter plates and shanks than either steers or spayed heifers.

FIG. 11.—A, rib cut from yearling steer, 1925; B, rib cut from yearling spayed heifer, 1925; C, rib cut from yearling open heifer, 1925.

Considering the hindquarter cuts we find that the open heifers outyielded the steers in percentage of loin by 1.04 per cent. The difference in weight of the loin between spayed heifers and steers was less marked, being only .47 per cent. The round did not differ greatly in any of the groups. More kidney suet was found in the open heifers than in the spayed and they in turn had more than the steers. Likewise, the flank was heaviest in the open heifers and lightest in steers.

GENERAL REMARKS

The yearlings, like the two-year-olds, produced choice carcasses carrying plenty of finish. While both groups of heifers were fatter than the steers and could have been sold at a somewhat earlier date, they were not criticized severely on account of wastiness. They were, however, inclined to be "cowy" in shape, looked more wasty because of excess fat about the udder, and did not carry the straight trim lines of the steers. Severe discrimination in price between steers and heifers of this type and finish seemed not to be justified from the standpoint of either attractiveness or yield of the more valuable cuts.

STEER CALVES VS. SPAYED HEIFER CALVES VS. OPEN HEIFER CALVES—LOTS 6, 7, AND 8

The third series of comparisons made during 1924 to 1926 inclusive had to do with the feeding of calves. It should be kept in mind that the results from spayed heifer calves represent only one year's work. (See Table 32.) It was impossible to secure spayed heifer calves of similar age and breeding during the fall of 1925. (For further comparisons between steers and open heifers see Tables 33, 34, and 35.)

While the average initial weights of the three lots differed slightly, the difference could hardly be considered significant. The steers averaged 382 pounds, the spayed heifers 386, and the open heifers 390 pounds.

DAILY RATIONS

As shown in Table 11 there was very little difference in the amount of feed consumed daily by different lots, each group consuming slightly over 32 bushels of corn per head during the trial. This was true with both the corn and the alfalfa consumption. On a basis of daily ration all three lots should have produced approximately the same amount of beef daily.

DAILY GAINS

Altho the daily rations were almost identical, the steers produced more beef than the open heifers, and they in turn

TABLE 11.—*Two-year average, 1924-26—calves*

	Lot 6 19 steers	Lot 7[1] 17 spayed heifers	Lot 8 17 open heifers
Average daily ration:			
Shelled corn	10.38	10.30	10.44
Alfalfa hay	5.93	5.91	5.92
Average initial weight per head	382	386	390
Average final weight per head	745	677	727
Average gain per head	363	291	337
Average daily gain per head	2.07	1.66	1.92
Selling weight per head, Omaha	723	657	705
Shrink in transit (24 hrs. Lincoln to Omaha)	22	14	18
Shrink in live weight, per cent	3.12	2.13	2.53
Carcass weights (shrunk 2.2 per cent)	412	387	428
Dressing percentage cold, based on selling weight	57.25	59.03	60.72
Dressing percentage cold, based on final exp. weight	55.25	57.20	58.91
Feed required per 100 pounds gain:			
Shelled corn	502	619	544
Alfalfa hay	287	355	310
Feed cost of 100 pounds gain	$8.42	$10.40	$9.13
HOGS FOLLOWING			
Pounds pork produced per head cattle	26.54	23.47	27.86
Value at $11.75 per hundredweight	$3.10	$2.76	$3.23
Extra feed cost per head cattle	.46	.21	.51
Profit per head cattle	2.64	2.55	2.72
FINANCIAL STATEMENT			
Initial value per hundredweight	$7.57	$5.50	$6.25
Initial cost per head	28.90	21.25	24.35
Feed cost per head	31.02	30.26	31.04
Interest on investment at 8 per cent	1.69	1.65	1.55
Cost of marketing	2.21	2.10	2.19
TOTAL COST PER HEAD	63.82	55.26	59.13
Necessary selling price per hundredweight	8.46	8.03	8.00
Value per hundredweight at market	9.41	9.40	9.24
RETURNS PER HEAD INCLUDING PORK PROFIT	70.62	64.31	67.11
PROFIT OR LOSS PER HEAD	$6.80	$9.05	$7.98

[1]Figures for Lot 7 represent one year's work only.

TABLE 12.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Steer calves	1.79	2.09	2.07	2.73	2.25	2.07
Spayed heifer calves	1.52	1.61	1.78	2.40	1.32	1.66
Open heifer calves	1.70	2.05	2.17	2.33	1.86	1.92

more than the spayed heifers. While the difference in gain between steers and open heifers amounted to only .15 pound daily, this difference represents a total of 26 pounds per head in 175 days. The spayed heifers produced 46 pounds less beef than the open heifers and 72 pounds less than the steers. A tendency for steers to gain faster than either spayed or open

heifers is shown in Table 12. During the last 50 days the steers made noticeably larger gains than either of the heifer lots. While the rate of gain of all three groups decreased during the last 25-day period, the spayed heifers showed a drop of 1.08 pounds as compared to .48 pound for the steers and .47 for the open heifers. In every case the daily gains made during the first 75 days were less than those made during the last 100 days. This would indicate that the gain made by calves is influenced materially by the growth factor. No doubt the difference in gain between steers and heifers was in part due to the greater skeletal growth of the steers.

FEED REQUIRED PER 100 POUNDS GAIN

The amount of feed required to produce 100 pounds of gain was less in the case of steers than with either spayed or open heifers. However, the difference between steers and open heifers was much less marked than between open heifers and spayed heifers. As shown in Table 11, the steers produced 100 pounds of beef on 502 pounds of corn, the open heifers on 544 pounds, and the spayed heifers on 619 pounds. The extra corn consumed in producing 100 pounds of gain by the spayed heifers amounted to 117 pounds when compared to the steers and 75 pounds when compared to open heifers. In addition the spayed heifers consumed 68 pounds more alfalfa than the steers and 45 pounds more than the open heifers. It should be borne in mind, however, that the spayed-heifer results represent but one year's trial and that the figures are compared with averages of two years for the other two lots. Had the spayed heifers been compared to steers and open heifers during the same year's trial they would have shown to a better advantage, since all lots required slightly more feed to produce a given gain in Trial 1. (See Table 31.) Tho less marked in the single trial, the economy of gain was considerably in favor of the steers and open heifers. While steers and open heifers consumed the same amount of feed daily, the open heifers required 42 pounds more corn and 23 pounds more alfalfa to produce 100 pounds of beef. The difference is, therefore, not a matter of feed consumption, but rather a difference in gain produced.

COST OF 100 POUNDS GAIN

Whether or not a difference of 42 pounds of corn and 23 pounds of alfalfa in feed required to produce 100 pounds of gain is significant can be seen by referring to Table 11. It will be noted that 100 pounds of gain in Lot 6 cost $8.42 and in Lot 8, $9.13—a difference of 71 cents. This would hardly seem significant enough to justify severe price discrimination against heifer calves as compared to steers of the same

quality. The fact that 100 pounds of gain on the spayed heifers cost 27 cents more than on open heifers and $1.98 more than on steers cannot be accounted for except by the slower gains. Why spayed heifer calves should not gain as fast as open heifers is open to speculation.

HOGS FOLLOWING CATTLE

The amount of pork produced by the hogs following the calves seemingly should not have differed greatly between lots, since there existed so little variation in the amount of corn consumed daily. Contrary to expectations, the lot that gained the least also produced the least pork. This is brought out in Table 11 where it will be seen that the spayed heifers were credited with 23.47 pounds of pork per head as compared to 26.54 pounds for the steers and 27.86 pounds for the open heifers. Giving hogs a value of $11.75 per hundredweight, the pork profit was as follows: $2.64 for the steers, $2.55 for the spayed heifers, and $2.72 for the open heifers.

INITIAL VALUE, SALES PRICE, AND APPRAISALS BY 25-DAY PERIODS

Table 13 shows that the steers were appraised into the trials at $7.57 per hundredweight and the open heifers at $6.25. This represents a spread between steers and open heifers of $1.32 per hundred. The spayed heifers were valued at $5.50 but this should not be compared to the values for the other two lots, which represent an average of two years. The spayed heifers were included in the 1924-25 trial and that year cattle were selling much below the 1925-26 price level. Consequently the initial value of the spayed heifers is out of line as compared to the values representing an average of the two years. Suffice to say that the initial value of the spayed heifers in the fall of 1924 was identical with that given for the open heifers in the same trial.

A comparison of the steers and open heifers presented a noticeable difference in finish at the end of the 75-day period. At that time the open heifers would have outsold the steers by 52 cents per hundredweight. The steers at this stage were not finished enough to interest killers. They were graded as fleshy feeders. On the other hand the heifers gave outward

TABLE 13.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Steer calves	$7.57	$7.51	$7.68	$8.82	$9.54	$9.41
Spayed heifer calves	5.50	7.75	8.00	8.40	9.75	9.40
Open heifer calves	6.25	8.03	8.17	8.57	9.58	9.24

evidence of finish enough to produce good carcasses. Likewise at the end of 100 days the open heifers would still have outsold the steers, but by a slightly narrower margin. This verifies the statement that heifers finish faster than steers even tho they make slightly smaller daily gains. At the end of 175 days the price paid for the cattle favored the steers by 17 cents per hundredweight.

Going back to the 1924 trial and comparing the price received for the spayed heifers with those received for the steers and open heifers, we find that the steers outsold the open heifers and they in turn the spayed heifers. The difference between spayed and open heifers was 10 cents per hundredweight. These figures bring out the difference in cattle prices during the two years. In 1924 there existed a low market on feeder cattle with a correspondingly high fat-cattle market the following spring. Cattle prices during 1925 and 1926 were of the reverse order, a high feeder market followed by a low fat-cattle market.

FINAL WEIGHTS AND SHRINK IN SHIPMENT

Tho lighter than either of the other two groups at the beginning, the steers weighed out of the experiments slightly heavier than either the open or spayed heifers. The final weights of the three groups were 745 pounds per head for the steers, 727 pounds for the open heifers, and 677 pounds for the spayed heifers. The weights on the market at Omaha were 723, 705, and 657 pounds respectively. These weights represent a shrink of 22, 18, and 14 pounds per head for the three groups or in terms of percentage, the steers shrank 3.12, the open heifers 2.53, and the spayed heifers 2.13 per cent. While the shrink was light on all three lots, the steers shrank considerably more than either lot of heifers. No appreciable difference existed in shrink between the open and spayed heifers.

PROFIT OR LOSS

Market fluctuations during various years and the several seasons of the same year affect very materially profit or loss statements. Nevertheless these statements are not without value in interpreting the results of two or more comparisons. In this case they may be used in a measure to indicate differences that existed between steers and heifers.

Table 14 indicates that not until the end of the 150-day period could the steers have been sold at a profit, the most apparent difference occurring from the 125th to the 150th days. During this 25-day period a loss of $2.71 per head was changed to a profit of $3.11 per head. In contrast, the open

TABLE 14.—*Estimated profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Steer calves	-$3.65	-$3.35	-$2.71	$3.11	$6.80
Spayed heifer calves[1]	4.37	4.49	5.68	14.31	9.05
Open heifer calves	3.45	3.89	8.64	12.31	7.98

[1]One year's data only (1924-25).

heifers could have been sold at a profit any time after the first 75 days. During each successive 25-day period the profit per head increased until 150 days was reached. This difference is due to an increase in margin between initial and final values rather than to economy of gain. The open heifer calves carried noticeably more finish than the steer calves during the first 100 days and consequently were worth more to the packer at that time. The marked initial spread in price between steers and open heifer calves was not maintained by the packer.

DRESSING PERCENTAGES

Based upon the selling weight at Omaha, the open heifers were the high yielders of the calf lots, dressing 60.72 per cent. The spayed heifers were second, yielding 59.03 per cent, and the steers scored third with 57.25 per cent. The percentage of beef dressed by the open and spayed heifers was on the whole very satisfactory for cattle of this age and weight. The steers were rather disappointing both in dressing yield and the amount of finish which they showed. This, however, helps to emphasize the fact that more time is required to get steers ready for market than heifers.

TABLE 15.—*Cutting yields, percentage of carcass weights—two-year average*

Cuts	Steer calves Lot 6			Spayed heifer calves	Open heifer calves Lot 8		
	Trial 1	Trial 2	Av.	1 trial	Trial 1	Trial 2	Av.
Fore	50.66	50.11	50.39	48.77	49.65	49.42	49.53
Hind	49.34	49.89	49.61	51.23	50.35	50.58	50.47
Chuck	27.64	26.25	26.94	26.93	26.74	25.63	26.18
Rib	9.21	10.20	9.70	9.37	9.86	10.26	10.06
Plate	11.25	10.83	11.04	10.31	10.39	10.95	10.67
Shank	3.12	2.95	3.03	2.87	3.06	2.74	2.90
Loin	18.56	19.02	18.79	19.15	18.27	19.38	18.82
Round	24.24	24.04	24.14	23.67	24.45	22.68	23.56
Flank	4.39	4.19	4.29	5.45	5.28	5.17	5.22
Kidney	2.08	2.10	2.09	2.46	2.01	2.74	2.37
Hanging tender	.....	.71	.71	.....	.....	.77	.77

The dressing percentage of the open heifers based upon final experimental weights shows an advantage over the steers of 3.66 per cent. This difference is rather significant and indicates that the steers could have been fed somewhat longer. The open heifers also outyielded the spayed heifers by 1.71 per cent.

CUTTING YIELDS

The steers yielded slightly more forequarter than either spayed or open heifers. This difference was due to the relatively heavier chuck, shank, and plate of the steers. It is interesting to note that the steer calves had heavier plates than heifer calves, whereas in the case of yearlings and two-year-olds the opposite was true. Open heifer calves also outyielded the steers in percentage of rib.

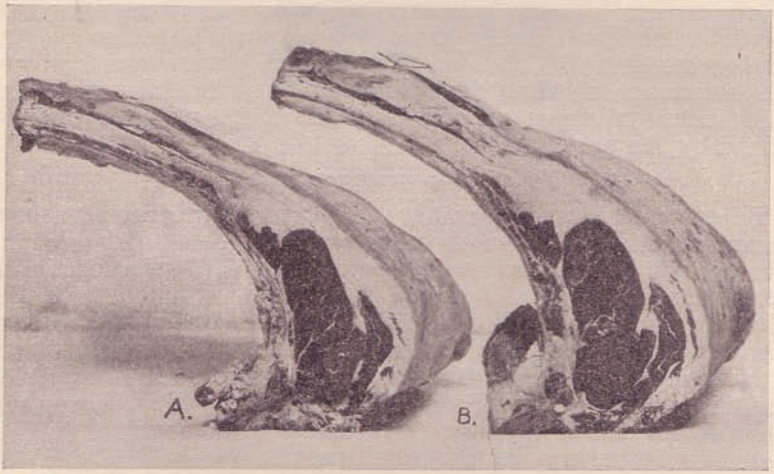

FIG. 12.—A, rib cut from steer calf, 1925; B, rib cut from open heifer calf, 1925.

The most noticeable differences in the hindquarter between steers and heifers were to be found in the percentage of round and loin. The steers outyielded the spayed heifers in round by .47 per cent and they in turn the open heifers by .11 per cent. While the steers were slightly higher in percentage of round, they were lowest in percentage of loin. As in previous comparisons with calves, the percentage of flank and kidney suet was highest in the heifers.

GENERAL REMARKS

On a basis of carcass comparisons there appears to be no good reason for severe discrimination in price between steer

and heifer calves. In fact the heifers produced more attractive carcasses than the steers by virtue of their being somewhat better finished. In the packing house coolers, the open heifer calves were the popular favorites of the entire eight lots. The spayed heifers were preferred to the steers. Again it was demonstrated that heifers fatten more readily than steers of equal age, quality, and breeding. Even with such young cattle as these, extensive marbling was found in the eye of beef. Spayed heifers seemed to hold an intermediate place between steers and open heifers in regard to cutting yields.

PART II—A COMPARISON OF STEERS AND HEIFERS OF VARIOUS AGES

In addition to the sex factor, the trials reported in this bulletin make possible a comparison of two-year-olds, yearlings, and calves in both the steer and heifer classes. Because of the importance of age in the economics of cattle feeding, Part II of this bulletin will be given over to a discussion of age and its influences on the economy of production. However, only a brief discussion of differences due to age will be made, since this subject is treated rather extensively in Nebraska Bulletin 229.

TWO-YEAR-OLD STEERS VS. YEARLING STEERS VS. STEER CALVES—LOTS 1, 3, AND 6

The cattle used in these trials were representative in size of the several ages and were consistent in the two years' work. The average initial weight of the two-year-olds was 792 pounds, the yearlings 635 pounds, and the calves 382 pounds.

DAILY RATION

The daily ration is given in Table 16. It will be noted that the three groups consumed between 5½ and 7¼ pounds of alfalfa per head daily. The two-year-olds consumed 17.91 pounds of corn daily against 14.56 pounds for the yearlings and 10.38 pounds for the calves. This represents an increase of approximately 4 pounds of corn for each year's increase in age. For the entire period the averages of corn consumed per steer in the three lots were 55.97, 44.73, and 32.44 bushels respectively.

DAILY GAIN

The gains made by the three groups of steers varied according to age, the older steers gaining slightly more than the younger ones. However, the difference between the gains made by two-year-olds and yearlings was less than between

yearlings and calves. Based upon 1,000 pounds of live weight, however, the calves outgained the older steers. In terms of total gain the two-year-olds produced 371 pounds of beef, the yearlings 367, and the calves 363 pounds.

The average daily gain by 25-day periods is given in Table 17. It is interesting to note that the gains of the two-year-old steers decreased materially during the last 25-day period.

TABLE 16.—*Two-year average, 1924-26—two-year-olds, yearlings, and calves*

	Two-year-olds Lot 1 11 steers	Yearlings Lot 3 14 steers	Calves Lot 6 19 steers
Average daily ration:			
Shelled corn	17.91	14.56	10.38
Alfalfa hay	5.61	7.23	5.93
Average initial weight per head	792	635	382
Average final weight per head	1163	1002	745
Average gain per head	371	367	363
Average daily gain per head	2.12	2.10	2.07
Selling weight per head, Omaha	1152	977	723
Shrink in transit (24 hrs. Lincoln to Omaha)	28	28	22
Shink in live weight, per cent	2.46	2.88	3.12
Carcass weights (shrunk 2.2 per cent)	696	588	412
Dressing percentage cold, based on selling weight	60.46	60.17	57.25
Dressing percentage cold, based on final exp. weight	59.85	58.72	55.25
Feed required per 100 pounds gain:			
Shelled corn	844	702	502
Alfalfa hay	266	340	287
Feed cost of 100 pounds gain	$12.50	$11.33	$8.42
HOGS FOLLOWING			
Pounds pork produced per head cattle	50.28	38.28	26.54
Value at $11.75 per hundredweight	$5.90	$4.50	$3.10
Extra feed cost per head cattle	.30	.53	.46
Profit per head cattle	5.60	3.97	2.64
FINANCIAL STATEMENT			
Initial value per hundredweight	$7.78	$7.89	$7.57
Initial cost per head	61.54	49.99	28.90
Feed cost per head	47.83	42.23	31.02
Interest on investment at 8 per cent	3.30	2.71	1.69
Cost of marketing	2.81	2.57	2.21
TOTAL COST PER HEAD	115.48	97.50	63.82
Necessary selling price per hundredweight	9.54	9.57	8.46
Value per hundredweight at market	9.83	9.66	9.41
RETURNS PER HEAD INCLUDING PORK PROFIT	118.32	98.37	70.62
PROFIT OR LOSS PER HEAD	$2.84	$.87	$6.80

TABLE 17.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Two-year-old steers	2.14	2.60	1.94	2.19	1.71	2.12
Yearling steers	2.24	1.95	1.59	2.37	2.07	2.10
Steer calves	1.79	2.09	2.07	2.73	2.25	2.07

This was also true of the yearlings, tho the decrease was less marked. On the other hand, the gain made by the calves increased rather than decreased during the last half of the feeding period. This would indicate that the feeding of two-year-old steers is essentially a fattening process, while in the case of calves growth is combined with fattening, tending to produce greater gains over longer periods of time.

FEED REQUIRED FOR 100 POUNDS GAIN

The difference in feed requirements of mature and growing cattle is brought out in Table 16. In producing 100 pounds of gain, the two-year-olds consumed 844 pounds of corn as against 702 for yearlings and 502 for the calves. In other words, the yearlings produced 100 pounds of beef on 142 pounds less corn than the two-year-olds, and the calves on 200 pounds less corn than the yearlings. This represents a difference between calves and two-year-olds of 342 pounds of corn in the amount of feed required to produce 100 pounds of gain. This illustrates very clearly the greater economy of the calves. The conclusion drawn in Nebraska Bulletin 229, that calves make materially more efficient use of feed than yearlings, and they, in turn, more than the two-year-olds, was borne out by the results obtained in these trials.

COST OF 100 POUNDS GAIN

The difference in economy of gain between calves and two-year-olds is illustrated very clearly when the amount of feed required to produce 100 pounds of gain is calculated in terms of dollars and cents. In the two-year-old group, 100 pounds of gain cost $12.50 as against $11.33 for the yearlings and $8.42 for the calves. In percentage, 100 pounds of gain on calves cost 67 per cent as much as on two-year-olds. One hundred pounds of gain on yearlings cost 90 per cent as much as on two-year-olds.

HOGS FOLLOWING

The amount of pork produced by the hogs following the cattle varied in direct proportion to the age. The two-year-old steers produced considerably more pork than the yearlings, and they, in turn, more than the calves. The two-year-old steers were credited with 50.28 pounds of pork, the yearlings with 38.28, and the calves with 26.54 pounds. In other words, the two-year-olds produced slightly less than twice as much pork per head as the calves. The pork produced per bushel of corn consumed by the two-year-old steers was .9 pound. The yearlings produced .84 pound and the calves .82 from like amounts of corn. The pork profit per head of cattle was $5.60 for two-year-olds, $3.97 for yearlings, and $2.64 for calves. The hogs were valued at $11.75 per hundredweight.

INITIAL VALUE, SALES PRICE, AND APPRAISALS BY 25-DAY PERIODS

As noted in Table 18 there was less spread in the initial value between two-year-olds and yearlings than between calves and yearlings. In these trials both yearlings and twos were charged into the experiment at a higher value per hun-

TABLE 18.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Two-year-old steers	$7.78	$8.56	$8.58	$9.01	$9.90	$9.83
Yearling steers	7.89	8.46	8.46	8.86	9.89	9.66
Steer calves	7.57	7.51	7.68	8.82	9.54	9.41

TABLE 19.—*Profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Two-year-old steers	−$2.82	−$3.06	−$2.25	$5.83	$2.84
Yearling steers	− 2.25	− 4.36	− 4.02	4.80	.87
Steer calves	− 3.65	− 3.35	− 2.71	3.11	6.80

dredweight than the calves. Ordinarily the opposite is true. When the cattle were marketed, the three groups of steers sold at prices representing a narrow range. The two-year-olds sold for $9.83, which was 17 cents above the yearlings and 42 cents more than the calves brought per hundredweight. The popularity of light beef is manifested by the fact that while the two-year-olds carried considerably more finish than the calves, they outsold them by only 42 cents.

Considering appraisals by 25-day periods, it is interesting to note that at the end of 75 days the two-year-olds and yearlings would have outsold the calves by approximately $1.05 per hundredweight. This is also true at the end of 100 days, and is due to the fact that the older cattle were carrying considerably more finish at that time than the calves. At the end of 100 days, the calves would have sold to feeders, while the packers would have taken the older cattle.

FINAL WEIGHTS AND SHRINK IN SHIPMENT

The sale weight in Omaha was 1,152 pounds for the two-year-olds, 977 pounds for the yearlings, and 723 pounds for the calves. This represents a shrink in shipment from final experimental weight of 28, 28, and 22 pounds respectively.

In terms of percentage, the two-year-olds shrank 2.46 per cent, the yearlings 2.88 per cent, and the calves 3.12 per cent.

PROFIT OR LOSS

From the standpoint of financial returns, the calves returned a profit of $6.80 per head as against $2.84 for the two-year-olds. Yearling steers, on the other hand, showed a profit of only 87 cents per head. The difference in returns between calves and two-year-olds was due primarily to the greater economy of gains made by the calves. It will be remembered that the calves produced 100 pounds of gain $4.08 cheaper than did the two-year-olds. Had the cattle been sold at the end of 150 days, the two-year-olds would have shown a profit of $5.83 per head, the yearlings $4.80, and the calves $3.11. While market fluctuations are in a large part responsible for this difference in profit per head between the 150- and 175-day periods, the decrease in rate of gain and the increased cost of gain during the last 25-day period were also contributing factors. Obviously it did not pay to feed yearlings and two-year-olds longer than 150 days.

TABLE 20.—*Cutting yields of steers, percentage of carcass weight—two-year average*

Cuts	Two-year-olds	Yearlings	Calves
Fore	51.63	51.66	50.39
Hind	48.37	48.34	49.61
Chuck	27.27	27.57	26.94
Rib	10.11	10.05	9.70
Plate	11.88	11.74	11.04
Shank	2.71	2.75	3.03
Loin	18.17	18.25	18.79
Round	22.74	22.45	24.14
Flank	4.37	4.45	4.29
Kidney	2.44	2.61	2.09
Hanging tender	.65	.57	.71

DRESSING PERCENTAGE

That the steer calves were not carrying the finish of the two older groups is shown in part by their yield of beef. They dressed 57.25 per cent, whereas the yearlings yielded 60.17 per cent, and the two-year-olds 60.46 per cent. The yield was calculated on a basis of the selling weight in Omaha.

Figuring the yield of beef on a basis of the final experimental weights, we find that the two-year-olds dressed 59.85 per cent, as against 58.72 for the yearlings and 55.25 for the calves.

CUTTING YIELDS

The weight of each wholesale cut is given in percentage of carcass weight in Table 20. From this table it will be noted that the calves yielded a higher percentage of hindquarter than the older groups. A study of the percentage of chuck by ages reveals that the neck and shoulders were proportionally heaviest in the yearlings and lightest in the two-year-olds. It is interesting to note that the calves showed a higher percentage of shank than the two-year-olds. The percentage of plate, however, increased with increasing age, as did the round and the rib. These changes were quite noticeable.

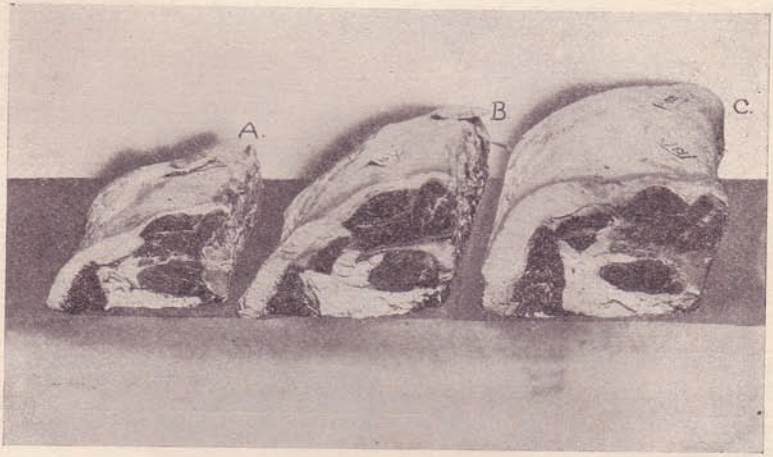

FIG. 13.—Steer short loins: A, calf; B, yearling; C, 2-year-old.

TWO-YEAR-OLD SPAYED HEIFERS VS. YEARLING SPAYED HEIFERS VS. SPAYED HEIFER CALVES— LOTS 2, 4, AND 7

The average initial weights are given in Table 21. It will be noted that the spread in initial weight between two-year-old and yearling spayed heifers was 132 pounds, and between yearlings and calves 203 pounds.

AVERAGE DAILY RATION

The daily consumption of alfalfa varied but little between calves and two-year-old spayed heifers. The yearling spayed heifers, as in the case of the yearling steers, consumed somewhat more than either of the other groups. The corn consumption, however, was greater with the older animals. For the two-year-olds the daily amount of corn consumed was 17.34 pounds, for the yearlings 13.56 pounds, and for the calves 10.30 pounds, which represents an increase of approx-

imately 4 pounds of corn for each year's increase in age. The total bushels of corn consumed per animal were 54.19, 42.38, and 29.10 respectively.

DAILY GAIN

Table 22 shows that the largest daily gain was made by the two-year-old heifers, and the smallest by the heifer calves. The yearlings held an intermediate place between two-year-olds and calves. It is interesting to note that the average daily gain made by the yearlings was reasonably consistent thruout the trial, while that made by the two-year-olds decreased without exception with each succeeding 25-day period. During the last 25 days this decrease in rate of gain was quite pronounced. In contrast to the two-year-olds, the gain made by the calves increased materially during the first 150 days, followed by a marked decrease during the last 25.

TABLE 21.—*Two-year average, 1924-26—two-year-olds, yearlings, and calves*

	Two-year-olds Lot 2 11 spayed heifers	Yearlings Lot 4 14 spayed heifers	Calves Lot 7 17 spayed heifers
Average daily ration:			
Shelled corn	17.34	13.56	10.30
Alfalfa hay	5.64	7.21	5.91
Average initial weight per head	721	589	386
Average final weight per head	1069	919	677
Average gain per head	348	330	291
Average daily gain per head	1.99	1.89	1.66
Selling weight per head, Omaha	1058	883	657
Shrink in transit (24 hrs. Lincoln to Omaha)	25	30	14
Shrink in live weight, per cent	2.37	3.44	2.13
Carcass weights (shrunk 2.2 per cent)	639	527	387
Dressing percentage cold, based on selling weight	60.44	59.78	59.03
Dressing percentage cold, based on final exp. weight	59.77	57.33	57.20
Feed required per 100 pounds gain:			
Shelled corn	869	723	619
Alfalfa hay	285	380	355
Feed cost of 100 pounds gain	$13.02	$11.53	$10.40
HOGS FOLLOWING			
Pounds pork produced per head cattle	50.67	39.71	23.47
Value at $11.75 per hundredweight	$5.95	$4.68	$2.76
Extra feed cost per head cattle	.38	.56	.21
Profit per head cattle	5.57	4.12	2.55
FINANCIAL STATEMENT			
Initial value per hundredweight	$ 6.63	$ 6.39	$ 5.50
Initial cost per head	47.84	37.64	21.25
Feed cost per head	46.59	40.00	30.26
Interest on investment at 8 per cent	2.77	2.19	1.65
Cost of marketing	2.68	2.43	2.10
TOTAL COST PER HEAD	99.80	82.26	55.26
Necessary selling price per hundredweight	8.91	8.85	8.03
Value per hundredweight at market	8.68	8.63	9.40
RETURNS PER HEAD INCLUDING PORK PROFIT	97.32	80.33	64.31
PROFIT OR LOSS PER HEAD	-$2.48	-$1.93	$9.05

TABLE 22.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Two-year-old spayed heifers	2.18	2.16	1.99	1.93	1.34	1.99
Yearling spayed heifers	1.94	1.96	1.68	1.95	1.84	1.89
Spayed heifer calves	1.52	1.61	1.78	2.40	1.32	1.66

TABLE 23.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Two-year-old spayed heifers	$6.63	$8.18	$8.18	$8.63	$9.00	$8.68
Yearling spayed heifers	6.39	8.54	8.69	8.50	9.03	8.63
Spayed heifer calves	5.50	7.75	8.00	8.40	9.75	9.40

TABLE 24.—*Estimated profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Two-year-old spayed heifers	$2.87	$ .86	$2.83	$4.43	-$2.48
Yearling spayed heifers	3.47	4.47	2.06	5.18	-1.93
Spayed heifer calves	4.37	4.49	5.68	14.31	9.05

FEED REQUIRED TO PRODUCE 100 POUNDS GAIN

The two-year-olds consumed 869 pounds of corn and 285 pounds of alfalfa in producing 100 pounds of gain as compared to 619 pounds of corn and 355 pounds of alfalfa for the calves. In other words, the two-year-olds required 250 pounds more corn and 70 pounds less alfalfa to produce 100 pounds of beef than the calves. Tho the yearlings were less efficient than the calves, they were more efficient than the two-year-olds.

COST OF 100 POUNDS CAIN

The greater economy of gains made by the younger cattle is shown by the fact that it cost $13.02 to produce 100 pounds of beef on the two-year-olds, $11.53 on the yearlings, and $10.40 on the calves. This represents a spread of $2.62 between two-year-olds and calves in the cost of 100 pounds of gain. One hundred pounds of gain on calves cost 80 and on yearlings 88.4 per cent as much as on two-year-olds.

HOGS FOLLOWING

Since the older cattle consumed more corn daily and were less efficient in their feed utilization than were calves, it would follow that the amount of pork produced by the hogs following would be greater for the older cattle. Two-year-olds were credited with 50.67 pounds of pork, as against 39.71 for the yearlings and 23.47 for the calves. The amount of pork produced per bushel of corn fed to the cattle was 1.07 pounds for the two-year-olds, 1.06 pounds for the yearlings, and 1.37 pounds for the calves. With hogs valued at $11.75 per hundredweight, the pork profit for the two-year-olds was $3.02 per head greater than for the calves.

INITIAL PRICE, APPRAISALS BY PERIODS, AND SALES VALUE

While the older cattle were appraised into the experiments at a higher value, the calves outsold both the yearlings and the two-year-olds. Had the cattle been sold at the end of 125 days, the difference in sale value would have been reversed, the two-year-olds outselling both yearlings and calves. This would have been due to the fact that the two-year-olds were carrying considerably more finish than either of the other two groups, yet had not reached a point of wastiness.

TABLE 25.—*Cutting yields of spayed heifers, percentage of carcass weight—two-year average*

Cuts	Two-year-olds	Yearlings	Calves
Fore	49.69	49.95	48.77
Hind	50.31	50.05	51.23
Chuck	25.61	25.90	26.93
Rib	9.78	10.15	9.37
Plate	12.13	11.93	10.31
Shank	2.90	2.78	2.87
Loin	19.35	18.72	19.15
Round	21.57	22.31	23.67
Flank	5.50	5.52	5.45
Kidney	3.31	2.93	2.46
Hanging tender	.65	.79	.....

FINAL WEIGHTS AND SHRINK IN SHIPMENT

At the conclusion of the trials, the two-year-old heifers weighed 1,069 pounds, the yearlings 919, and the calves 677 pounds. The shrink in shipment was 25, 30, and 14 pounds respectively. The fact that all three groups were well finished is brought out by the relatively small shrink as shown by the above figures.

PROFIT OR LOSS BY 25-DAY PERIODS

Profit or loss by 25-day periods is shown by Table 24. The heifer calves showed a profit of $9.05 as against a loss of $1.93 for the yearlings and $2.48 for the two-year-olds. It should be remembered, however, that the figures on the heifer calves represent but one year's trial, and that in this trial they enjoyed a wide spread between buying and selling price. Market conditions were not as favorable the next year. This tends to give the calves an advantage, since the figures given for the other two groups represent an average of two years. Had the two-year-olds been sold at the end of 150 days, the loss of $2.48 per head would have been changed to a profit of $4.43 per head.

DRESSING PERCENTAGE

Based upon the selling weight in Omaha, the two-year-olds dressed 60.44 per cent, or .66 per cent more than the yearlings and 1.41 per cent more than the calves. However, a yield of 59.03 per cent for calves fed 175 days is on the whole very satisfactory and would indicate that they were carrying considerable finish at the time of marketing.

Due to the relatively greater shrink in shipment of the two younger groups, the two-year-olds showed to a better advantage when yield was calculated upon a basis of final experimental weight. On this basis the twos outdressed the yearlings by 2.44 per cent and the calves by 2.57 per cent.

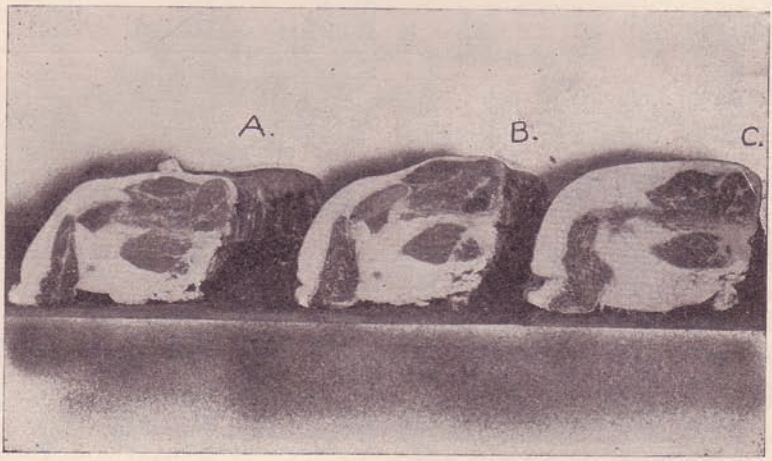

FIG. 14.—Heifer short loins: A, open calf; B, open yearling; C, spayed 2-year-old.

CUTTING YIELDS

The calves showed .92 per cent more hindquarter than the two-year-olds, and the two-year-olds slightly more than the yearlings. The calves showed considerably more chuck than the yearlings, and they, in turn, more than the two-year-olds. The round showed a tendency to decrease with increasing age. The loin was found to be heaviest in the two-year-olds and lightest in the yearlings. The plate and kidney suet increased as age of the animal increased. The kidney fat was heavy in all lots but more especially in the older ones. In this respect heifer carcasses proved to be uniformly less desirable than those of steers.

YEARLING OPEN HEIFERS VS. OPEN HEIFER CALVES—LOTS 5 AND 8

Inasmuch as range practice provides for the breeding of heifers the spring they are two years old, it was impractical as well as virtually impossible to procure a pen of open two-year-old heifers. Consequently, this comparison is confined to yearling heifers and heifer calves.

The average initial weight of the open heifers was 570 pounds, and for the open heifer calves 390 pounds.

AVERAGE DAILY RATION

Yearling open heifers consumed approximately 4 pounds more corn and 2 pounds more alfalfa than the open heifer calves. This difference of 4 pounds in daily corn consumption is the same as that which occurred between steers and spayed heifers of the two ages.

DAILY GAIN

As in the other age comparisons, the yearlings outgained the calves. Here the difference was .23 pound daily. In terms of total gain, this represents a difference of 39 pounds per head. As brought out in Table 27, the gain made by the yearlings remained practically constant thruout the 25-day periods. In contrast to the yearlings, the calves showed a greater gain during the latter half of the feeding period. Especially was this true from the 75th to the 150th days. During the last 25 days the gain decreased materially, yet it was still somewhat higher than that made during the first 75 days.

TABLE 26.—*Two-year average of open heifers—yearlings and calves*

	Yearlings Lot 5 14 open heifers	Calves Lot 6 17 open heifers
Average daily ration:		
Shelled corn	14.15	10.44
Alfalfa hay	7.41	5.92
Average initial weight per head	570	390
Average final weight per head	946	727
Average gain per head	376	337
Average daily gain per head	2.15	1.92
Selling weight per head, Omaha	927	705
Shrink in transit (24 hrs. Lincoln to Omaha)	23	18
Shrink in live weight, per cent	2.51	2.53
Carcass weights (shrunk 2.2 per cent)	562	428
Dressing percentage cold, based on selling wt.	60.67	60.72
Dressing percentage cold, based on final exp. wt.	59.39	58.91
Feed required per 100 pounds gain:		
Shelled corn	665	544
Alfalfa hay	340	310
Feed cost of 100 pounds gain	$10.86	$9.13
HOGS FOLLOWING		
Pounds pork produced per head cattle	35.29	27.86
Value at $11.75 per hundredweight	$4.15	$3.23
Extra feed cost per head cattle	.72	.51
Profit per head cattle	3.43	2.72
FINANCIAL STATEMENT		
Initial value per hundredweight	$6.14	$6.25
Initial cost per head	34.94	24.35
Feed cost per head	41.53	31.04
Interest on investment at 8 per cent	2.11	1.55
Cost of marketing	2.50	2.19
TOTAL COST PER HEAD	81.08	59.13
Necessary selling price per hundredweight	8.38	8.00
Value per hundredweight at market	8.74	9.24
RETURNS PER HEAD INCLUDING PORK PROFIT	84.32	67.11
PROFIT OR LOSS PER HEAD	$3.24	$7.98

TABLE 27.—*Average daily gain by 25-day periods—two-year average*

	First 75 days	4th 25 days	5th 25 days	6th 25 days	7th 25 days	Average, 175 days
Yearling open heifers	[2.11	2.34	1.83	2.17	2.36	2.15
Open heifer calves	1.70	2.05	2.17	2.33	1.86	1.92

TABLE 28.—*Initial value, appraisals by 25-day periods, and sales price—two-year average*

	Initial cost	75 days	100 days	125 days	150 days	175 days—sales price
Yearling open heifers	$6.14	$8.75	$8.64	$8.81	$8.98	$8.74
Open heifer calves	6.25	8.03	8.17	8.57	9.58	9.24

FEED REQUIRED PER 100 POUNDS GAIN

Again the efficiency of the younger cattle is shown by the fact that the calves consumed 121 pounds less corn and 30 pounds less alfalfa than the yearlings in producing 100 pounds of beef. The amount of feed required for each of the two groups is shown in Table 26.

COST OF 100 POUNDS GAIN

The feed cost of 100 pounds of gain was $10.86 for the yearlings and $9.13 for the calves. This represents a difference of $1.73 in cost of producing 100 pounds of beef between calves and yearlings.

HOGS FOLLOWING

The amount of pork produced by the hogs following was 35.29 pounds for the yearlings and 27.86 pounds for the calves. At $11.75 per hundred for hogs, the profit on the pork produced was 71 cents per head greater for the yearlings than for the calves.

INITIAL VALUE, APPRAISALS BY PERIODS, AND SALES PRICE

As shown in Table 28, the yearling heifers were appraised into the experiment at 11 cents lower per hundredweight than the open heifer calves. At the end of the period, the difference in value between yearlings and calves increased slightly, the calves outselling the yearlings by 50 cents. This is due to the fact that the calves were carrying sufficient finish for the packer, were somewhat smoother than the yearlings, and were of the desired market weight at that time. Had the yearlings been sold at the end of 100 days, they would have outsold the calves by 47 cents per hundredweight. These figures bring out the fact that calves should be held longer than yearlings before being marketed.

FINAL WEIGHTS AND SHRINK IN SHIPMENT

The selling weight per head in Omaha for the yearlings was 927 pounds as against 705 for the calves. This represents a shrink from final experimental weight of 23 pounds for the yearlings and 18 pounds for the calves. Both groups shrank approximately 2.5 per cent.

TABLE 29.—*Profit or loss by 25-day periods—two-year average*

	75 days	100 days	125 days	150 days	Actual, 175 days
Yearling open heifers	$9.01	$7.64	$7.04	$7.21	$3.24
Open heifer calves	3.45	3.89	8.64	12.31	7.98

PROFIT OR LOSS BY 25-DAY PERIODS

More economical gains, together with greater spread between buying and selling price and a higher market value, caused the calves to return considerably more profit than the yearlings. (See Table 29.) The difference was $4.74 per head in favor of the calves. Had the yearlings been sold at any time between 75 and 125 days, they would have returned more profit than the calves, due to the fact that they were carrying more finish and were not too heavy to supply market demands.

TABLE 30.—*Cutting yields of open heifers, percentage of carcass weights—two-year average*

Cuts	Yearlings	Calves
Fore	49.22	49.53
Hind	51.28	50.47
Chuck	25.40	26.18
Rib	9.89	10.06
Plate	11.53	10.67
Shank	2.47	2.90
Loin	19.29	18.82
Round	22.61	23.56
Flank	5.62	5.22
Kidney	3.03	2.37
Hanging tender	.83	.77

DRESSING PERCENTAGE

Practically no difference existed in the yield of beef between yearling and open heifer calves. Each group dressed approximately 60.7 per cent when calculated on a basis of market weight. On a basis of final experimental weight, the yearlings outyielded the calves by .48 per cent. The dressing percentage was good in both lots. The beef men in the packing house coolers, however, preferred the carcasses of the calves.

CUTTING YIELDS

In the case of the open heifers, the greatest percentage of hindquarter was shown by the yearlings (Table 30). The

TABLE 31.—*Trial 1, 175 days, October 23, 1924, to April 16, 1925*

	Two-year-olds		Yearlings			Calves		
	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7	Lot 8
	Steers 11 head	Spayed heifers 11 head	Steers 12 head	Spayed heifers 12 head	Open heifers 12 head	Steers 19 head	Spayed heifers 17 head	Open heifers 20 head
Average daily ration:								
Shelled corn	19.05	17.96	15.33	14.59	15.03	10.18	10.30	9.89
Alfalfa hay	4.38	4.77	5.17	5.34	5.30	6.11	5.91	5.74
Average initial weight per head	807	706	659	590	578	389	386	388
Average final weight per head	1184	1069	993	903	922	732	677	693
Average gain per head	377	363	334	313	344	343	291	305
Average daily gain per head	2.16	2.08	1.91	1.79	1.97	1.96	1.66	1.74
Selling weight per head, Omaha 4/28	1160	1049	980	886	909	700	657	668
Shrink in transit (based on 4/27 weight)	42	39	31	31	21	24	14	19
Shrink in live weight, per cent	3.62	3.72	3.16	3.49	2.31	3.43	2.13	2.84
Carcass weights (shrunk 2.2 per cent)	715	634	603	525	556	388	387	404
Dressing percentage cold, based on selling weight	61.69	60.51	61.40	59.36	61.22	56.03	59.03	60.44
Dressing percentage cold, based on final exp. weight	60.4	59.3	60.7	58.1	60.3	53.0	57.2	58.3
Per cent hide	6.58	6.27	7.15	7.26	6.58	9.81	8.26	8.69
Feed required per 100 pounds gain:								
Shelled corn	884	865	804	816	764	520	619	567
Alfalfa hay	203	230	271	299	269	312	355	329
Feed cost per 100 pounds gain	$12.57	$12.54	$12.08	$12.44	$11.57	$8.84	$10.40	$9.56
HOGS FOLLOWING								
Pounds pork produced per head cattle	50.91	46.73	37.33	39.33	37.00	19.74	23.47	15.00
Value at $12.00 per hundredweight	$6.11	$5.61	$4.48	$4.72	$4.44	$2.37	$2.82	$1.80
Extra feed cost per head cattle	.51	.56	.55	.58	.88	.19	.21	.16
Pork profit per head cattle	5.60	5.05	3.93	4.14	3.56	2.18	2.61	1.64
FINANCIAL STATEMENT								
Initial value per hundredweight	$7.00	$6.50	$7.40	$5.90	$5.65	$6.85	$5.50	$5.50
Initial cost per head	56.46	45.87	48.81	34.82	32.65	26.64	21.25	21.31
Total feed cost per head	47.39	45.52	40.35	38.94	39.80	30.32	30.26	29.16
Interest on investment at 8 per cent including 100 days feed	3.56	3.09	3.04	2.45	2.40	1.86	1.65	1.63
Cost of marketing	2.80	2.65	2.55	2.42	2.45	2.16	2.10	2.12
TOTAL COST PER HEAD	110.21	97.13	94.75	78.63	77.30	60.98	55.26	54.22
Value per hundredweight at market	10.35	9.00	10.35	9.00	9.25	9.85	9.40	9.60
RETURNS PER HEAD—Including pork profit	124.50	99.46	105.36	83.88	87.64	71.13	64.37	64.77
PROFIT PER HEAD	$14.29	$2.33	$10.61	$5.25	$10.34	$10.15	$9.11	$10.55

Market value of feeds: Shelled corn at 70 cents per bushel, alfalfa hay at $15 per ton.

TABLE 32.—*Trial 2, 175 days, November 9, 1925, to May 3, 1926*

	Two-year-olds		Yearlings			Calves	
	Lot 1	Lot 2	Lot 3	Lot 4	Lot 5	Lot 6	Lot 7
	Steers 12 head	Spayed heifers 12 head	Steers 16 head	Spayed heifers 16 head	Open heifers 16 head	Steers 20 head	Open heifers 15 head
Average daily ration:							
Shelled corn	16.86	16.73	13.99	12.79	13.49	10.57	11.17
Alfalfa hay	6.75	6.52	8.77	8.61	8.99	5.76	6.16
Average initial weight per head	779	735	617	589	564	376	392
Average final weight per head	1144	1069	1008	932	964	758	772
Average gain per head	365	334	391	343	400	382	380
Average daily gain per head	2.09	1.91	2.24	1.96	2.29	2.18	2.17
Selling weight per head, Omaha 5/11	1145	1067	974	881	940	745	755
Shrink in transit (based on 5/10 weight)	16	11	26	30	25	21	16
Shrink in live weight, per cent	1.40	1.03	2.67	3.41	2.66	2.82	2.12
Carcass weights (shrunk 2.2 per cent)	679	644	577	529	566	435	461
Dressing percentage cold, based on selling weight	59.34	60.38	59.24	60.09	60.25	58.41	61.1
Dressing percentage cold, based on final exp. weight	59.35	60.24	57.24	56.76	58.71	57.39	59.72
Feed required per 100 pounds gain:							
Shelled corn	807	874	625	653	590	484	514
Alfalfa hay	323	341	392	440	393	264	284
Feed cost of 100 pounds gain	$12.51	$13.49	$10.76	$11.47	$10.33	$8.03	$8.56
HOGS FOLLOWING							
Pounds pork produced per head cattle	49.7	54.6	39	40	34	33	45
Value at $11.50 per hundredweight	$5.71	$6.28	$4.52	$4.65	$3.94	$3.80	$5.14
Extra feed cost per head cattle	.11	.19	.52	.54	.60	.72	.97
Profit per head cattle	5.60	6.09	4.00	4.11	3.34	3.08	4.17
FINANCIAL STATEMENT							
Initial value per hundredweight	$8.50	$6.75	$8.25	$6.75	$6.50	$8.25	$7.25
Initial cost per head	66.19	49.65	50.87	39.75	36.65	31.04	28.41
Feed cost per head (including feed from 5/3 to 5/10)	48.23	47.66	43.64	40.80	42.83	31.68	33.54
Interest on investment at 8 per cent including 100 days feed	3.07	2.45	2.46	1.99	1.89	1.53	1.45
Cost of marketing	2.82	2.71	2.58	2.45	2.54	2.26	2.28
TOTAL COST PER HEAD	120.31	102.47	99.55	84.99	83.91	66.51	65.68
Value per hundredweight at market	9.35	8.35	9.15	8.35	8.35	9.00	8.75
RETURNS PER HEAD—Including pork profit	112.66	95.18	93.12	77.67	81.83	70.13	70.23
PROFIT OR LOSS PER HEAD	–$7.65	–$7.29	–$6.43	–$7.32	–$2.08	$3.62	$4.55

Market value of feeds: Shelled corn at 70 cents per bushel, alfalfa hay at $15 per ton.

difference was .81 per cent. The yearling heifers also showed a higher percentage of loin, flank, kidney suet, and plate than the calves. However, the calves excelled in the rib and round. The calves also showed a slightly greater percentage of chuck and shank than the yearlings.

REPORTS BY TRIALS

The results of the two separate trials are presented in Tables 31 and 32. These tables are submitted for those who wish to study each experiment in detail. Excepting minor variations, it will be found that the results of both trials are remarkably uniform, and because of this uniformity it seems reasonably safe to conclude that future trials would not differ materially from the averages reported in the foregoing pages. Likewise, it seems reasonable to assume that similar results would be obtained in practical feeding operations.

APPENDIX—ADDITIONAL TRIALS WITH CALVES

STEER CALVES VS. OPEN HEIFER CALVES

Three additional trials comparing steer and open heifer calves are reported in Tables 33, 34, and 35. Since these trials varied in length, they were not included in the averages presented in this bulletin. A brief summary accompanies each table. It is interesting to note that the results in these trials check closely with those reported in Table 11 and substantiate the conclusions presented in the fore part of this bulletin. With one exception all lots were fed upon a simple shelled corn and alfalfa hay ration. In one trial two additional lots were added and given a protein supplement of cottonseed cake.

SUMMARY OF TABLE 33

The calves used in this experiment were purchased on the P. H. Young ranch at Valentine, Nebraska. They were of Hereford breeding and graded choice. The initial weight of the steers into the experiment November 17, 1922, was 338 pounds, and of the heifers 337 pounds. The trial was of 175 days' duration, closing May 11, 1923. There were 16 calves in each of the two lots.

The daily gain made by the steers was 2.47 pounds as against 2.30 pounds for the heifers, giving the steers an advantage of .17 pound daily. In terms of total gain, this represents a difference of 30 pounds in favor of the steers. Since there existed practically no difference in daily feed consumption, the amount of feed required to produce 100 pounds of gain was somewhat higher for the heifers. This difference amounted to 40 pounds of corn and 12 of alfalfa. Because of the greater feed requirement, the cost of 100 pounds of gain on the heifers was also greater, $7.50 as against $6.91 for the steers. The heifers were appraised into the experiment at $1.00 per hundred less than the steers, and sold for 75 cents per hundred less. Due to the relatively greater cost of production, the heifers failed to show as much profit as the steers, $5.38 per head as against $10.33 for the steers.

In the packing-house coolers the heifers showed considerably better than the steers. They carried materially more finish, were attractive in shape, and yielded 1.33 per cent more beef than the steers. The heifers dressed 59.80 per cent as against 58.47 per cent by the steers. On this basis and the attractiveness of the carcasses, it would seem that the discrimination in price against the heifers was rather more than was justified. However, discrimination by the feeder buyer in this case seemed justified.

TABLE 33.—*Steer calves vs. open heifer calves—175 days, November 17, 1922, to May 11, 1923*

	Lot 1 16 steer calves	Lot 2 16 open heifer calves
Average daily ration:		
Shelled corn	11.20	11.35
Alfalfa hay	4.12	4.10
Average initial weight per head	338	337
Average final weight per head	771	740
Average gain per head	433	403
Average daily gain per head	2.47	2.30
Selling weight per head, Omaha	750	717
Shrink in transit	21	23
Shrink in live weight, per cent	2.7	3.1
Carcass weights (shrunk 2.2 per cent)	439	429
Dressing percentage cold, based on selling wt	58.47	59.80
Dressing percentage cold, based on final exp. wt.	56.87	57.94
Feed required per 100 pounds gain:		
Shelled corn	453	493
Alfalfa hay	166	178
Feed cost of 100 pounds gain	$6.91	$7.50
HOGS FOLLOWING		
Pounds pork produced per head	47	53
Value at $7.00 per hundredweight	$3.28	$3.69
Extra feed cost per head	1.87	1.92
Profit per head	1.41	1.77
FINANCIAL STATEMENT		
Initial cost per hundredweight	$8.25	$7.25
Initial cost per head	27.87	24.48
Feed cost per head	29.92	30.23
Feed cost per head 5/11 to 5/15	1.00	1.00
Interest on feed for 87½ days	.57	.58
Interest on investment at 8 per cent	1.07	.94
Cost of marketing	1.90	1.90
TOTAL COST PER HEAD	62.33	59.13
Necessary selling price per hundredweight	8.12	8.00
Value per hundredweight at market	9.50	8.75
RETURNS PER HEAD INCLUDING PORK PROFIT	72.66	64.51
PROFIT PER HEAD	$10.33	$5.38

Market value of feeds: Shelled corn at 70c per bushel, alfalfa hay at $15 per ton.

SUMMARY OF TABLE 34

This experiment was of 250 days' duration, beginning October 24, 1923, and terminating June 30, 1924. There were 20 steers in Lot 1 and 20 open heifers in Lot 2. The calves were high-grade Shorthorns and quite uniform, grading good to choice. They were purchased upon the ranch of Arthur Bowering near Merriman, Nebraska, and were typical Sand Hill calves. The steers weighed 342 pounds at the beginning and the heifers 349 pounds.

From Table 34 it will be noted that the steers consumed 12.26 pounds of corn per day and the heifers 11.97 pounds. However, the steers consumed slightly less alfalfa than the heifers. While the total feed consumed daily by the two lots did not differ materially, the steers produced 51 pounds more gain during the 250-day trial than the heifers. The greater feed requirement by the heifers in producing 100 pounds of gain resulted in a cost of $1.02 more for the heifers than for the steers. This difference in feed cost reacts very materially in favor of the steers. It required 57 pounds more corn and 41 pounds more alfalfa to produce 100 pounds of gain upon the heifers than upon the steers. There were 9 pounds more pork produced behind each heifer. At the close of the experiment, the heifers sold at $8.25 per hundred and the steers at $8.75—a difference of 50 cents per hundred. On this basis the heifers lost $5.15 per head and the steers made a profit of $1.21 per head. As in previous tests the heifers dressed a higher percentage of beef and produced a more attractive carcass. However, the heifers were bordering on the point of wastiness. Apparently 250 days is too long to feed heifer calves. In general it may be said that the heifers did not gain as rapidly as the steers, required more feed to produce 100 pounds of gain, but were fatter at the close of the trial, resulting in a higher dressing percentage and a more attractive carcass. In spite of the fact that good carcasses were produced by the heifers, they failed to sell on the same price level with the steers.

TABLE 34.—*Steer calves vs. heifer calves—250 days, October 24, 1923, to June 30, 1924*

	Lot 1 20 steer calves	Lot 2 20 heifer calves
Average daily ration:		
Shelled corn	12.26	11.97
Alfalfa hay	4.54	4.82
Average initial weight per head	342	349
Average final weight per head	888	834
Average gain per head	546	485
Average daily gain per head	2.18	1.94
Selling weight per head, Omaha	856	802
Shrink in transit	32	32
Shrink in live weight, per cent	3.6	3.84
Carcass weights (shrunk 2.2 per cent)	508	486
Dressing percentage cold, based on selling wt.	59.3	60.6
Dressing percentage cold, based on final exp. wt.	57.2	58.3
Feed required per 100 pounds gain:		
Shelled corn	562	619
Alfalfa hay	208	249
Feed cost per 100 pounds gain	$8.58	$9.60
HOGS FOLLOWING		
Pounds pork produced per head	42	51
Value at $6.00 per hundredweight	$2.54	$3.04
Extra feed cost per head	.37	.37
Pork profit per head	2.17	2.67
FINANCIAL STATEMENT		
Initial cost per hundredweight	$7.00	$6.50
Initial cost per head	23.96	22.69
Feed cost per head	46.80	46.44
Feed cost per head (6/30 to 7/7)	1.62	1.52
Interest on investment at 8 per cent	1.31	1.24
Cost of marketing	2.16	2.10
TOTAL COST PER HEAD	75.86	73.99
Necessary selling price per hundredweight	8.61	8.89
Values per hundredweight at market	8.75	8.25
RETURNS PER HEAD Including pork	77.07	68.84
PROFIT OR LOSS PER HEAD	$1.21	–$5.15

Market value of feeds: Shelled corn at 70c per bushel, alfalfa hay at $15 per ton.

SUMMARY OF TABLE 35

This experiment was started November 23, 1926, and terminated April 17, 1927—a total of 145 days. The calves used were choice Herefords raised by Shockey Brothers in Cherry county, Nebraska. There were four lots of 15 calves each, two of steers and two of heifers. The initial weight into

TABLE 35.—*Steer calves vs. heifer calves—145 days, Nov. 23, 1926, to April 17, 1927*

	Lot 1 15 steer calves	Lot 2 17 heifer calves	Lot 3 15 steer calves	Lot 4 17 heifer calves
Average daily ration:				
Shelled corn	11.07	11.37	10.56	10.91
Cottonseed cake	.....	.....	1.80	1.81
Alfalfa hay	4.4	5.47	4.57	4.33
Average initial weight per calf	369	378	369	394
Average final weight per calf	718	704	737	742
Average gain per calf	349	326	368	348
Average daily gain per calf	2.41	2.25	2.54	2.40
Selling weight per calf, Omaha 4/26	701	691	733	721
Shrinkage in transit	29	23	19	23
Per cent shrinkage in transit	3.97	3.22	2.53	3.09
Carcass weights (shrunk 2.5 per cent)	394	396	421	425
Dressing percentage cold, Omaha	56.27	57.31	57.42	58.98
Dressing percentage cold, Lincoln	54.87	56.25	57.12	57.14
Per cent fat	4.21	5.02	4.77	5.57
Per cent hide	7.70	8.18	8.59	7.38
Feed required per 100 pounds gain:				
Shelled corn	460	506	415	455
Cottonseed cake	.....	.....	71	75
Alfalfa hay	182	244	180	180
Feed cost per 100 pounds gain	$7.12	$8.16	$7.78	$8.36
Net pork per calf at 10c per pound	.82	1.00	.93	1.04
FINANCIAL STATEMENT				
Initial value per hundredweight	$8.50	$7.75	$8.50	$7.75
Initial cost per calf	31.34	29.32	31.33	30.53
Feed cost per calf	24.87	26.57	28.68	29.06
Feed cost per calf (4/17 to 4/25)	1.16	1.22	1.28	1.31
Interest on investment at 8 per cent	1.00	.93	1.00	.97
Cost of marketing	2.23	2.22	2.27	2.26
TOTAL COST PER CALF	60.60	60.26	64.56	64.13
Necessary selling price	8.50	8.60	8.70	8.75
Selling price per hundredweight	10.25	9.75	10.50	10.20
RETURNS PER CALF—including pork	72.67	68.37	77.89	74.58
PROFIT PER CALF	$12.07	$8.11	$13.33	$10.45

Market value of feeds: Shelled corn at 70 cents per bushel.
Cottonseed cake at $35.00 per ton.
Alfalfa hay at $15.00 per ton.

the experiment varied from 369 pounds in Lots 1 and 3 to 394 pounds in Lot 4. All lots received a ration of shelled corn and alfalfa and in addition Lots 3 and 4 received a cottonseed-cake supplement.

The steers gained 23 pounds per head more than the heifers (Lots 1 and 2). The daily feed consumption was greater and the gains cost $1.04 per hundred more on the heifers than on the steers. The steers produced 12.2 pounds of gain from one bushel of corn and 15 pounds of alfalfa, while the heifers gained 11.1 pounds from a bushel of corn and 21 pounds of alfalfa. The steers returned $1.12 for each bushel of corn consumed per head, while each heifer returned 97½ cents per bushel. The steers consumed 28⅔ and the heifers 29½ bushels.

The steers sold for 50 cents per hundred more than the heifers. They yielded 56.27 per cent in the beef, while the heifers dressed 1.04 more, or 57.31 per cent. The steers did not prove to be satisfactorily finished. They were very bare over the rounds and when ribbed open were found to lack finish at the eye of beef. The external covering of fat over the back was relatively thin and there was practically no marbling. On the other hand, the heifers showed quite a little more finish. In fact, a number of them were rather excessively finished, showing considerable wastiness at the kidney. The development of lean in the heifer carcasses was less than in the steers. In other words, the heifers had taken on considerable fat; however, the muscles were not as large as those of the steers and consequently the carcasses were not as well shaped, altho they did possess more finish.

The profit per head on steers amounted to $12.07, while on the heifers it was $8.11. Had the heifers sold for $10.32 per hundred pounds instead of $9.75, they would have returned the same profit as the steers. If the heifers could have been charged into the experiment at $6.70 per hundred pounds, or $1.80 less per hundred pounds than the steers, the profit would have been the same in the two lots. Inasmuch as the heifers were invoiced at $7.75, there was an initial variation of but 75 cents. The steers returned a profit of $12.07 on a spread of $1.75 between cost and sales price. To have returned the same profit the heifers would have required a spread of $2.57.

Briefly summed up, the addition of one part of cottonseed cake to each six parts of corn fed with alfalfa hay to heifer calves resulted in a 6.7 per cent greater gain, which was 2.4 per cent more expensive to produce (Lots 3 and 4). The cake-fed heifers sold 4.2 per cent higher and returned a 22.4 per cent larger profit per head.

[10M]