Steer and Heifer Beef II.

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FORMER EXPERIMENT REVIEWED.

The first investigation of the subject of steer and heifer beef by this station was made in 1893 and reported in Bulletin No. 24. In that experiment fifteen high grade Shorthorn yearlings were used, five of which were steers, five heifers, which were spayed, and five heifers not spayed. These cattle were all purchased from Mr. A. J. Graves, a Shorthorn breeder within a few miles of the college, and were raised alike and sired by the same bull. They were put on feed January 4th, when coming two years old, and fed until the first of the following December, when they were sent to market and sold separately, each lot on its merits. They were fed alike and on the same kind of a ration from first to last, but the amount of feed was regulated to conform to the capacity of each lot. Some features of that experiment are presented in the following condensed summary:

	5 Steers	5 Spayed Heifers	5 Open Heifers
Total gain in eleven months.....	4032 lbs.	3416 lbs.	3288 lbs
Average gain per day.....	2.44 lbs.	2.07 lbs.	1.99 lbs
Cost of gain per pound.....	5.02 cts.	5.86 cts.	6.04 cts
Selling price on Chicago market..	$5.75	$4.75	$4.75
Percentage of dressed beef.....	63.2	62.8	62.4

Both lots of heifers were placed at a disadvantage by some of their number proving to be in calf,* but while this interfered with their gain and economy of production, they fed out to a finish that was considered, and demonstrated by the block test, to be as good as that of the steers. The market

*Three of the spayed heifers and four of the open heifers dropped calves.

at that time made a sharp discrimination between steer and heifer beef and the best offer we could get for the heifers was a dollar a hundred less than for the steers. Swift & Co. bought the steers at $5.75 and the heifers at $4.75. The slaughter test showed no material difference in percentage of dressed beef but on the block the heifers cut out a greater percentage of high priced meat than the steers. In the value of the meat on the block, a discrimination of one-and-a-half cents a pound on the rib, loin, and plate cuts was again made by Chicago meat dealers against the heifers. The prices for all other products were the same. The application of these prices, however, after allowing the difference of one-and-a-half cents per pound as claimed, in value of ribs, loins, and plates, showed that the margin of profit to the packers was much greater in the heifers than the steers; and that the actual difference in live weight value of the steers and heifers, instead of being a dollar a hundred was not more than half that amount. There was also considerable variation of opinion among experts as to the existence of any real difference in value of the steer and heifer meat. The English meat dealers whose judgement was obtained testified in favor of the heifer beef and rated it above that of the steers.

THE SECOND EXPERIMENT.

In October of 1894 the station purchased from Joe Adams of Moweaqua, Illinois, thirteen head of Hereford calves—five steers and eight heifers, with which to repeat the investigation relating to the cost of production and the relative value of steer and heifer beef. These calves ranged from six to seven months of age when purchased in October, and were still in the pasture with their dams where they had been since birth. They were all sired by a pure bred Hereford bull, bred by Tom Ponting of Moweaqua, Illinois, and were out of pure bred and high grade cows. Two heifer calves were purchased from George S. Redhead of Des Moines, Iowa. These calves were pure bred Herefords and had also run in the pasture with their dams during the summer.

The thirteen head purchased from Adams arrived at the station grounds October 25, 1894, and on November 1st five of the heifers were spayed. The weights on this date were —five steers, 2685; five spayed heifers, 2360; and three open

heifers, 1330. All lots were grazed alike on good fall pasture until well into the winter; and in addition were given a moderate allowance of shelled corn and oats morning and evening. December 1st the steers weighed 3040, having made an average gain of 71 pounds each during the preceding month; the spayed heifers weighed 2560, having gained an average of 40 pounds each during the month in which they were spayed; and the open heifers weighed 1530, showing an average gain of 66⅔ pounds during the same time. These apparently large gains were perhaps in part due to the light weights November 1st, on account of the calves having been recently weaned and shipped. The weights made by the spayed heifers indicate that the operation of spaying is not a serious interruption when done at this age. Spayed heifer No. 417 also dropped an embryo calf on November 10th. On December 19th the two calves purchased from Mr. Redhead were put into the open heifer lot at a weight of 450 and 419 pounds each. The calves were all fed together on cut corn fodder and roots and a moderate grain ration until February 1, 1895, when the separate feeding began and continued until the cattle went to market on April 1, 1896.

During the progress of the experiment open heifer No. 420 met with an accident producing permanent lameness and making it necessary to discard her. The record of this lot therefore only includes the four that went through. In all our feeding experiments of this nature, every animal is given an ear tag number, and individual weights taken at the end of every period. The record of feed was kept only by lots but inasmuch as all of the lots prior to the accident, were on rather a moderate ration the greater part of the time, and each feed was eaten promptly, it is probable that the individual feed record did not vary greatly.

This experiment covered a period of fourteen months from the time the separate feeding began and during all but four months of this time, the cattle were confined to the feed yards. They were on grass from June 1st to October 1st 1895, and each lot had equal areas of uniform pasture. The grain was gradually taken off when the cattle were put on grass, and before leaving the pasture at the end of this period, the grain ration was gradually restored. While in

the feed yards each lot had access to a comfortable well bedded shed. A portion of the yard was also kept dry and bedded as much of the time as the weather would permit, in order to give comfortable quarters for lying outside. Hay was fed in mangers inside the shed. In time of severe storms, grain was also fed inside the shed, but at all other times the grain was eaten from the troughs in the open yards. Rock salt, and a tank of pure water were constantly accessible in the yards.

The following tables present a record of the amount and kinds of feed consumed and gains made by each lot during the period of fourteen months.

COMPLETE FEEDING RECORD FOR FIVE STEERS.

	Hay	Stover	Snapped Corn	Corn and Cob Meal	Mangels	Green Clover	Green Sweet Corn	Corn Fodder	Cottonseed Meal	Bran	Gluten Meal	Oats	Dry matter per head daily	Dry matter per pound of Gain	Average monthly gain per head	Average daily gain per head
February 1895	519	....	450	90	280	....	....	887	5	214	355	.....	13.66	8.86	43	1.54
March "	515	....	....	600	310	....	....	1022	77	310	465	.....	15.14	5.80	81	2.62
April "	320	....	....	600	300	....	....	882	75	300	450	.....	18.67	6.83	60	2
May "	956	....	45	630	95	425	....	149	67	315	441	.....	14.40	7.55	61	1.96
June "	....	....	....	....	....	....	....	....	....	....	....	.....	.....	.....	19	.63
July "	....	....	....	....	....	....	....	....	....	....	....	.....	.....	.....	2	.06
August "	....	....	....	699	....	....	1411	....	....	....	....	.....	.....	.....	30	1
September "	....	....	365	810	....	....	1520	....	....	....	....	.....	.....	.....	48	1.6
October "	585	....	1190	465	....	....	1822	....	127	....	....	.....	14.28	5.94	74.5	2.48
November "	584	....	1530	120	....	....	† 1636	....	271	....	....	.....	15.46	12.80	38	1.26
December "	620	240	2135	....	365	....	† 480	....	435	155	....	.....	18.84	7.70	76	2.45
January 1896	546	....	2935	....	702	....	....	496	527	250	....	.....	23.86	8.77	84	2.72
February "	506	....	2952	....	725	....	....	391	508	290	...	.....	25.65	12.96	57	2
March (thirty days)	525	....	1962	542	860	....	....	500	525	300	...	95	25.08	14.03	55	1.84
												465				
Totals... ..	5676	240	13564	4556	3637	425	6869	4327	2617	2134	1711	560	*18.07	*8.70		

*Averages. †Sweet corn fodder.

Average gain per head daily, for entire period. - - 1.71 lbs.
" " " " " for ten months not on grass - 2.07 "
" dry matter per pound of gain for ten months not on grass 8.70 "
" cost of feed per pound of gain for ten " " " 3.90 cts.
" cost of feed per pound of gain for entire period - 4.08 "

COMPLETE FEEDING RECORD FOR FIVE SPAYED HEIFERS.

	Hay	Stover	Snipped Corn	Corn and Cob Meal	Mangels	Green Clover	Green Sweet Corn	Corn Fodder	Cottonseed Meal	Bran	Gluten Meal	Oats	Dry matter per head daily	Dry matter per pound of gain	Average monthly gain per head	Average daily gain per head
February 1895	527	....	448	92	280	....	....	868	5	.....	358	...	13.65	7.52	51	1.74
March "	545	.. .	.....	603	310	....	....	952	77	310	465	....	14.88	5	92	3
April "	220	....	....	600	300	....	....	812	75	300	450	....	13.40	7.91	51	1.70
May "	955	....	45	630	95	425	....	147	66	315	441	. .	13.98	20.2	23	.74
June "	...	....	....	....	....	....	....	....	....	.....	....	....	....	....	53	1.77
July "	....	....	...	....	....	....	....	....	....	.....	....	....	....	....	-4	-.13
August "	.. .	....	....	700	..	....	1420	....	....	....	....	....	....	....	25	.81
September "	....	....	365	810	....	....	1520	....	....	....	....	....	....	....	51	1.03
October "	556	....	1190	465	....	....	1807	....	127	....	....	....	14.43	4.36	103	3.31
November "	588	..	1530	120	....	....	† 1647	....	271	....	....	....	15.49	11.45	41	1.35
December "	620	230	2135	....	365	....	† 875	....	435	155	....	....	18.66	10.26	56	1.82
January 1896	544	....	2794	....	710	....	....	441	523	262	....	....	23.01	8.96	79 6	2.57
February "	504	....	2705	....	725	....	....	351	518	290	....	95	24.64	11.52	62	2.14
March (thirty days)	525	....	1401	542	860	....	....	450	525	300		465	22.19	11.90	58	1.93
Totals.....	5684	230	12613	4559	3645	425	6789	4021	2612	1932	1712	560	*17.53	*8.60		

*Averages. †Sweet corn fodder.

Average gain per head daily for entire period - - 1 70 lbs.
" " " " " for ten months not on grass - 2.03 "
" dry matter per pound of gain for ten months not on grass 8.60 "
" cost of fedd per pound of gain " " " " 3.88 cts
" cost of feed per pound of gain for entire period - 4.05 "

COMPLETE FEEDING RECORD FOR FOUR OPEN HEIFERS.

	Hay	Stover	Snapped Corn	Corn and Cob Meal	Mangels	Green Clover	Green Sweet Corn	Corn Fodder	Cottonseed Meal	Bran	Gluten Meal	Oats	Dry matter per head daily	Dry matter per pound of gain	Average monthly gain per head	Average daily gain per head
February 1895	422	....	359	74	224	....	....	692	4	171	285	....	13.64	5.09	75	2.69
March "	450	....	....	469	242	....	....	759	61	248	362	....	14.13	7.01	62	2.01
April "	256	....	....	480	240	....	....	664	60	240	360	....	13.65	7.31	56	1.87
May "	166	....	36	504	76	340	....	116	53	252	353	....	13.99	11.55	40	1.29
June "	....	....	....	....	....	....	....	....	....	....	....	....	....	....	55	1.83
July "	....	....	....	....	....	....	....	....	....	....	....	....	....	....	-10	-.32
August "	....	....	....	560	....	....	1136	....	....	....	....	....	....	....	28	.92
September "	....	....	292	648	....	....	1216	....	....	....	....	....	....	....	34	1.13
October "	456	....	952	372	....	....	1442	....	102	....	....	....	14.50	4 47	101	3.24
November "	466	....	1224	96	....	....	† 1329	....	215	....	....	....	15.46	8.70	53	1.79
Dece nber "	496	117	1688	....	208	....	† 412	....	348	124	....	....	18.41	13.43	42	1.37
January 1896	423	....	2156	....	572	....	....	349	424	197	....	....	22.40	6.64	103	3.34
February "	387	....	2071	....	580	....	....	298	406	242	....	76	23.45	6.71	90	3.10
March (thirty days)	405	....	1253	434	688	....	....	330	420	240	....	372	22.75	11.51	61	2.04
Totals	4527	117	10031	3637	2920	340	5535	3210	2093	1704	1360	448	*17.34	*7.67		

*Average †Sweet Corn Fodder.

Average gain per head daily for entire period - - 1.86 lbs.
" " " " " for ten months not on grass - - 2.26 "
" Dry matter per pound of gain for ten months not on grass 7.67 "
" cost of feed per pound of gain for ten months not on grass 3.47 cts
" cost of feed per pound of gain for entire period - - 3.65 "

In the foregoing computation the feeds used prior to the grazing period were rated at the following prices based upon local market values prevailing at that time.

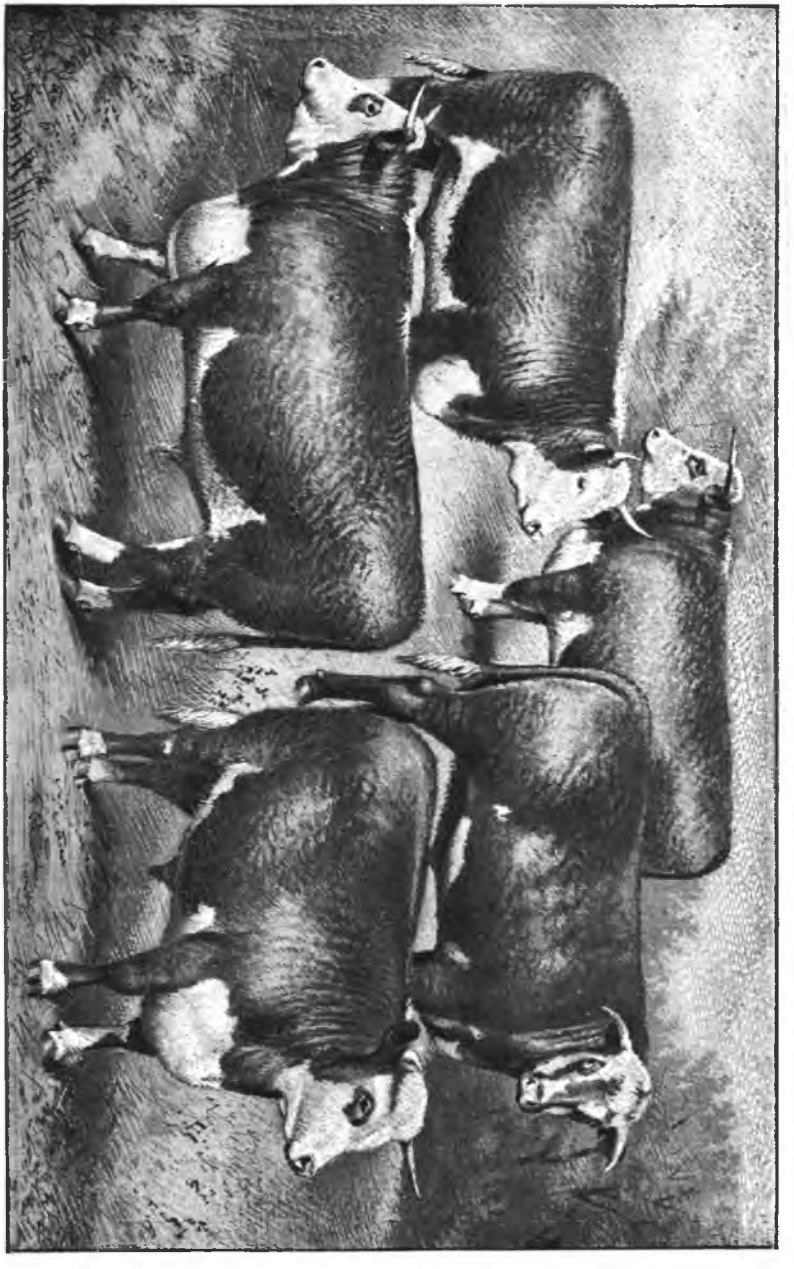
Gluten meal,	per cwt.....	70 cents
Snapped corn	"	56 "
Hay	"	30 "
Corn fodder	"	20 "
Corn and cob meal	"	75 "
Bran	"	70 "
Ear corn	"	65 "
Mangels	"	5 "
Green clover	"	2.5 "

During the grazing period the pasture was charged at the rate of one dollar per head each month, and in the last period, the feeds used were rated at the following prices:

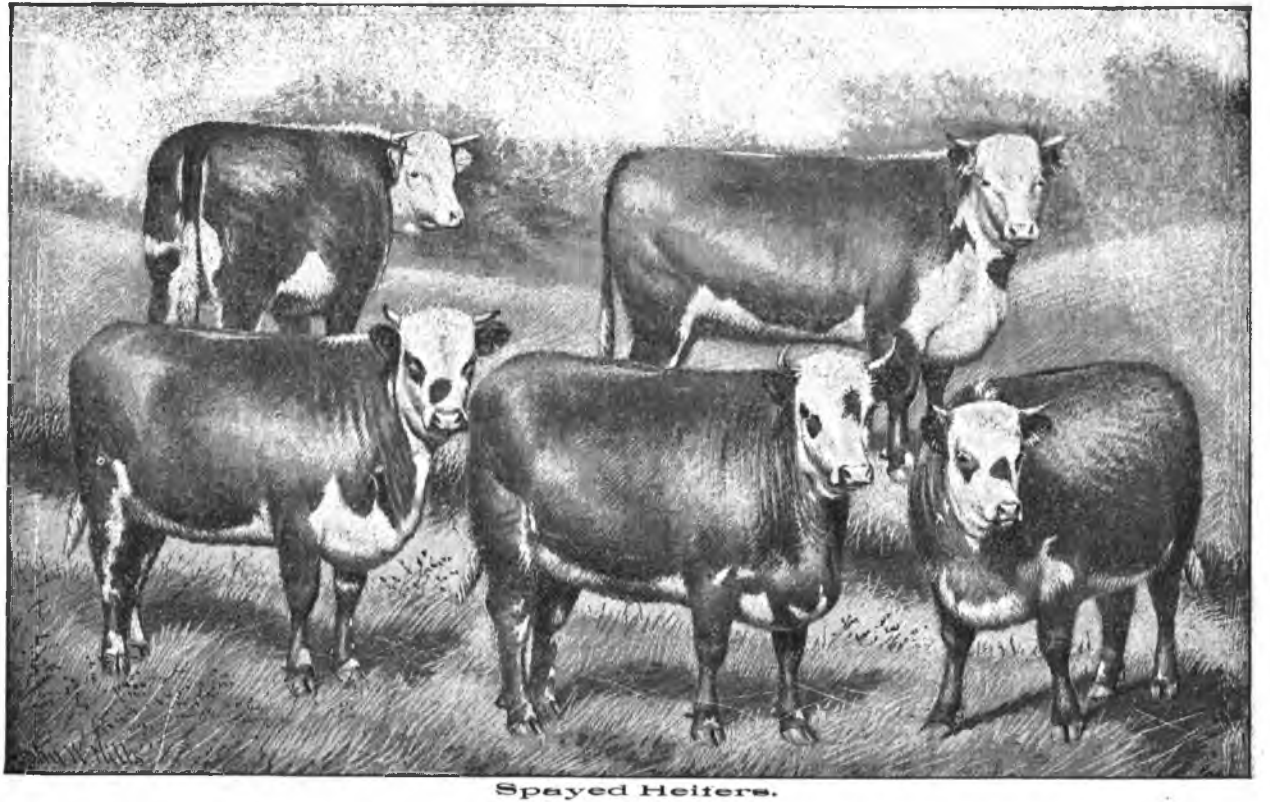
Green sweet corn	per cwt	2.5 cents
Snapped corn	"	20 "
Oats	"	40 "
Hay	"	28 "
Corn stover	"	10 "
Corn and cob meal	"	30 "
Cotton seed meal	"	85 "
Bran	"	40 "
Mangels	"	5 "

These prices represent a wide range in values of the principal feeding stuffs, but the variation is due to the transition from a year of very severe drouth (1894) and consequent shortage of grain crops, to one of great abundance of all farm feeds.

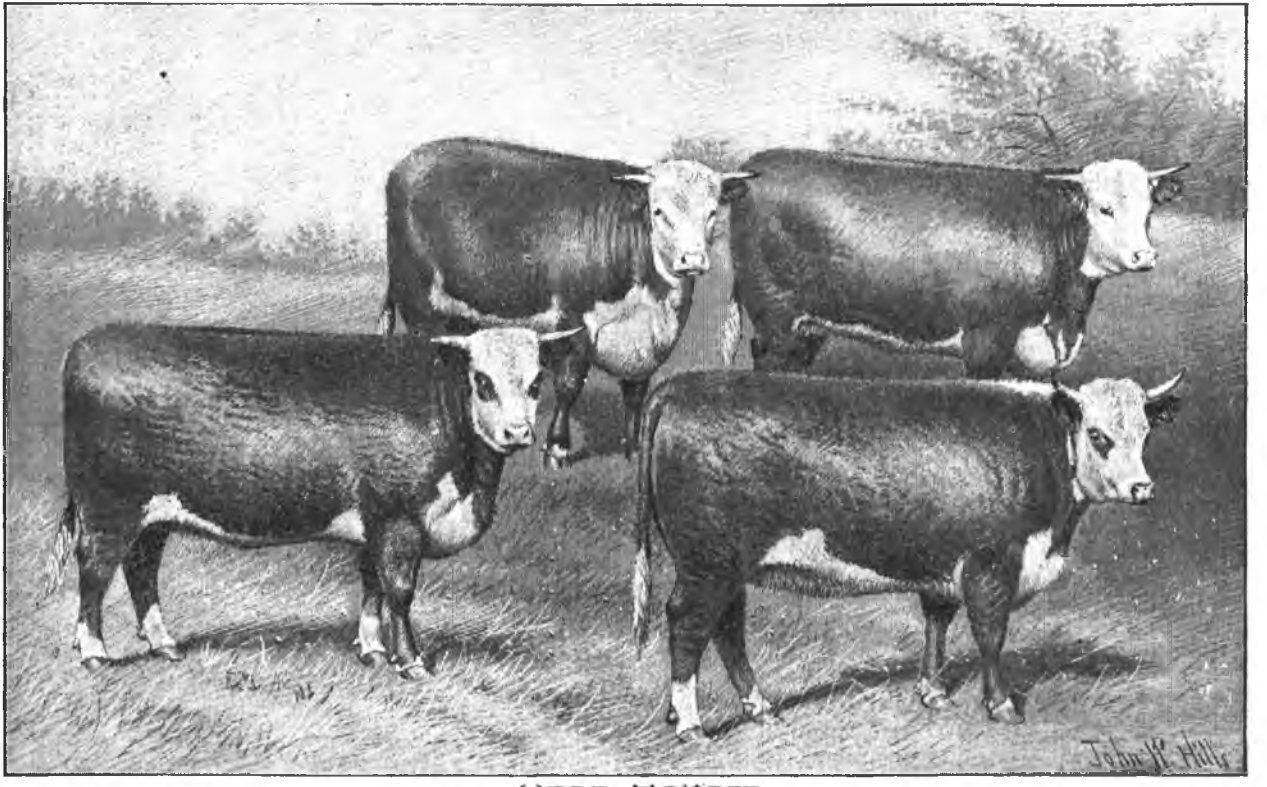
The illustrations appearing on the following pages represent the cattle at the close of the feeding experiment. These are very faithful likenesses of all animals of each lot and indicate the superiority of form and finish demonstrated by the record made in the slaughter and block test reported in another place.



The Steers.



Spayed Heifers.



Open Heifers.

The individuals in each lot were selected with a view to uniform excellence and good feeding quality, and each class was well represented. As before stated, all of these cattle were by the same sire and from a uniform herd of cows, except the two that were purchased from Mr. Redhead. These are shown in rear of the open heifer group. One of them was perhaps the best animal in this lot and the other was considered the poorest, though there was no great variation in any of them and these two averaged about the same as the others.

It will be seen by reference to the feeding record that the open heifer lot made the best returns in the feed yard, the gains being not only the largest but also from the least feed. The steers ranked next to the open heifers, and the spayed heifers made practically the same gains at about the same cost.

In the former investigation of this subject by the station in 1893 and '94, the steers made both larger and cheaper gains than either lot of heifers. This result was doubtless in part due to the disadvantage of several representatives of the heifer lot proving to be in calf, though the individual record of each animal showed that the heifers that were free from calf also failed to make as good average gains as the steers.

It should also be noted that two heifers in the latter experiment dropped calves Mention has already been made of spayed heifer No. 417 dropping a calf in November 1894. This was soon after the operation of spaying and caused little if any interruption as she made a gain of 45 pounds in the month of November. This heifer is shown in the center of the spayed heifer group. Open heifer No. 418 shown at the left of the illustration of the open heifer group also gave evidence of being in calf soon after the feeding test began and Dr. Niles of the Veterinary department, gave treatment causing her to abort March 4th. This interruption prevented any gain by this heifer in the month of March. Her weight on March 1st was 780 pounds and on April 1st it was the same. In the following month, however, her gain was 70 pounds. the largest made by any heifer in the lot during that month. It is unusual for heifers of this age to get with calf and it was thought that in starting with animals und

one year of age, the danger of that kind of interruption would be avoided, but in this case it is evident that the heifers became pregnant when not over six or seven months old while yet with their dams and other cattle in the pasture.

The object of this experiment was to compare the feeding value of heifers with that of steers under like conditions, and to get indications of the effect of spaying on one-half of the heifers. A comparison shows that in this case, spaying was not beneficial, as the open heifers made a gain of 2.26 pounds per head daily for the ten months of yard feeding, the time when we could control the actual amount of nutrients each lot consumed. The spayed heifers gained 2.03 pounds per head daily during the same time. Individuality may have operated but as careful a division as could be was made before spaying. We can go the length of saying that we have found no advantage to the spayed lot from the operation in this experiment. Spaying does not suppress nature altogether, the spayed heifers did not come in heat as regularly as the open heifers, but they did come in heat occasionally during the earlier months of feeding, and it may be added that as the fattening process went on, evidences of being in heat diminished with both lots until toward the close of the feeding period, it ceased entirely. It is well settled that fattening is antagonistic to fecundity. The steers gained 2.07 pounds per head daily during the ten months of yard feeding, which is slightly less than the average gain of both lots of heifers.

The open heifers made this gain in live weight from 7.67 pounds of dry matter for a pound of gain; that is, from nutrents estimated after the organic moisture was deducted. The spayed heifers made their gain on 8.60 pounds of dry matter for a pound of added weight; while the steers required 8.70 pounds of dry matter to gain a pound in weight. This controlled the cost of the gains made which for the open heifers was 3.47 cents; for the spayed heifers, 3.88 cents; and for the steers, 3.90. The heifer commends herself to the feeder in comparison with the steer. In this experiment she made gains on less feed and at less expense.

The average daily gains for the entire period are less than those for the ten months of yard feeding. The table

shows that gains were decidedly less during the four months of pasturing, and the cost of gain was also greater. This is contrary to the results of former experiments at this station, with one exception, and that was a bunch of cattle reported in Bulletin 32, and grazed under similar conditions to these. When these cattle went to grass they had been on good rations for four months, in fact on fattening rations for animals of their age and weight, although they were not fed heavily. Very excellent pasture conditions are required to keep up a two pound a day gain on as young animals as they were. We did not have such conditions. It is an open question how fat an animal should be to make best gains on different pastures.

Bulletin 20 of this station (page 688) shows grazing results from 18 steers on clover pasture; one-half of them getting corn meal gained 2.32 pounds per head daily; the other half of them on oil meal gained 2.03 pounds per head daily. The cattle in that experiment were a year older than the steers and heifers under consideration. The cattle reported in Bulletin 20 were on clover; the steers and heifers in this experiment were on timothy and blue grass pasture. The former had grain regularly while on pasture, the latter had grain only during the last two months. Gains made on grass throughout the west are generally on cattle in lean condition in spring, or on cattle half fat when grazing begins, to which corn is regularly fed. The cattle in this experiment made about half the gains on grass that they did in the yards; the cattle in Bulletin 20 on the finest conditions possible with liberal amounts of corn meal to one-half of them and oil meal to the other half did not make as good gains as they did in the yards. We have yet to learn of grazing cattle making as good gains as stall or yard fed cattle, although as before stated the gains produced on pasture are almost invaribly made at less expense than by yard or stall feeding.

During the preceding summer, 1894, the station had twenty head of two year old feeding steers on this same pasture for three months. Ten head of these cattle had a daily allowance of ten pounds of corn and cob meal per head and made an average daily gain of 2.13 pounds per day, and ten head made an average daily gain of 2.01 pounds per head

from grass alone. This was in the season of excessive drouth, when the rainfall at this place during the summer grazing months was less than one-half that of 1895. Those results are reported in Bulletin 28 of this station. The cattle in this experiment were a year younger than both of the other bunches to which we have referred. To what extent the age may have influenced the results is not known.

The gain of January on all lots deserves notice. The steers reached 2.72 pounds, the highest monthly gain; the open heifers reached 3.34 pounds being their highest; and the spayed heifers gained 2.57 pounds exceeded only in the month of October, during which month all the lots made heavy gains that may perhaps be partially attributed to the change from pasture to feed yard conditions and an increase of stomach contents. The January gains were made on an increase of dry matter, but the increase had been gradual from a fraction over fourteen pounds a day to each lot in October, to 23 in January, culminating in 25.65 for the steers, 23.45 for the open heifers, and 24.64 for the spayed heifers in February after which it was reduced in each case, although only very little for the steers. These were the months where the greatest gains were made. Both lots of heifers exceeded the steers in gains during the last six months from October to March, and the heifers made greater gains than the steers on less feed during the last three months.

The increase in feed for January was considerable both in snapped corn and cottonseed meal, but the nutritive ratio was not changed radically. There was an increase in the the mangels that perhaps had an influence on the digestion of the animals. Bulletin 32, page 434, calls attention to the value of roots in feeding dairy cows. Wolff, a german experimenter, finds that the digestibility of crude protein of coarse fodders is decreased when the dry matter of roots or potatoes is fed heavily, equal to a sixth or a half of the entire ration. We have never fed roots so heavily. The dry matter of the mangels fed in this experiment being only at most about two per cent of the entire rations.

We are aware that extensive root feeding is not practical in Iowa in beef making, but the farmer feeding a few finely

bred steers, raised on his farm, designed to sell in the extra steer class, may find it profitiable during winter to provide a few pounds of mangels daily to aid digestion. There is a point beyond which added feed is not profitable. The January ration was not as heavy as that fed in February to any of the lots, yet the January gain was greatest. No rule can laid down regarding the amounts of feed that will be most profitable; the feeder must be the judge and the appetites of the animals will be the best indication.

From the time these cattle were brought from the pasture to the feeding yards October 1st to April 1st, they were on full feed and had all they would eat up promptly with a good, keen appetite for each feed. Heavier gains have been made in some of the former experiments at this station than those recorded here, but on larger cattle and at a greater ratio of feed per pound of gain. The rate of increase in this experiment is one pound of gain in live weight for each 8⅓ pounds of dry matter in the feed consumed, while as stated on page 536 of this bulletin, the average amount of dry matter per pound of gain in cattle is over ten pounds. Large cattle will produce heavier daily gains but they are usually produced at greater cost.

Cottonseed meal was fed liberally to these cattle from October to April as will be noted by referring to the feeding record. It was also fed moderately during the first winter. The results from the use of this feed for fattening cattle at the Iowa station have been very satisfactory in all respects. Toward the close when the cattle were being crowded to their full capacity, we fed liberally of roots and also added some oats to the ration. Both of these feeds were highly relished and they were used mainly to induce the animals to eat and digest as heavy a ration as possible. We place a high estimate upon the value of roots for this purpose. All the cattle marketed by this station since 1892 have been fattened and finished on corn, supplemented toward the end with some nitrogenous product, and roots. This contributes to the high finish in conjunction with large gains and smooth even flesh of superior quality, that has characterized the station cattle. Five shipments of cattle from the station since 1892 have topped the market in every case but one, and in some

cases by as much as fifty cents per hundred. The percentage of dressed beef and the record made on the block by this and other shipments have, we believe never been equalled by a car load lot. We call attention to these results for the purpose of emphasizing the value of good methods in feeding well bred animals.

SHIPMENT AND SALE OF THE CATTLE.

The three lots of cattle were prepared for shipment by withholding the water and evening grain feed on March 31, and giving a double allowance of hay. On the morning of April 1st each lot was given twelve pounds of snapped corn per head, but no water. At ten o'clock A. M. they were weighed and loaded in a Chicago & Northwestern car side tracked at the station yards. The car was deeply bedded with straw and had racks filled with hay.

The average weights taken at home just before loading were as follows: Steers, 1388; spayed heifers, 1300; and open heifers 1337. The selling weights in Chicago April 2nd were steers, 1346; spayed heifers, 1264; open heifers, 1285. These are heavier shrinkages than our cattle usually sustain in going to Chicago but much of it is probably due to the day in the yards being so cold and disagreeable as to prevent a good fill. The total shrink from the final weights on full feed and water at our yards was 50 pounds on the steers, 53 pounds on the spayed heifers, and 59 pounds on the open heifers. The cattle were purchased by Swift & Co. at $4.50 per hundred for the steers, and $4.25 for the heifers, both lots being rated alike. The highest price paid for any other cattle on the market that day was $4.40 for steers. They were sold in the open market Thursday, April 2nd in competition with 5500 head of other cattle.

The Breeders' Gazette of current issue, said:

"Some buyers were disposed to consider them about as fat a bunch as has been seen in the yards in years. They were also pronounced about as good a bunch as had crossed the scales in a long time. * * * They were prime cattle including some that would have ranked high at the fat stock show, and the bunch averaged a dress of 67.7 per cent."

The cattle were killed by Swift & Co. and subjected to a careful detailed test on the following day April 3rd.

RECORD OF THE SLAUGHTER TEST.

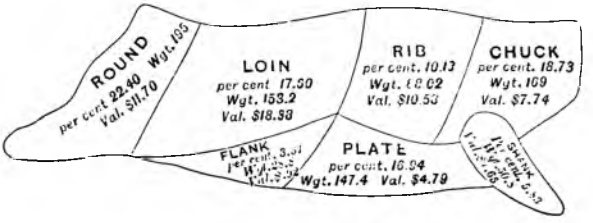
FIVE STEERS.		Weights	Percentages
	Beef	4438	67.05
	Hides	437	6.61
	Blood	222	3.35
	Heads	146.50	2.21
	Tongues	43	.65
	Tongue trimmings	1	.01
	Feet	90	1.36
	Caul fat	128	1.91
	Brisket fat	12.50	.19
	Bed tallow	39.50	.59
Paunches & contents 539 lbs.	Paunches empty	159	2.40
	" waste	282	4.26
	" fat	98	1.49
Intestines & contents 382 lbs.	Intestines empty	92.50	1.39
	" waste	59.50	.89
	" fat	200	3.02
Plucks 173.5 lbs.	Livers	70	1.06
	Hearts	15	.23
	Lungs & windpipes	60.50	.91
	Heart fat	3	.04
	Pluck fat	25	.38
		6620	100

FIVE SPAYED HEIFERS.		Weights	Percentages
	Beef	4172	67.47
	Hides	368.50	5.96
	Blood	192.50	3.11
	Heads	117.75	1.74
	Tongues	39.50	.64
	Tongue trimmings	.75	.01
	Feet	69.50	1.23
	Caul fat	122	1.97
	Brisket fat	14	.22
	Bed tallow	40	.65
Paunches & contents 557 lbs.	Paunches empty	162	2.62
	" fat	112	1.81
	" waste	283	4.58
Intestines & contents 531 lbs.	Intestines empty	95.50	1.54
	" waste	54	.87
	" fat	181	2.92
Plucks 159 lbs.	Livers	65	1.15
	Hearts	15	.24
	Lungs & windpipe	49	.79
	Heart fat	5	.08
	Pluck fat	25	.40
		6183	100

FOUR OPEN HEIFERS.		Weights	Percentages
	Beef	3445	68.59
	Hides	326	6.49
	Blood	149.50	2.97
	Heads	95.50	1.90
	Tongues	30	.59
	Tongue trimmings	.50	.01
	Feet	58	1.15
	Caul fat	89	1.77
	Brisket fat	10.75	.22
	Bed Tallow	29	.57
Paunches and contents 398 lbs	Paunches empty	205	4.08
	" waste	126	2.52
	" fat	67	1.33
Intestines & contents 263.5 lbs	Intestines empty	73	1.45
	" waste	45.50	.92
	" fat	145	2.88
Plucks 128 lbs	Livers	55	1.09
	Hearts	12	.24
	Lungs and windpip's	41	.81
	Heart fat	3	.08
	Pluck fat	17	.34
		5023	100

It will be seen that both lots of heifers dressed out a higher percentage of beef than the steers. Aside from this no material difference is revealed in the slaughter test. The weights and percentages of head and feet of heifers indicate a slightly finer bone and correspondingly less waste in these parts. It is commonly held that heifers run more to fat, on the block, than steers. The records of this test indicate but very slight variation in the internal fat, and when any difference is apparent the steers generally present the larger amounts. The distinctions brought out by the slaughter test in this experiment, though comparatively small, are in favor of the heifers, and to that extent the heifer carcasses were the most profitable to the butcher.

The following diagram represents Swift & Co's. method of cutting beef.

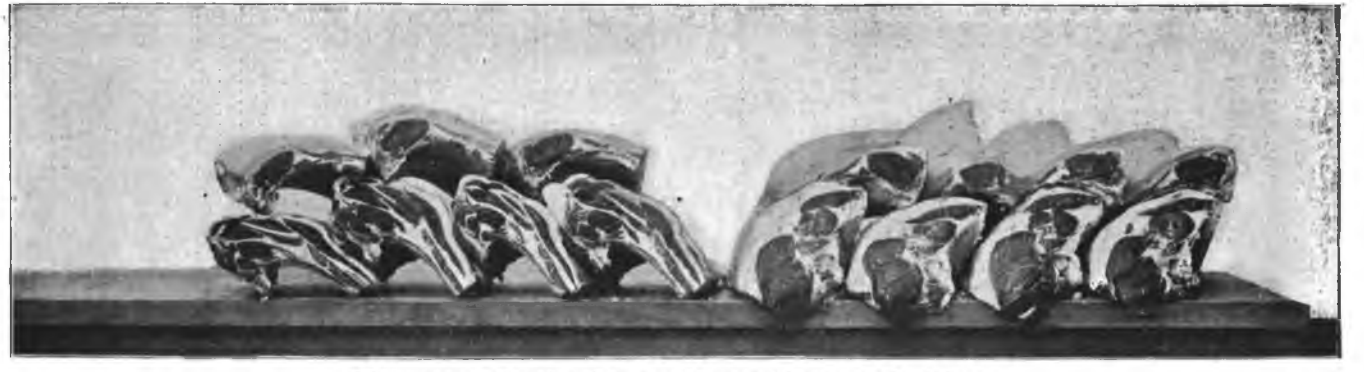


*The weights, percentages, and values given here are the average per head for the lot of five steers.

The records made on the block are presented in the following illustrations and table. The illustrations are the reproductions of photographs of the rib and loin cuts from each lot. The rib cuts are shown on the left and the loin on the right. The position of these cuts is reversed in the upper layer thus giving a view of each end.

Rib and Loin Cuts from Steers.

Rib and Loin Cuts from Spayed Heifers.



Rib and Loin Cuts from Open Heifers.

BLOCK TEST

FIVE STEERS.

Pieces		Percentage of carcass	Pounds	Price	Amount
10	Loins	17.60	766	12	$ 91.92
10	Ribs	10.13	441	12	52.92
10	Chucks	18.73	815	4¾	38.71
10	Rounds	22.40	975	6	58.50
10	Plates	16.94	737	3¼	23.95
10	Flanks	3.31	144	3¼	4.68
10	Shanks	5.83	254	3¼	8.26
10	Necks	.69	30	1	.30
	Suet	4.37	190	4	7.60
	Totals	100	4352		286.84

Average cost price.....6.51 cts. per pound
Average selling price..6.59 " "

FIVE SPAYED HEIFERS.

10	Loins	18.33	755	11	$ 83.05
10	Ribs	10.66	439	11	48.29
10	Chucks	17.99	741	4½	33.34
10	Rounds	21.73	895	5¾	51.46
10	Plates	16.68	687	3¼	22.33
10	Flanks	3.93	162	3¼	5.26
10	Shanks	5.31	219	3¼	7.12
10	Necks	.73	30	1	.30
	Suet	4.64	191	4	7.64
	Totals	100	4119		258.79

Average cost price....6.21 cts. per pound.
Average selling price 6.26 " "

FOUR OPEN HEIFERS.

8	Loins	18.34	620	11	$ 68.20
8	Ribs	10.53	356	11	39.16
8	Chucks	17.66	597	4½	26.87
8	Rounds	20.57	695	5¾	39.96
8	Plates	17.93	606	3¼	19.69
8	Flanks	4.44	150	3¼	4.88
8	Shanks	5.38	182	3¼	5.91
8	Necks	.71	24	1	.24
	Suet	4.44	150	4	6.00
	Totals	100	3380		210.91

Average cost price.....6.14 cts. per pound.
Average selling price.. 6.24 " "

It will be observed from the block test that the percentage of weight found in the highest priced cuts, ribs and loins, averages greater in both lots of heifers than in the steers. The same result was noted in the former comparison of steers and heifers on the block reported in Bulletin 24 and the difference was even greater there than in this case.

In January of 1892, this station marketed a car load of heavy well fattened steers of which Swift & Co. said,

"We have never cut up a load of cattle that were better than this load taken altogether." (Bulletin 20)

We find that the heifers in this experiment also average nearly one per cent, more weight in rib and loin, than those steers. These facts are of striking significance for they indicate that heifers are inclined to put rather more of their weight into the high selling parts than steers, and in consequence kill more profitably. A variation of one per cent. at first thought, seems small, but it is one in seventeen; and that, considered independently, is nearly six per cent., and when it is remembered that the price of this product is about three times the average for the whole carcass, a comparatively slight variation assumes considerable importance.

It will be seen by referring to the values put on the meat in the block test, that the ribs and loins from the steers were rated one cent per pound higher than the same cuts from the heifers, and the chucks and rounds were rated one-fourth of a cent higher. In our former comparison of these products, a uniform distinction of one-and-a-half cents a pound was made by Swift & Co. in favor the steer beef on ribs, loins, and plates, and one-fourth of a cent on rounds. At that time the judgement of leading English and American meat dealers was obtained. The opinion of the American dealers sustained Swift & Co. in discriminating against the heifer beef to the extent named; while the difference made by the English authorities was fully as much in favor of the heifers. (See Bulletin 24) This marked difference in the estimate put on the value of steer and heifer beef in the American and English markets at that time is hard to account for. It seems evident, however, that the value of well finished heifer beef has not been fully appreciated by American butchers. The difference in live weight value has already been reduced from $1.00, to 25 cents per hundred since December 1893, and yet the heifers have in both cases returned a higher net profit on the block than the steers, even when then the higher rating of the steer meat is allowed.

The opinion of American dealers appears to be rapidly changing in reference to the relative value of steer and heifer

beef. In December 1893 when the first lot of steers and heifers was marketed by this station, the verdict of the Chicago authorities was almost unanimous in favor of sustaining the marked discrimination against the heifer. The present attitude of the market is indicated by a paragraph which appeared some time since in Clay, Robinson & Co's Live Stock Report of Chicago:

"Even yet the heifers are too cheap in proportion, but the circumstances are forcing them into favor. The English butchers prefer the heifer and pay the price. They found out the value of quality in their cuts sooner than we did, but we are following fast in their steps."

It has been claimed that the principal cuts in heifer carcasses run more to fat than in steers and are in consequence less profitable to the consumer. The evidence of the camera is furnished on this point in the illustrations on another page, and as will be observed, very little difference is apparent.

One distinction that has been noted in this and other investigations of the subject is that under similar conditions, the heifers are inclined to take on flesh a little more readily than steers. This distinction is not so likely to be manifest in larger gains on the heifers as in a tendency to finish at a little earlier stage in the process of fattening. This difference has also been noted by practical feeders where heifers and steers have been fed under uniform conditions on an extensive scale.

The results of this experiment fully confirm the indications of the former work at this station, viz: that the merits and relative value of heifer beef have been underestimated in the Chicago market. The conditions surrounding this experiment have been more satisfactory than in the former, for the reasons stated in giving the details, and the results in the latter investigation point even more strongly than in the former to the excellence of well-fatted heifers for the block. The difference in live weight value was reduced to only 25 cents per cwt., in the latter case but when the heifers make a better record both on the block and in the slaughter test, and no essential difference can be detected in the quality of the product, it is difficult to understand why there should be any distinction whatever in favor of the steers.

SUMMARY OF RESULTS.

The operation of spaying temporarily retarded the growth of heifers eighteen months of age, but heifers a year younger were not perceptibly interrupted.

The heifers in the first experiment were at a disadvantage on account of some of them having gotten in calf previous to purchase by the station. The cost of feed per pound of gain was 5.86 cents by the spayed heifers, 6.04 cents by the open heifers, and 5.02 cents by the steers.

The cost of feed per pound of gain in this experiment was 3.88 cents by the spayed heifers, 3.47 cents by the open heifers, and 3.90 cents by the steers. The former experiment covered a period of eleven months feeding, and the latter fourteen months. In the former experiment, the average daily gains for the total period were, spayed heifers, 2.07 pounds; open heifers, 1.99 pounds; steers, 2.44 pounds. In the latter experiment, the gains were, spayed heifers, 1.70 pounds; open heifers, 1.86; steers, 1.71 pounds. The lighter gains in the latter case were due to the fact that younger cattle were used, and also to unfavorable pasture conditions.

In the last experiment where conditions were more nearly equal, the heifers made a slightly greater average gain from correspondingly less feed, and at less cost, than the steers.

In the first experiment both lots of heifers sold for $4.75 per cwt. in Chicago and the steers $5.75 on the same market. In the second experiment both lots of heifers sold for $4.25 and the steers for $4.50. All of these cattle topped their respective classes on the market.

The percentage of dressed beef made in the first experiment was 62.8, 62.4, and 63.2 by the spayed, and open heifers and steers respectively; and in the second experiment it was 67.47, 68.59, and 67.05 by the spayed, and open heifers, and steers respectively. In both experiments the heifers have made about one per cent more weight in the high priced cuts of meat than the steers.

Carefully conducted slaughter and block tests have not revealed any material difference in the character, composition, or quality, of the meat from the steers and heifers used in these experiments.

But little if any benefit has been derived from spaying.

In both cases the heifers have given more profitable carcasses on the block, even when granting the higher valuation put on the leading cuts from the steers.