

EXPERIMENT STATION
OF THE
KANSAS STATE AGRICULTURAL COLLEGE,
MANHATTAN.

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Farm Department.

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BABY BEEF.

IN THE latter part of October, 1900, the Kansas Experiment Station put into the feed-lots 130 head of calves that had just been weaned. They were divided into lots to test the value of alfalfa hay, prairie hay, corn, Kafir-corn and soy-beans in the production of baby beef.

Sixty head of heifers were purchased in the Kansas City stock-yards, weighed an average of 418 pounds each, cost \$4.25 per cwt. at the yards, and cost an average of \$18.25 per head delivered in the College feed-lots. These were range calves—grade Shorthorn, Hereford, and Angus. Fifty head were purchased of farmers near Manhattan, and had been kept with their dams through the summer in small pastures. Twenty head were mixed-bred calves that had been purchased around Manhattan when born, and had been raised by the College by hand, ten being raised on creamery skim-milk and ten on whole milk. The calves were vaccinated to prevent blackleg. Without this safeguard we would not have dared to undertake this experiment.

* Mr. Haney had charge of the feeding in this experiment until March 1, 1901, when he resigned to go to Mexico as agriculturist of the Chihuahua & Pacific railway. After March 1, Mr. Elling had charge of the feeding.

The calves were fed seven months, with the following results:

FEED.	Average gain per head	Grain per 100 lbs. gain.	Hay per. 100 lbs. gain.
Alfalfa hay and corn	407 lbs.	470 lbs.	544 lbs.
Alfalfa hay and Kafir-corn	379 "	524 "	626 "
Prairie hay, corn 2/3, and soy beans 1/3 . . .	378 "	520 "	486 "
Prairie hay, Kafir-corn 2/3, and soy beans 1/3,	342 "	594 "	539 "
Skim-milk calves—alfalfa hay and corn . . .	440 "	439 "	436 "
Whole-milk calves—alfalfa hay and corn . . .	404 "	470 "	420 "
Average	392 lbs.	503 lbs.	509 lbs.

At the close of the experiment. May 27, the entire lot averaged 800 pounds per head in the College feed-lots. The shrinkage in shipping to Kansas City was three per cent. Thirty-two steers averaged 838 pounds and sold at \$5.40 per 100 pounds, seventy-four heifers averaged 758 pounds and sold for \$5.35, and eighteen heifers averaged 741 pounds and sold at \$5.15. Six head of heifers went as springers.

The calves were slaughtered by the Armour Packing Company, who made the following report:

	Live weight.	Dressed weight.	Tallow.	Dressed weight.	Tallow.
32 steer calves	838 lbs.	480 lbs.	52 lbs.	57.2%	6.1%
74 heifer calves	758 "	432 "	48 "	57.0%	6.3%
18 heifer calves	741 "	420 "	49 "	56.6%	6.6%

THE FEEDING.

The calves were fed twice daily, beginning at 7 A. M. and at 4.30 P. M. The lots were fed in the same order each time and exactly at the same time each day. The hours of feeding were arranged so that the calves did all the work of eating in daylight. Each lot was given at each feeding all the grain and roughage it would eat up clean within three hours after feeding. In each lot the grain was fed mixed with the roughage and the roughage was fed whole. Fine barrel salt was kept in boxes under the sheds, where the calves had free access at all times. Each lot of calves was sheltered with a common board shed, closed on the north, open to the south.

WATER.

Water was supplied in tanks regulated by float valves so that the tanks were kept full and the calves could drink at will. From December 2 to April 1 a tank-heater was kept going in each tank and the water was kept at a temperature of about fifty degrees. Five styles of tank-heaters were used, with results as follows:

NAME.	Coal used.	Coal used daily.
United States (U. S. Wind Engine & Power Co., Batavia, Ill.),	1,869 lbs.	15.7 lbs.
United States (U. S. Wind Engine & Power Co., Batavia, Ill.),	1,933 "	16.2 "
Butler (Butler Company, Butler, Ind.)	1,894 "	15.9 "
Butler (Butler Company, Butler, Ind.)	1,538 "	12.9 "
Goshen (Kelly Foundry & Machine Co., Goshen, Ind.) . . .	2,180 "	18.3 "

This shows an average consumption of 15.8 pounds of coal daily per tank. With coal at four dollars per ton, this would make the daily cost of warming a tank a small fraction over three cents per day. A heater will warm water for forty head apparently as cheaply as for five or ten head. We found the previous winter that it required no more labor to keep a tank-heater running than it did to keep the ice out of a tank not heated. We would urge every Kansas feeder to use a tank-heater. A successful feeder of long experience recently made the statement that gains in feeding follow very closely the amount of water drank by the fattening animal; the larger the quantity of water drank the greater the gains, provided there is no unnatural stimulation to drinking. With clean, palatable water, free from ice, kept where the animal can drink at will, the animal drinks often, and each twenty-four hours consumes a large quantity, but at no time is the stomach overloaded or unduly chilled. The cost of using a tank-heater is trifling and the returns are good.

SAVING IN FEED.

The remarkable feature of this experiment is the small amount of grain required to make 100 pounds of gain. The skim-milk calves fed alfalfa hay and corn averaged 100 pounds of gain for only 439 pounds of corn, and this in seven months' feeding. The other lots fed alfalfa and corn required 470 pounds of corn for 100 pounds of gain.

Prof. W. A. Henry, our best authority on feeding, in his book on "Feeds and Feeding," states that about 1000 pounds of grain and 500 pounds of roughage will be required on an average for 100 pounds of gain with well-fattened steers.

Prof. C. C. Georgeson, in a series of feeding trials with full-grown steers at this Station, made the following averages:

	Grain required for 100 pounds of gain.
*Ear corn	1135 lbs.
Shelled corn.	1106 "
Corn-meal	1081 "

These trials lasted from 129 to 175 days. One of these trials lasted 140 days, and 1334 pounds of corn-meal was required for 100 pounds of gain. The least amount used was 911 pounds of corn-meal for 100 pounds of gain.

In a feeding trial made by Cottrell and Haney at this Station in 1900, with eighty 1000-pound steers fed 116 days, 747 pounds of grain on an average were required to make 100 pounds of gain. The gain was fed mixed with alfalfa hay. The best record was made with

*Actual grain, weight of cob deducted.

twenty steers fed corn-meal and cut alfalfa hay mixed, where 680 pounds of grain were required for 100 pounds of gain.

These records show that the skim-milk calves fed alfalfa and corn required less than one-third as much grain to make 100 pounds of gain as was required by one lot of mature steers fed by Professor Georgeson; that the other two lots of calves, fed alfalfa and corn, required only forty-seven per cent. as much grain as Professor Henry states is the average requirement for full-grown steers, and only seventy per cent. as much grain as the best record made by Cottrell and Haney with 1000-pound steers. In other words, the production of beef with calves up to one year of age requires only from one-third to three-fourths as much grain as is required with full-grown steers.

With the constantly increasing price of corn land throughout the corn belt of the United States, the feeder is forced to find some way in which he can produce more pounds of beef from a bushel of corn than he has been producing by the old methods with cheap land and cheap corn. The gains made by the old methods too frequently, under present conditions, result in loss. Does not the feeding of baby beef, as shown by this experiment, show one good solution of the problem?

PRICES FOR BABY BEEF.

At the close of the experiment the calves were shipped to the McIntosh & Peters Live Stock Commission Company, Kansas City, and were sold May 29 at the following prices: Seventy-four heifers brought \$5.35 per hundred; eighteen heifers, \$5.15; thirty-two steers, \$5.40; and six heifers went as springers, bringing \$3.60 per hundred. These prices were fully as high as prices paid for fully matured fat steers of equal quality with the calves. For the past three years well-fattened baby beef on foot has sold in Kansas City and Chicago for as high prices per hundred pounds as mature fat steers of the same quality.

HIGH PRICES FOR HEIFERS.

The production of baby beef returns high prices for the heifers. These calves were put in the feed-lots at weaning time, and were probably a little over a year old when sold in Kansas City, May 29. The thirty-two steers sold at \$5.40 and brought an average of \$45.29 each; seventy-four of the best heifers sold at \$5.35 and brought \$40.60 each; and the eighteen poorest heifers sold at \$5.15 and brought \$38.20 each. All the steers were home bred, while sixty of the heifers were range bred.

For equal weight and quality, the packers will pay as much for fat year-old heifers as they will for steers at the same age, and this is the only time in the heifer's life when she will bring as much, pound for pound, as a steer.

When the calves were purchased at weaning time, heifer calves were quoted in Kansas City at one dollar per hundred less than steer calves of the same quality. This made a margin of \$4.25 per head in favor of heifer calves to start with. We found, and feeders generally find, that heifer calves fatten more evenly and become better finished than steer calves, where both are pushed for baby beef. The steers make as good gains as the heifers, but have a greater tendency to grow than to fatten, and, when forced to heavy gains, the second six months of their lives a considerable per cent. of the steer calves have to be sold as stockers rather than as baby beef, because, while they are sufficiently heavy, they lack finish.

The prices secured for the year-old heifer calves fattened in this experiment were fully as great as would have been secured if they had been kept under usual conditions and marketed two years later.

QUICK RETURNS—SAVING IN PASTURE.

The production of baby beef gives quick returns on the investment. The farmer who raises and fattens mature steers has to furnish pasture for his cows, the yearlings, the two-year-olds and often for the three-year-old steers. He waits three years from the time the calf is born until he realizes on his investment, and only one-fourth of his herd are cows producing calves. If the farmer will produce baby beef he can fill his pasture to the full limit of cows producing calves and he will realize on the calves twelve months from date of birth.

DEMAND FOR BABY BEEF.

The packers report that they have never been able to supply the demand for baby beef, and that there is no likelihood of the market ever becoming oversupplied, even though stockmen generally should go to producing it. The best demand and the highest prices are in the months of April, May, and June. During these months butchers want light cuts and they find less waste in baby beef than in that from larger cattle. After July 1 the price for baby beef has a tendency to become lower, as light grass-fed cattle compete. The best prices are obtained for well-fattened calves weighing from 600 to 1000 pounds. Calves either above or below these weights do not top the market. The age should be from twelve to fourteen months.

THE FEED.

Alfalfa hay and corn gave the greatest gains in this experiment, followed by alfalfa hay and Kafir-corn grain. At all times through the seven months' feeding the calves fed alfalfa hay appeared to be in the best condition and they finished the best. The corn and Kafir-corn were fed whole for the first eighty-three days; after that both

were ground. With all lots during the whole time of the experiment the roughage was fed whole and the grain was fed mixed with it.

With the lots fed prairie hay, soy-beans balanced up the ration and helped secure good gains, though not as good as was made by alfalfa hay.

Kafir-corn did not show as good gains as corn, but the calves did well on it, and it will be profitable grain to grow on upland and in dry regions for feeding for baby beef. The farmer who produces baby beef should raise alfalfa and make it the basis for feeding both cow and calf. Cow-peas, soy-beans, field peas and clover hay may be used to give variety, and all these crops increase the fertility of the soil, as well as supply the best feed at lowest cost. Feeding trials not yet complete, made since this test was finished, indicate that a mixture of grains will secure gain for a less weight of grain than corn alone, and that in Kansas it is profitable to feed cottonseed-meal up to three pounds per day per thousand pounds live weight, after the calves reach nine months of age.

BREEDING FOR BABY BEEF.

Calves used in this experiment were "common-bred" ones, and they made good gains and sold for a good price when fattened. The farmer whose business was producing baby beef would use the best type of bull he could secure—short-legged, thick-meated, blocky, and quick-maturing. He would select well-bred cows of strongly pronounced beef type that were good milkers. With good breeding and good feeding, an average weight of 1000 pounds may be secured at twelve to fourteen months of age.

The tamer calves are when they go in the feed-lots the better the gains and the cheaper every pound of gain is put on. The farmer who raises his own stock and pets them has every advantage in producing beef cheaply over the ranchman, and over the feeder who buys at stock-yards and gets calves that have had all the loss and excitement of shipping. In every case home-grown stock made the best gains. In the first four lots there were in each lot fifteen range calves and five calves that had run with their dams in small pastures under ordinary farm conditions. The home-grown calves made an average gain of 399 pounds each, the range calves 369 pounds.

In three lots that were fed alfalfa hay and corn, range calves gained an average of 396 pounds each, calves that ran with their dams in small pastures 436 pounds each, and calves raised on skim-milk 440 pounds each.

THE SKIM-MILK CALF FOR BABY BEEF.

Feeders find that the average skim-milk calf does not make profitable gains in the feed-lot and will not buy him. Farmers find that the difference in price between an ordinary skim-milk calf and one that has run with the cow is frequently greater than the profits made from milking and they drop dairy work.

In this experiment one lot of calves had been raised on skim-milk and another lot had run with their dams in small pastures until weaning time. Both lots were put in the fattening yards at weaning time and were fed the seven months on alfalfa hay and corn. The results are as follows:

	Average gain per head.	Feed for 100 pounds gain	
		Corn.	Alfalfa.
Calves raised with dam.	435 lbs.	475 lbs.	472 lbs.
Skim-milk calves.	440 "	439 "	436 "

Corn cost 40 cents a bushel and alfalfa hay \$8 a ton, making the cost of each 100 pounds of gain \$5.28 for calves raised with their dams and \$4.88 for skim-milk calves. The calves when fattened were shipped to Kansas City, the steers in each lot bringing \$5.40 per hundred and the heifers \$5.15. The packers paid the same price for the fattened skim-milk calves as they did for the others. In this trial the skim milk calves made the greater gains, gains at the least cost, and made the most profit.

We attribute the good showing made by the skim-milk calves to the fact that at weaning time they were already on grain feed, they did not worry at the loss of their dams as did the other calves, and they were perfectly tame.

The skim-milk calves were fed until weaning on sterilized skim-milk, with a grain ration composed of equal parts of corn and Kafir-corn, with all the alfalfa hay they would eat. They were fed in this way twenty-two weeks and made an average daily gain of one and one-half pounds per calf. The feed to raise those calves to weaning cost \$5.27 per head. As the results show they were in good condition for feeding when weaned, and the experiment shows strongly the good feeding qualities of the skim-milk calf and the profits that can be made from it, when the calf is properly handled from birth to weaning and then pushed for baby beef.

The College herd of scrub cows, bought without regard to their value for the dairy, produced in a year, at creamery prices, milk worth \$37.75 per cow. The skim-milk calves which were fattened in this experiment were of mixed breeding and were selected without regard to their value for the production of baby beef. They brought an average of \$40 each when marketed, at about a year old. This shows

a gross income in a year from a scrub cow and a scrub calf of \$77.75, when both cow and calf are pushed, the cow's milk sold, and the calf raised on skim-milk.

The best cow in the scrub herd produced milk in a year worth, at creamery prices, \$60.88. The best calf in the skim-milk lot brought \$47. This shows that a good scrub cow with a good calf can be made to bring over \$100 gross income in a year. With large grade Shorthorn or Hereford cows, that were good milkers, crossed with a short-legged, thick-meated, blocky bull, the returns from both cow and calf would undoubtedly be greater, making the combination of dairying and baby beef very profitable. The combination properly made of baby beef with dairying will enable the Kansas dairyman to double his income.

CARE IN FEEDING FOR BABY BEEF.

In forcing calves for baby beef, the feeder must remember that the calves are babies and must be treated as such to secure the greatest gains. The feeder who loves them and pets them and never allows a harsh word to be spoken in the feed-lot will get many more pounds of gain from his feed than will the feeder who simply puts an equal amount of feed in the boxes and kicks a calf when it gets in his way. The striking differences shown in this experiment in the cost of gain from calves that had been petted for six months while on skim-milk, calves that had been raised in small pastures and were ordinarily tame and wild range calves emphasize this.

The feed should be fresh and palatable at every feeding, and the calves should be fed in such a way as to induce them to eat the greatest possible amount and yet come to the feed-boxes hungry at every feeding. The feeding should be done regularly to the minute. Water and salt should be before them all the time, and both should be palatable. We prefer loose salt, and place it in the boxes under the sheds. Fresh salt should be placed in the boxes at least twice each week, and care must be taken to see that the salt does not cake and harden. If it does the calves will not eat enough for best results.

The best results will be obtained by feeding the grain mixed with the roughage, and the mixing is best when done in such a way that each particle of grain is taken into the mouth attached to a piece of roughage. When this is done the calves chew the greater part of the grain over a second time with the cud. Greater gains are made from each hundred pounds of gain, scouring and getting off feed not troublesome.

In stormy weather it will pay the feeder to stay in the feed-lots with the calves all day. In bad weather a calf feels "blue," just

as a human being, and often, if left to himself, will not eat. When the calf does not eat he will not gain. At such times, if the feeder who has petted his calves will stay in the feed-lot, stir up the feed in one box, freshen it in another, and offer a handful to the calf that is not eating, the calf will come around his feeder for companionship, and, after he has had a few mouthfuls of feed, will find that he is hungry and will eat a hearty meal. The calf makes a good gain from that day's feed.

Care and kindness do not cost money, but come from thoughtfulness and love for animals. They pay.

WHAT DOES THE PRODUCTION OF BABY BEEF MEAN?

Nothing to the ranchman who has cheap pastures; a complete change in the methods of crop-production and of feeding to the farmer with high-priced, limited pastures.

The farmer who raises and fattens mature steers has to furnish pasture for his cows, the yearlings, the two-year olds, and often for the three-year-old steers. He waits three years from the time the calf is born until he realizes on the investment and only-one-fourth of his herd are cows producing calves. If the farmer will produce baby beef, he can fill his pasture to the full limit with cows producing calves, and he will realize on the calves twelve months from the date of their birth. Capital is turned annually instead of once in every three years. The farmer's grain will produce from 50 to 100 per cent. more pounds of baby beef than it will of beef from a mature steer, and for the past three years the baby-beef animal has sold for as high prices per hundred as has the average steer.

In producing baby beef, the farmer can market his heifer calves at the same price as his steers, and will usually get more for the twelve-months-old heifer than he would for the same animal if kept until maturity.

Record of the Best Hundred Head of Cattle ever Raised and Fattened in One Lot in the United States.

STOCKMEN, ATTENTION !

Who Can Beat This Record.

Weight of 100 head of Cattle, fatted by B F Harris, of Champaign County, Ills.:

No Cattle.	Weight.	No. Cattle.	Weight.	No. Cattle.	Weight
2	4718	2	4694	2	4650
2	4732	2	4610	2	4806
2	4340	2	4773	2	4505
2	4580	2	4488	1	2548
2	4582	2	4572	2	4890
2	4730	2	4988	2	4762
2	4764	2	4634	2	4708
2	4738	2	4458	2	4854
2	4880	2	4920	2	4749
2	4756	2	4828	2	4700
2	5150	2	4702	2	4546
2	4624	2	4852	1	2516
2	4582	2	4464	2	4049
2	5304	2	4900	2	4724
2	4828	2	4634	2	4720
2	5378	3	4764	2	4732
2	4804	1	2690	1	2640
2	4640				

Average price sale, 7 cents

These cattle were weighed by Dr Johns, President of State Agricultural Society.

Twelve of the large cattle out of 100 head, weighed May 23d, 1856, which was during the time of

fattening

Black.....	2424	Ch Roan.....	2522	S. White.....	2360
Red.....	2340	B. Red.....	2574	P. Red.....	2486
Pied.....	2840	S. Roan.....	2330	Long White.....	2498
M. Red.....	2264	C. Red.....	2340	M. Red.....	2540

Same Cattle Weighed July 18, 1856

Black.....	2326	Ch Roan.....	2654	S. White.....	2430
Red.....	2490	B. Red.....	2646	P. Red.....	2330
Pied.....	2730	S. Roan.....	2470	L. White.....	2300
M. Red.....	2424	C. Red.....	2490	M. Red.....	2564

Same Cattle Weighed February 12th, 1857.

Black.....	2720	Ch. Roan.....	2810	S. White.....	2605
Red.....	2780	B. Red.....	2910	P. Red.....	2840
Pied.....	2900	S. Roan.....	2680	L. White.....	2310
M. Red.....	2640	C. Red.....	2770	M. Red.....	2890

Average, 2786¼ lbs.

Average age, 4 years.

Weighed by Frank Harris; sold for 8 cents per lb.

Largest steer in Illinois, weight 3524, 7 years old, raised by Jno. Rising, fed by

H. H. Harris.

Average weight of the 100 head. 2377 lbs.

The foregoing is a correct statement of a famous cattle sale which occurred in the City of Chicago, month of March, 1856.

The herd comprised 100 head of the finest and heaviest cattle ever raised and fattened in one lot by one man in the State of Illinois, or in the United States of America, or elsewhere, so far as the records go to show. These cattle were raised from 1 and 2-year-old steers on my farm in Champaign County, Illinois, and fattened for the market the years of 1855 and 56, their average age, at that time, being 4 years. They were weighed on my farm by Dr. Johns, of Decatur, Illinois President State Agricultural Society. Said weights were witnessed by a large number of representative men from Ohio, Indiana, Kentucky and Illinois to the number of five hundred, among whom were many professional cattle raisers and dealers, all of whom bore willing testimony to the average weight of the cattle, which was 2,377 lbs per head. Out of this lot of 100 cattle 12 head of the finest steers were selected and fed until the following February. They then showed an average weight of 2,786¼ lbs, and were sold to Messrs Cliborn & Alby, of Chicago, at 8 cents per lb. The weight master kept a record of each draft as the cattle were weighed—one and two in a draft. A copy of said weight is herewith attached for the inspection of the general public, also copy of average gain at different periods.

On the 22d of February, 1857, the 12 steers sold to Cliborn & Alby, appropriately decorated with tri-colored ribbons preceded by a band of music, were led through the principal streets of Chicago followed by 100 butchers, mounted and uniformed. After this unique procession, the cattle were slaughtered by said Cliborn & Alby for the city markets, some of the beef selling as high as 50 cents per lb. Small packages of it were sent to customers in various parts of the United States and even Europe and sold, in some cases, as high as \$1 per lb. These orders were given by these parties simply that they might say they had eaten of this famous premium beef.

B. F. HARRIS.

On the opposite page is a reproduction of a circular that shows the methods of feeding and the class of cattle which were considered best forty years ago. To-day the 1000-pound steer is the standard weight to put in the feed-lot, and the length of the fattening period seldom extends over seven months, and thousands of steers are in feed-lots but 75 to 120 days. Other things being equal, the older the animal the greater the amount of grain necessary to put on a pound of gain, and the longer the period of fattening the greater is the amount of grain required to put on a pound of gain. The record made by Mr. Harris is published to show the strong contrast in methods and economy of feeding needed forty years ago and the methods practised to-day. Is not the production of baby beef as much in advance in economy of feed and time over the usual methods of beef-production of to-day as to-day's methods are over those of 1856?

The Kansas farmer who produces baby beef should raise alfalfa and feed alfalfa hay to both cow and calf every day in the year. Cow-pea, soy-bean, field-pea and red-clover hays may be used to give variety, and this means that the farmer will grow leguminous crops largely and these will continually improve his fields.