

EXPERIMENT STATION  
OF THE  
KANSAS STATE AGRICULTURAL COLLEGE,  
MANHATTAN.

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***QUALITY IN BEEF.***

Six steers were purchased to be fed and slaughtered, for a demonstration on quality in beef to the College classes in stock judging. These steers were purchased for the College in the Kansas City stockyards by Clay, Robinson & Co., and were selected by Mr. John Gosling.

At the time of purchase Mr. Gosling commented on the steers as follows: The Short-horn grade is just fair, but indicates quality; the Angus grade is nearly typical and has big flesh; the Jersey is rather extra; the Holstein is somewhat light-fleshed, partaking more of the dairy than the beef element; the red scrub is light-fleshed and coarse—is red, but not a Short-horn; the spotted scrub shows more Short-horn of a common family, and has a characterless head. Both scrubs are about the stamp an unsophisticated breeder breeds for and feeds at. They have plenty of daylight under them, are woefully light in the thigh, and are without indications of twist.

THE FEEDING.

The steers were put on feed August 28, 1901, and feeding was completed March 21, 1902, a period of 205 days. The feed was corn, corn chop, and alfalfa hay.

Weights and gains are as follows:

|                     | Weight at beginning, lbs. | Weight at close, lbs. | Gain, lbs. |
|---------------------|---------------------------|-----------------------|------------|
| Short-horn .....    | 1,041                     | 1,436                 | 395        |
| Angus .....         | 882                       | 1,170                 | 288        |
| Jersey .....        | 862                       | 1,210                 | 348        |
| Holstein .....      | 886                       | 1,297                 | 411        |
| Red scrub .....     | 1,052                     | 1,487                 | 435        |
| Spotted scrub ..... | 1,064                     | 1,370                 | 306        |

The condition and age of the steers at the beginning made considerable difference in the gain. The Angus was in good flesh when put in the feed lot; others were thin. The difference in condition is shown by the pictures of the steers taken when the feeding began.

The feed required for each 100 pounds of gain is as follows:

|                     | Corn, lbs. | Hay lbs. |
|---------------------|------------|----------|
| Short-horn .....    | 978        | 546      |
| Angus .....         | 1,138      | 504      |
| Jersey .....        | 936        | 598      |
| Holstein .....      | 816        | 508      |
| Red scrub .....     | 770        | 491      |
| Spotted scrub ..... | 1,045      | 692      |
| Average .....       | 947        | 557      |

The steers ran together in a lot and had a shed opening to the south for shelter. They were tied up and fed separately. After eating they were turned loose. The steers were wild at first and fretted over the restraint of being caught and tied. This explains in part the reason for the large amount of grain required to make 100 pounds of gain. In a previous experiment in the same lot, with the same kind of feed, steers running loose all the time made 100 pounds of gain for 718 pounds of grain.

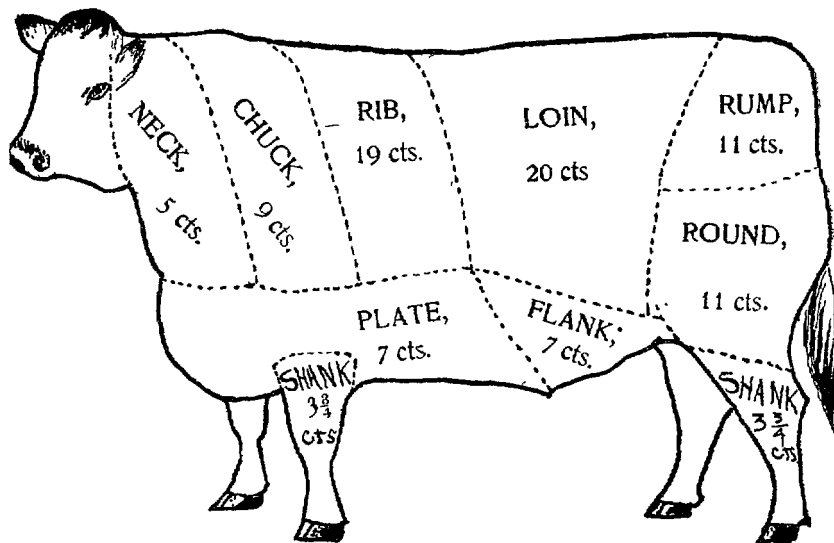
DATA FROM SLAUGHTERING.

When fattened, the steers were weighed in the feed lot while on full feed and water and were slaughtered, showing the following results:

|                     | Live weight, lbs. | Dressed weight, lbs. | Weight of tallow, lbs. | Weight of hide, lbs. |
|---------------------|-------------------|----------------------|------------------------|----------------------|
| Short-horn .....    | 1,436             | 912                  | 73                     | 86                   |
| Angus .....         | 1,170             | 735                  | 49½                    | 80½                  |
| Jersey .....        | 1,210             | 720                  | 92½                    | 85                   |
| Holstein .....      | 1,297             | 774                  | 58½                    | 87½                  |
| Red scrub .....     | 1,487             | 890                  | 60                     | 95½                  |
| Spotted scrub ..... | 1,370             | 818                  | 71½                    | 93½                  |

The per cent. to live weight of dressed beef, tallow and hides follow:

|                     | Per cent. of dressed beef. | Per cent. of tallow. | Per cent. of hide. |
|---------------------|----------------------------|----------------------|--------------------|
| Short-horn .....    | 63.5                       | 5.0                  | 6.0                |
| Angus .....         | 62.6                       | 4.2                  | 6.9                |
| Jersey .....        | 59.5                       | 7.6                  | 7.0                |
| Holstein .....      | 59.6                       | 4.5                  | 6.7                |
| Red scrub .....     | 59.8                       | 4.0                  | 6.4                |
| Spotted scrub ..... | 59.7                       | 5.2                  | 6.1                |



The highest-priced cuts of beef are taken from the loins and ribs. The sketch above shows the method of cutting beef used by Kansas City packers, and the prices given are prices per pound, wholesale, as quoted April 23, 1902, by Swift & Co., Kansas City. These prices are: Loin, 20 cents; rib, 19 cents; round, 11 cents; rump, 11 cents; chuck, 9 cents; plate, 7 cents; flank, 7 cents; neck 5 cents; and shank, 3<sup>3</sup>/<sub>4</sub> cents. The greater the weight and quality that can be secured in the loin and rib cuts the more valuable the animal.

The loin and rib cuts from the carcasses of the six steers under trial were as follows:

|                         | Loin cuts.<br>lbs. | Rib cuts.<br>lbs. | Total weight<br>loin and rib<br>cuts, lbs. | Total<br>dressed<br>weight, lbs. | Per cent.<br>high priced<br>cuts, loin<br>and rib. |
|-------------------------|--------------------|-------------------|--|----------------------------------|--|
| Short-horn . . . . .    | 164                | 93                | 257  | 912                              | 28.1   |
| Angus . . . . .         | 132                | 70                | 202  | 735                              | 27.5   |
| Jersey . . . . .        | 129                | 72                | 201  | 720                              | 27.9   |
| Holstein . . . . .      | 137                | 73                | 210  | 774                              | 27.1   |
| Red scrub. . . . .      | 156                | 77                | 233  | 890                              | 26.1   |
| Spotted scrub . . . . . | 148                | 75                | 223  | 818                              | 27.2   |

The beef grades, Short Horn, and Angus, furnished 27.8 per cent. of high-priced cuts; the dairy steers, 27.5 per cent., and the scrubs 26.7 per cent.

FINANCIAL STATEMENT.

At the close of the feeding, Mr. Geo. Washington. Manhattan, an extensive feeder and shipper, estimated the market value of each steer. Mr. John Gosling, Kansas City, and Mr. Charles Anthony, head cutter for A. Weber, leading retail butcher of Kansas City, estimated the wholesale selling price of the dressed carcasses at Kansas City

prices. The cost per 100 pounds and the valuations made on the finished animals and the carcasses are as follows:

|                    | Cost per<br>100 lbs. | Value at finish<br>per 100 lbs.<br>live weight. | Value of dressed<br>carcass<br>per pound. |
|--------------------|----------------------|---|---|
| Short-horn.....    | \$3.75               | \$6.40  | 8½ cents.                                 |
| Angus.....         | 3.75                 | 6.25  | 7½ "                                      |
| Jersey.....        | 2.85                 | 6.00  | 8 "                                       |
| Holstein.....      | 3.25                 | 5.50  | 7¾ "                                      |
| Red scrub.....     | 3.25                 | 5.75  | 7½ "                                      |
| Spotted scrub..... | 3.25                 | 5.75  | 7 "                                       |

The value per 100 pounds live weight, as placed by Mr. Washington on the six steers, was regarded by well-informed stockmen who saw the animals as a conservative price, and many thought that the steers would bring twenty to fifty cents per hundred above Mr. Washington's estimate. Several butchers examined the dressed carcasses, and they considered that Mr. Gosling and Mr. Anthony had made an accurate estimate of the value of the carcasses, as based on prices of Kansas City packers. If these valuations on the live animals and on the carcasses were correct, we have the following showing:

|                    | Value alive<br>when fattened. | Value of<br>dressed carcass. | Loss to<br>slaughterers. |
|--------------------|-------------------------------|------------------------------|--------------------------|
| Short-horn.....    | \$91.90                       | \$77.52                      | \$14.38                  |
| Angus.....         | 73.13                         | 55.13                        | 18.00                    |
| Jersey.....        | 72.60                         | 57.60                        | 15.00                    |
| Holstein.....      | 71.34                         | 59.99                        | 11.35                    |
| Red scrub.....     | 85.50                         | 66.75                        | 18.75                    |
| Spotted scrub..... | 78.78                         | 57.26                        | 21.52                    |

These facts make creditable the statements often made by persons connected with the great packing-houses, that every dressed carcass sold from a packing-house is sold for less than is paid for the live animal that furnishes the carcass. They also show the remarkable utilization of the offal and by-products of slaughtering that enables the packing-house to make up the loss on carcass, pay running expenses, and make large profits.

The steers were fed corn and corn chop which cost the Station an average of \$1.30 per 100 pounds, and alfalfa hay which cost \$10 per ton. The cost of feed, cost of the steers at beginning, value of steers when fattened and loss in feeding are as follows:

|                             | Cost of<br>corn<br>eaten. | Cost of<br>hay<br>eaten. | Total<br>cost of<br>feed. | Cost of<br>steer at<br>beginning. | Cost of<br>steer when<br>fattened. | Value of live<br>steer when<br>fattened. | Loss.   |
|-----------------------------|---------------------------|--------------------------|---------------------------|-----------------------------------|------------------------------------|--|---------|
| Short horn....              | \$38.62                   | \$21.59                  | \$60.21                   | \$39.04                           | \$99.25                            | \$91.90                                  | \$7.35  |
| Angus.....                  | 32.79                     | 14.56                    | 47.35                     | 33.08                             | 80.43                              | 73.13                                    | 7.30    |
| Jersey.....                 | 32.58                     | 20.84                    | 53.42                     | 24.57                             | 77.99                              | 72.60                                    | 5.39    |
| Holstein....                | 33.54                     | 20.86                    | 54.40                     | 28.80                             | 83.20                              | 71.34                                    | 11.86   |
| Red scrub....               | 33.51                     | 21.34                    | 54.85                     | 34.19                             | 89.04                              | 85.50                                    | 3.54    |
| Spotted scrub,              | 31.92                     | 21.20                    | 53.12                     | 34.58                             | 87.70                              | 78.78                                    | 8.92    |
| Total loss.....             |                           |                          |                           |                                   |                                    |  | \$44.36 |
| Average loss per steer..... |                           |                          |                           |                                   |                                    |  | 7.39    |

The prices at which the steers were valued when ready for the market were high, but the unusual high cost of feed caused a loss in feeding every steer. These statements show plainly why the man who buys meat for his table has to pay high prices when feed costs so much.

Fortunately for the Station, we had hogs following the steers to pick up the droppings. For reasons not connected with this test it was necessary to change the hogs frequently and vary the number, so that no accurate account could be kept of the gain of the hogs. We greatly regret this. Work in previous feedings shows 200 pounds of pork per steer from seven months' feeding, and it is probable that more pork was made in this feeding. The hogs therefore covered the loss on the steers and left a balance for labor and profit.

The cost of feed for each 100 pounds of gain was as follows: Short-horn, \$15.41; Angus, \$17.31; Jersey, \$15.16; Holstein, \$15.16; red scrub, \$14.16; spotted scrub, \$17.02. Average, \$15.70.

#### THE BEEF.

The dressed carcasses of the steers were used in a class demonstration on quality of beef given to our College classes in judging beef cattle. Mr. John Gosling, of Kansas City, an expert judge of beef cattle and of beef, gave the lecture, and Mr. Charles Anthony, head cutter for A. Weber, the largest retailer of meat in Kansas City, cut up the carcasses before the class as Mr. Gosling lectured. Extracts from Mr. Gosling's lecture follow, as they explain the differences in the character of the meat from the different steers.

Mr. Gosling said: The dairy-bred steers have done better than I expected they would. An animal that yields thirty to thirty-two per cent. of high-priced cuts, ribs and loins, trimmed and uniformly gauged for acceptance by the hotel trade, is something extreme.

We find that the Jersey contributes 27.9 per cent. of this commodity, with a fine-grained, ripe carcass throughout. He was in good condition when bought, and about three years old.

The Holstein also did well, much on account of being lighter-fleshed than the general run of his breed. Heavier flesh in this breed of cattle means coarser quality of lean; light flesh means fat flesh. From the Holstein carcass we get 27.6 per cent. of loin and rib, which is also creditable. I think that this Holstein steer was several months younger than the Jersey.

In the display of carcasses we have two representatives of common beef cattle, designated as the red scrub and the spotted scrub.

The red scrub, which always looked a little better from a feeder's standpoint, I find in the statistics made the largest gross gain in weight of the six steers. One explanation of this is his age, which

must have been close to four years, when put on feed. Take a comparatively mature steer weighing 1050 to 1100 pounds, and when once on full feed he has but little but fat to make, and will gain faster than a young steer that has everything to make. Although the two scrub steers have weight, they lack in quality and depth of flesh, with fore quarters showing the superficialities of a picket-fence gate. The common red steer yields but 25.6 per cent. of high-priced cuts, although he shows the largest gain, while the spotted common steer, in which a trace of Shorthorn blood was noted, gives us 27.3 per cent. of high-priced cuts.

To represent the beef breeds proper, we have a Shorthorn grade and an Angus grade. The Angus is the youngest steer of the six, which in a measure accounts for some of his shortcomings. The Shorthorn presents us with the highest per cent. of high-priced cuts—28.1 per cent.—while the Angus grade shows 27.5 per cent. of high-priced cuts.

Please note the differences between the rib roasts of these two steers. In the rib of the Short-horn there is an admixture of fat or liberal marbling indicated, with ample spine fat-covering. Many people would consider it, as your fellow townsman and butcher remarked, a little wasty, but it is just what purveyors of high-class meats want. The rib of the Angus, while fine in the grain, is not fat enough at this stage for the best markets, but the very thing for those who consider the Short-horn cuts a little wasty. To be fair in our comparison and criticism, I must say that there was a probable difference of eight months to a year in the ages of these two, the Short-horn being the older; therefore riper than the other.

Among Hereford breeders we hear a great deal of talk about well-covered shoulders. Judging from the thick end of the rib cuts of the Jersey and Holstein, where the shoulder-blade is visible, neither indicates much flesh above the blade, plainly showing you a different flesh formation from that of the beef steer's, which is more plump and less shelly. The Holstein is the poorer covered of the two. However, we care little for that portion above the blade, that under it being preferable. Note the difference in the color of the lean, which is favorable to the Holstein. In the amount of back or basting fat the Jersey is best. What surprises me is the fulness of flesh throughout the back, and this in beef from dairy bred cattle, all of which is edible, which is what we want beef for.

The next we submit for your inspection are the ribs of the two steers known as the common or scrubs. The red scrub again redeems himself, in part, for, of the meat from the scrubs, his beef is the better. The color of his lean, the uniformity and amount of back fat

and the covering or basting fat are much more ample and even than in the spotted scrub, and indicate more tender beef. There is much in color; when the lean meat is of a dark-red shade it is not as tender as when more pale in color. Beef is better when the fat is nearer white, instead of a yellow cast. The fat of "baby" beef is white, and all know what to expect from it.

The late K. B. Armour, of the Armour Packing Company, Kansas City, Mo., said that breeders were "aiming for a class of cattle that would yield a better quality of meat other than the high-priced cuts." To prove his words, let me call attention to the flitch or plate piece of our grade Angus steer. Notice the quantity of beautiful lean. This is where he redeems himself by having a more edible plate in his composition, showing conclusively that his youth was against him, and that if other feed had been added to his ration, such as oil-meal or cottonseed-meal, they would have enriched his beef. This or more time was imperative. The amount of flesh in the Angus steer demands one or the other or both of these improvements in feeding, and, when properly ripened, commands a premium price in Chicago or any other market.

These steers were fed alfalfa for roughness. There is no roughness like it. Some of these steers were depreciated and belittled when alive, particularly before feeding began. But the free use of alfalfa has produced such a quality of flesh in their carcasses that they have redeemed themselves in death, on the hooks and at the block.

#### THE ILLUSTRATIONS.

Plates 1 to 6 show how the steers appeared when put in the feed lot at the beginning of the trial. The cuts show the quality in the two beef steers, the dairy form in the Jersey and Holstein, and the lack of quality and the thin flesh of the two scrubs. Note particularly the irregular top and bottom lines in the two scrubs.

Fig. 7 shows the rear view of the six steers when the feeding began. The steers were so wild that they could not be photographed in a group, but had to be taken singly. The cut shows a fair development of twist in the Short-horn and Angus, a poor development of twist in the two scrubs, particularly poor in the spotted scrub, and the usual lack of twist in the dairy steers. The good feeding and slaughter-test records made by the steers having weak hind quarters and poor twists, two points usually considered essential in a good feeder, simply emphasize the wonderful feeding qualities of a combination of alfalfa hay and corn to make good beef from poor animals.

Fig. 8 is a rear view of the six steers taken just before the steers were slaughtered. The differences in finish and quality are easily

seen. Fig. 9 is a front view of the steers taken just before slaughtering, and was taken to show the differences in chest and in spring of ribs.

Fig. 10 to fig. 21, inclusive, show rib and loin cuts from each steer. These cuts were selected because they are the highest-priced cuts in the carcass and because these cuts indicate the general character of the beef from the rest of the carcass. A careful study of these cuts and of Mr. Gosling's remarks will give a knowledge of how good beef should look and what defects we should avoid in selecting beef.

The photographs from which the engravings were made were taken by Dr. S. C. Orr, Manhattan. The camera was set at the same distance from the meat for each of the photographs of loin and rib cuts. The engravings therefore show the comparative sizes of these cuts.

#### CONCLUSIONS.

As a breed test this trial shows nothing. Every man who has fed and handled cattle in large numbers knows how greatly individuals vary with the same feed, even when the breeding and age are alike. These steers were purchased in the stock-yards, and no information could be obtained of the age or previous treatment.

There were not sufficient number of animals of each of the types represented to show what type is preferable, although the general deductions which may be drawn from a study of the forms of these steers agree in the main with those made where larger numbers have been fed.

This trial shows what every careful test has shown, that steers of the dairy breeds, properly fed, will make good beef; beef better than that usually found on the market, but not of as high quality as that secured from well-bred special beef animals.

The illustrations and Mr. Gosling's description of the beef from the different steers will give a good idea of how beef should look when ready for the consumer, and of the quality of carcass the stockman should feed to produce.

This feeding trial does bring out strongly the great value of a combination of alfalfa hay and corn for producing quality in beef. Manhattan is a town of 4000 people, and is supplied with beef of as good quality as is usually found in a town of this size. The beef from these steers was sold here, and it was the opinion of those who ate it that it was of unusually good quality. Many people said that they had no idea that beef could be produced that had such choice flavor. The beef from the Short-horn ranked highest in quality. It was rich, juicy, and tender, with a delicious flavor. It had more waste fat than that from the other steers, but the lean meat was so tender, and its flavor



so delicious, that lovers of good beef were willing to waste the fat in order to secure such quality in the lean. The beef from all the steers was of good flavor, ranking in flavor about in the order of the prices at which the dressed carcasses were valued.

This flavor was produced by alfalfa hay and corn. These feeds made good beef from the dairy steers, from the scrubs, and from the well-bred beef steers. If the reader will study the pictures of the red and spotted scrubs taken before fattening, and of the loin and rib cuts made from these steers after slaughtering, he will need no further proof of the value of alfalfa hay and corn for producing good beef.

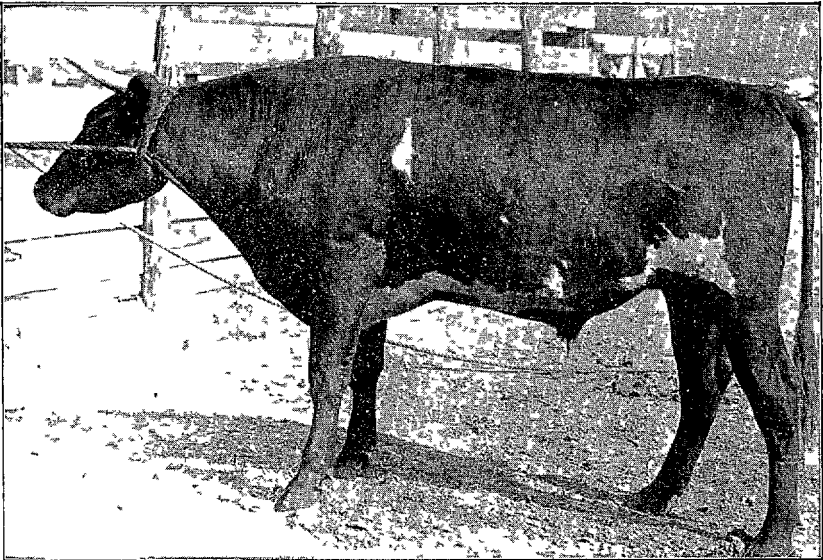


FIG. 1. Short-horn before Fattening.

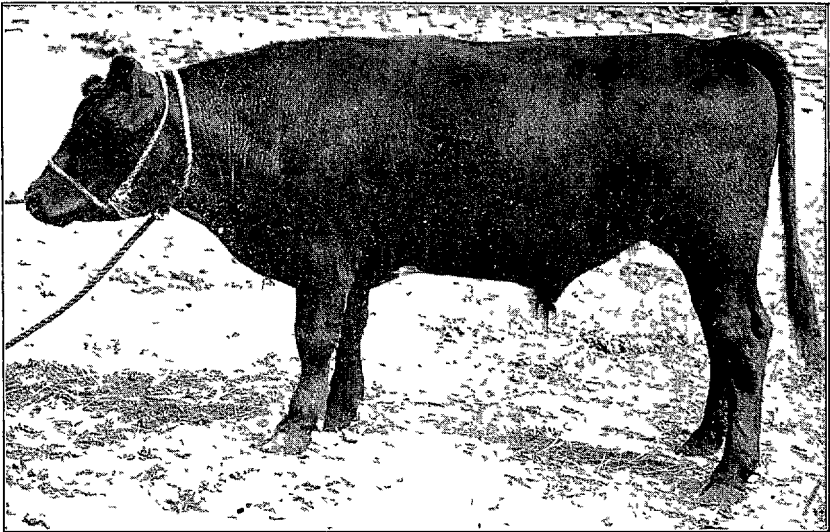


FIG. 2. Angus before Fattening.

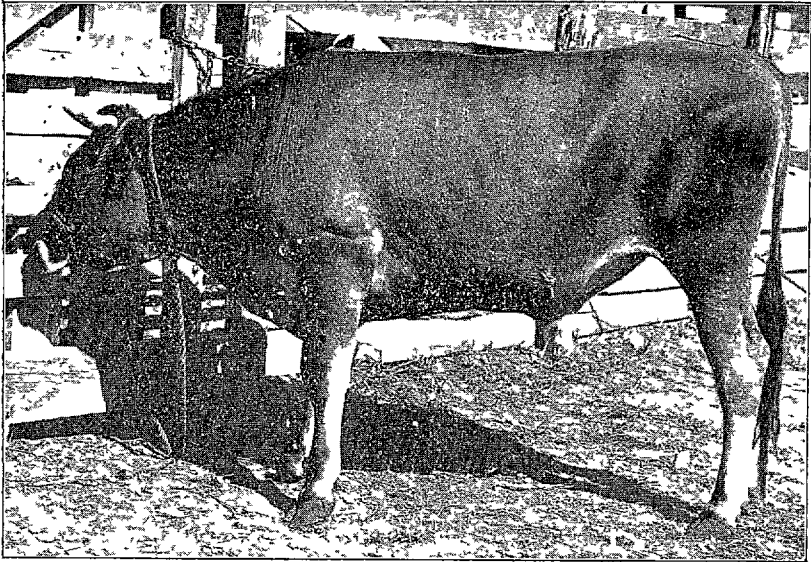


FIG. 3. Jersey before Fattening.

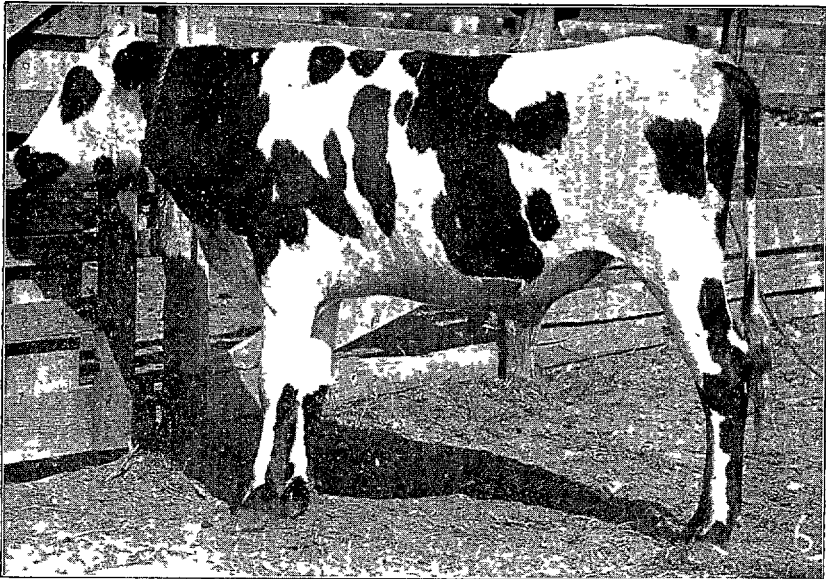


FIG. 4. Holstein before Fattening.





FIG. 5. Red Scrub before Fattening.

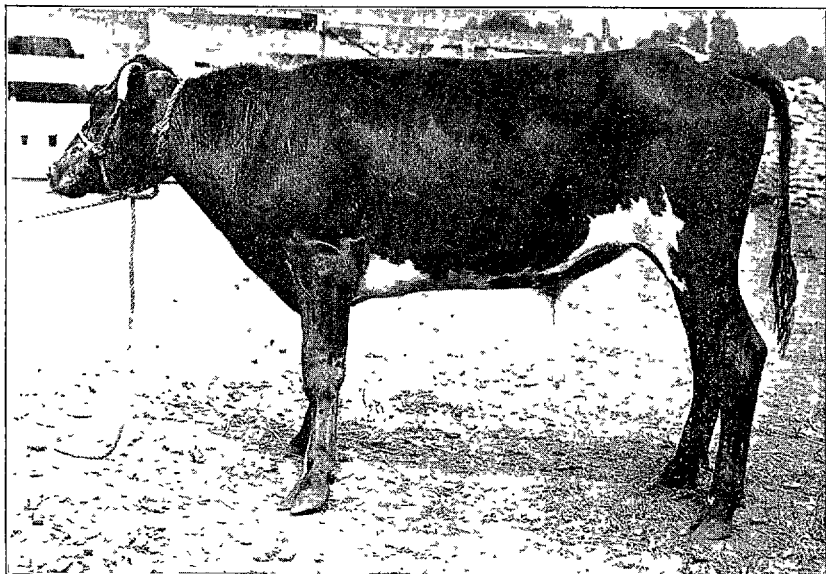


FIG. 6. Spotted Scrub before Fattening.



FIG. 1a. Short horn after Fattening.

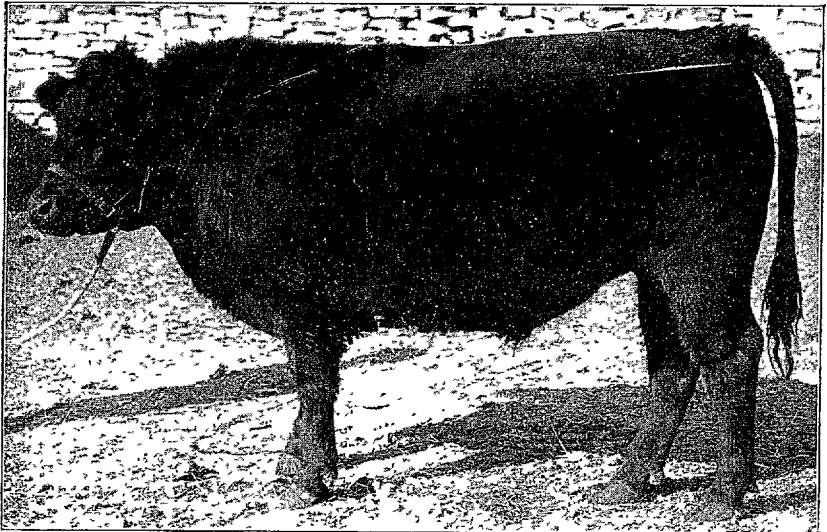


FIG. 2a. Angus after Fattening.

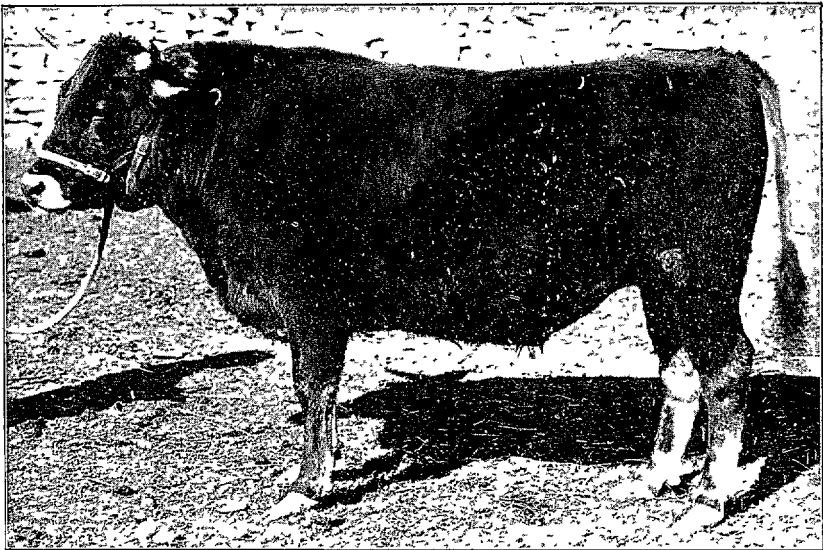


FIG. 3a. Jersey after Fattening.

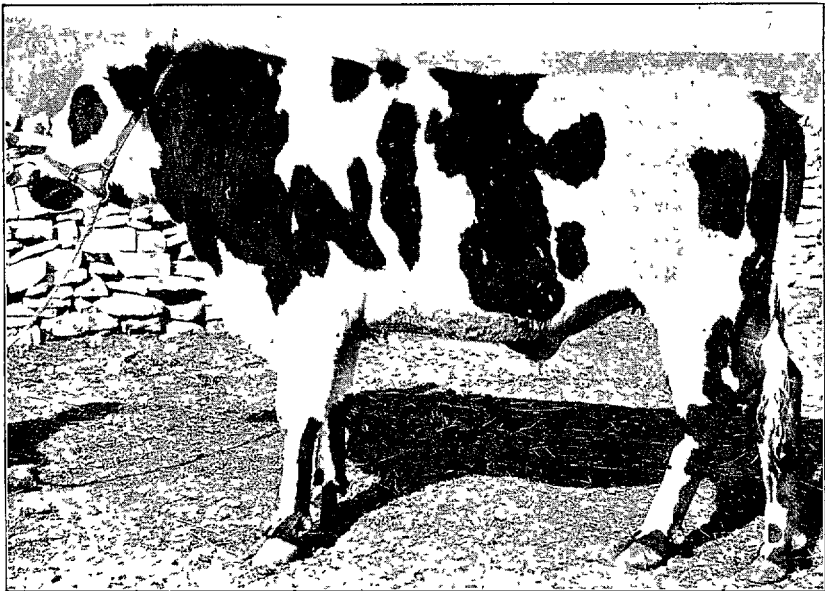


FIG. 4a. Holstein after Fattening.



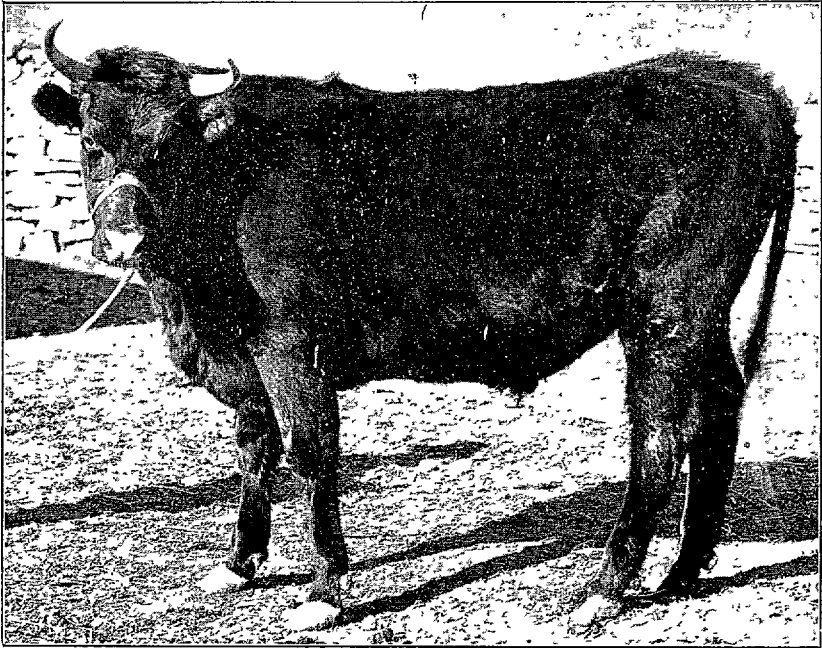


FIG. 5a. Red Scrub after Fattening.



FIG. 6a. Spotted Scrub after Fattening.



Angus.

Short-horn.

Red Scrub.

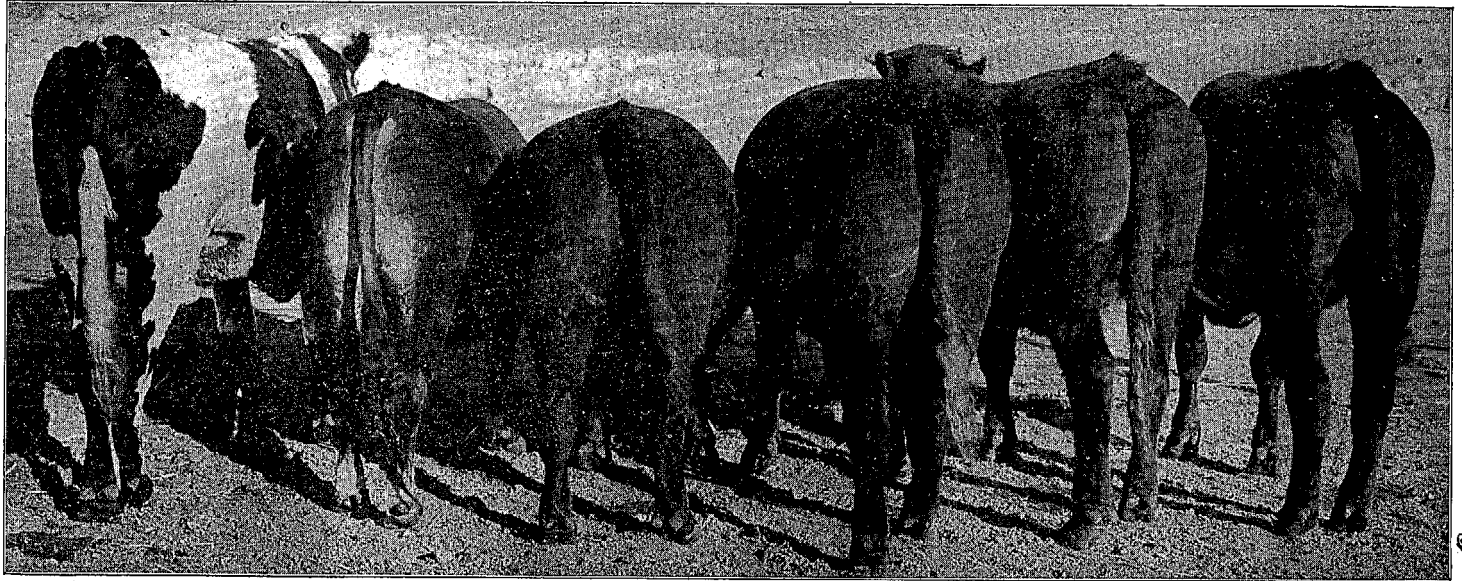
Spotted Scrub.

Holstein.

Jersey.

FIG. 7. Steers before Fattening, Rear View.





Holstein.

Jersey.

Angus.

Short-horn.

Red Scrub.

Spotted Scrub.

FIG. 8. Steers after Fattening, Rear View.



Angus.

Short-horn.

Spotted Scrub.

Red Scrub.

Holstein.

Jersey.

FIG. 9. Steers after Fattening, Front View.

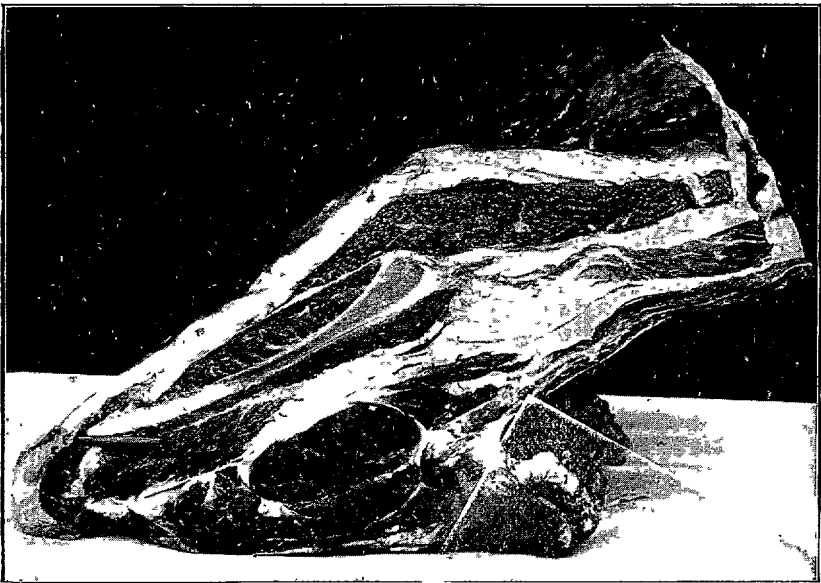


FIG. 10. Rib, Short-horn.



FIG. 11. Rib, Angus.



FIG. 12. Rib, Jersey.

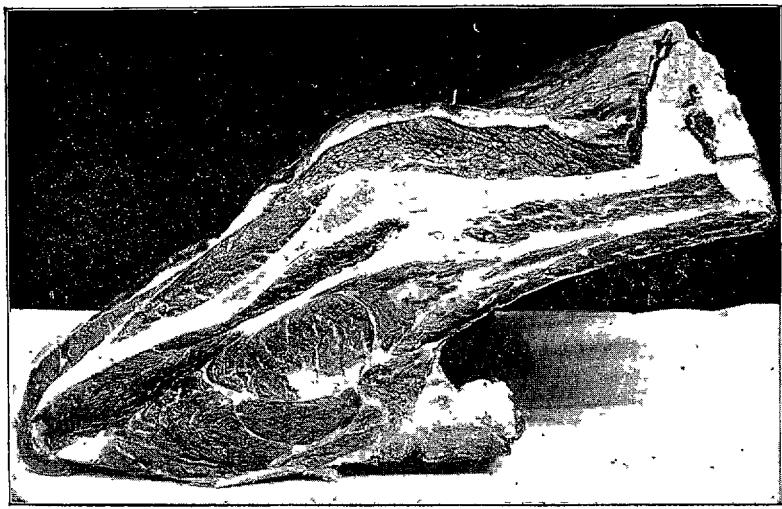


FIG. 13. Rib, Holstein.





FIG. 14. Rib, Red Scrub.



FIG. 15. Rib, Spotted Scrub.



FIG. 16. Loin, Short-horn.



FIG. 17. Loin, Angus.



FIG. 18. Loin, Jersey.



FIG. 19. Loin, Holstein.

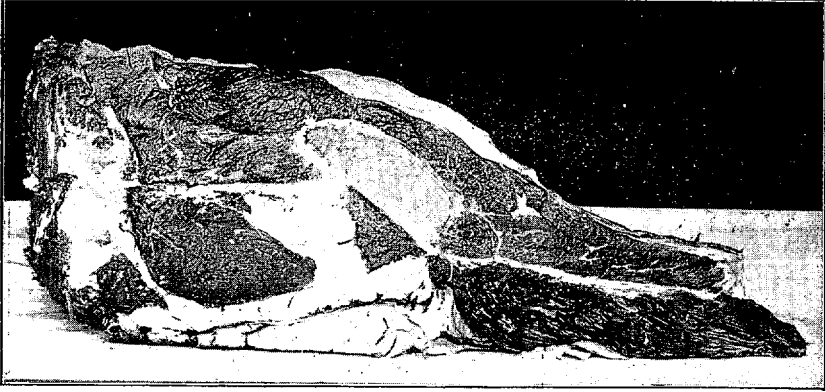


FIG. 20. Loin, Red Scrub.



FIG. 21. Loin, Spotted Scrub.