# Observations on the Performance of Two-Year-Old Holstein-Angus Crossbreds as Compared to Grade Angus Heifers

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## Story in Brief

The performance of 40 two-year-old Holstein-Angus crossbreds was compared to 42 grade Angus heifers under range conditions. Characteristics evaluated were calving percent, milk production, calf weights, rebreeding performance, and cow weight changes. Heifers were bred by yearling Angus bulls to calf during the spring as two-year-olds. The heifers ran on native grass during the summer, which was supplemented with prairie hay and cottonseed meal cubes in the winter. Milk production was estimated by the calf nursing method. All calves were weaned at an average age of 205 days. Cows were pregnancy checked to determine conception rate. Cow weights and condition scores were taken at critical points during the lactation period.

The crossbred heifers had a four percent higher conception rate and had six percent more live calves than the Angus heifers. The average calving date for the crossbreds was ten days earlier and their calves were 15 pounds heavier at birth. The average adjusted 200 day total milk production was 2,502 pounds or 12.5 pounds per day for the crossbreds compared to 1,750 pounds or 8.76 pounds per day for the Angus. The average adjusted weaning weight of the crossbred steer calves was 44 pounds heavier than the Angus steer calves, while the crossbred heifer calves weighed 76 pounds heavier than the Angus heifer calves. The rebreeding performance was disappointing in both breeds because only 13 percent of the crossbreds and only 44 percent of the Angus that nursed calves conceived. The crossbreds lost 56 pounds during the lactation period as compared to 6 pounds that the Angus lost. It appears that the crossbreds are capable of producing more milk and heavier weaning calves but need a higher nutrition level to rebreed and continue to grow.

## Introduction

Beef cattle producers are searching for ways to increase the weaning weight of their calves and in this way increase their profit. They have recognized for many years the importance of milk production in the beef cow and its influence on weaning weight. However, selection for milk production produces only slow improvement. Recently, there has been much interest in crossing dairy with beef breeds to increase the beef cow's milk producing ability. This study was undertaken to compare the performance of Holstein-Angus crossbreds to straight Angus heifers under range condition. The period studied was from breeding as yearlings, through calving and rebreeding, to the weaning of the first calf. In addition to milk production and calf weaning weight, a comparison of the rebreeding performance and cow weight change was made.

## Materials and Methods

In the early spring of 1968, 40 half Holstein-half Angus heifer calves, that had been purchased from various sources, were brought to Lake Carl Blackwell range near Stillwater. Forty-two Angus heifer calves, which were selected as replacements from the progeny test herd at the Blackwell range, were used as the other test group. Because this study was imposed over the progeny test breeding study at the Blackwell range, these 82 yearling heifers had to be randomly allotted within breed to ten different sire groups for breeding. Each group consisted of about 22 cows and 8 yearling hefiers for one registered Angus yearling bull. The breeding season extended from May 1 to August 1.

The heifers were under range conditions at all times with only native grass during the grazing season. The winter supplemental feed consisted of two pounds of cottonseed meal cubes and five pounds of prairie hay per head daily. The cubes were fed starting the middle of November to the middle of April while the hay was fed from January 1 to April 15. A mixture of salt and bonemeal was available free choice. The calving season began February 1 and extended to the middle of April. During this time the herdsman observed all heifers twice daily and gave calving assistance when deemed necessary. He weighed, tattooed, and ear tagged the calves within 12 hours after birth, and recorded all calving losses and difficulties (including retained placentas). The calves were vaccinated and castrated during the last week of April.

Milk production was estimated by the calf nursing method which involved weighing the calf before and immediately after nursing. The difference in the calf's weights was used as the amount of milk consumed. Using this procedure twice daily (three times per day for calves

under six weeks of age) an estimate of the daily milk consumption was obtained. Since the calves consumed all the milk available (with the exception of a few very young calves), this estimate could be used as the cow's daily milk production. The first milk estimate was made when the calf was approximately two weeks old and at two week intervals thereafter until breeding began the first of May, after which time a randomly selected group from each breed was tested every four weeks until weaning in September. By obtaining these estimates at two week and four week intervals, some early calving cows had a total of 11 estimates from which the estimated total milk production could be calculated. To calculate this total yield, each estimate was used as the average daily yield for the short period in which it was centered.

Calf growth during the lactation period was evaluated by using the first calf weight on the morning of each milk test day to calculate the gain in weight since the last test day. In this way the calves' growth could be compared at intervals during the lactation period. The calves were weaned, weighed and given conformation and condition scores at an average age of 205 days, which was September 18. All weaning weights were adjusted to the 205 day age within sex. The scores were given individually by three experienced graders from a scale ranging from 1-17 with 17 corresponding to the top prime grade.

Rebreeding performance and cow weight change patterns were evaluated from records on breeding dates, conception rates and cow weights. Since the cows were still in the progeny test herd, they were again randomly allotted within breed to ten sire groups for the rebreeding period between May 1 and August 1, 1969. During this time, the herdsmen made daily observations to record breeding dates. In October, the cows were pregnancy checked to determine conception rate. To evaluate changes during the lactation period, cow weights and condition scores were taken at each milk test. The condition scores were based on a scale of 1 to 9, with 1 being very thin and 9 being very fat. The weights and condition scores were also taken on the heifers before breeding as yearlings, before calving as two-year-olds, before rebreeding and after weaning of their first calf.

## Results and Discussion

A summary of the breeding and calving results is given in Table 1. Eighty-seven percent of the crossbreds and 83 percent of the Angus heifers conceived as yearlings. The crossbreds were larger and possibly older at breeding which probably caused this difference. Their average weight before breeding was 607 pounds compared to the Angus heifers

with an average weight of 553 pounds. Also, some Angus heifers were quite small and probably did not reach puberty until late in the breeding season. The larger crossbred heifers lost six percent fewer calves and had less difficulty at calving than the Angus. One Angus heifer died during calving before assistance could be given. These differences are probably due to the larger size of the crossbreds at calving. They averaged 110 pounds more in weight (869 to 759) before calving than the Angus. The crossbreds were also less fleshy in condition with a score of 3.26 compared to 4.30 for the Angus. Retained placentas were not a problem in either group. It was noted that the crossbred heifers had much larger udders before calving and some even experienced edema in front of the udder. Some quarters became quite large and were not suckled for the first three to four days after calving. However, no spoiled udders or quarters were observed.

The average calving date for the crossbreds was February 24 compared to March 6 for the Angus. This means that the crossbreds calved earlier; however, the range in dates was quite large for both groups. As shown in Table 1, the average calf birth weight of the crossbreds was significantly heavier than the Angus by over 15 pounds. This was due partly to the cows larger size. This was a very sizeable difference and gave these calves a great advantage from the start which could be followed all the way to weaning. This size enabled them to consume the larger quantity of milk which the crossbreds produced.

## Milk Production

Since milk estimates could not be obtained on all cows during the breeding season, the lactation period was divided at May 1. Table 2 shows the milk production of the cows from calving to May 1, the production from May 1 to weaning and the total production for the two selected groups of 13 cows. During early lactation, the crossbreds produced an average of 253 pounds more total milk than the Angus for a 60 day adjusted period. The crossbreds produced 13.96 pounds per day compared to 9.7 pounds per day for the Angus giving a difference of over 4 pounds per day. The estimates during the summer from the two randomly selected groups showed that the crossbreds produced 483 pounds more milk or about 3½ pounds per day more than the Angus. The total estimated milk production for these groups was 2,502 pounds for the crossbreds and 1,750 pounds for the Angus during a 200 day adjusted lactation period. The difference of 752 pounds was highly significant ($P<.01$) as well as the difference of 3.76 pounds for the average yield per day. When applying these values to the total cows in the original groups, the differences were only slightly less.

Table 1. Summary of the Breeding and Calving Results of Holstein-Angus Crossbred and Angus Heifers

| | No. Heifers | Open | | Calves Lost | | Calving Assistance | | Retained Placenta | Calving[1] Date | | Calf Birth Weight | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Breed | | No. | Percent | No. | Percent | No. | Percent | No | Range | Ave. | Ave. | Std. Dev |
| Crossbred | 31[2] | 4 | 12.9 | 3 | 11.1 | 3 | 11.1 | 2 | 35-111 | 55 (Feb. 24) | 67.0[4] | 8.59 |
| Angus | 41[3] | 7 | 17.1 | 6 | 17.6 | 8 | 23.5 | 1 | 31-118 | 65 (Mar. 4) | 51.7[4] | 5.73 |

[1] Day of year
[2] Nine crossbred heifers were pregnant when purchased and not included
[3] One Angus heifer broke a leg and was slaughtered
[4] Significant ($P < .01$)

Table 2. Summary of Total Milk Yield Adjusted for Lactation Length and Yield Per Day at Early, Late and Entire Lactation

| | Calving to May 1 | | | May 1 to Weaning | | | Entire Lactation | | |
|---|---|---|---|---|---|---|---|---|---|
| | No. | Ave. 60 Day Adj. Yield (lbs) | Ave. Yield/Day (lbs) | No. | Ave. 140 Day Adj. Yield (lbs) | Ave. Yield/Day (lbs) | No. | Ave. 200 Day Adj. Yield (lbs) | Ave. Yield/Day (lbs) |
| Crossbred | 22 | 837.6 | 13.96 | 13 | 1674.4 | 11.96 | 13 | 2502.0 | 12.51 |
| Angus | 26 | 585.0 | 9.75 | 13 | 1191.4 | 8.51 | 13 | 1750.0 | 8.75 |
| Diff. | | 252.6 | 4.21 | | 483.0 | 3.45 | | 752.0* | 3.76* |

*Difference significant ($P < .01$)

Figure 1 illustrates the greater production of the crossbreds during the lactation period. These estimates were made from all cows estimated on each test day. They included cows at different stages of lactation within breed, but they are comparable between breeds. Note the number of animals which made up each estimate—designated by number at each point. The variation within groups made it difficult to determine differences. However, it appears there may be a trend for the crossbreds to start fairly high in February, drop during March, and then pick up to a high in late April and May, with a rapid decline thereafter to September. The Angus were quite stable in their early production. They showed an increase in April to a high in late April and May, then a sharp decrease to weaning. The crossbreds had more variation in early production and the decrease may have been due to lack of adequate nutrition to maintain their high milk production. Both breeds showed the effects of spring grass in late April and May with high milk yields. Time of calving and stage of lactation are known to influence milk production. These factors are being investigated with these data.

## Calf Growth

Early calf growth was studied by using calf weights taken at each test period for milk production. The backcross calves (3/4 Angus-1/4

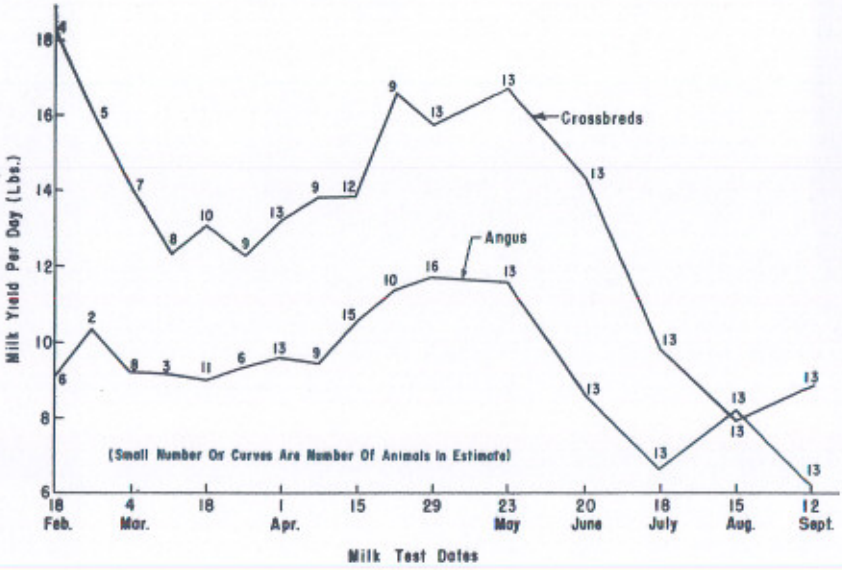


Figure 1. Average Daily Milk Production of Crossbreds & Angus

Holstein) weighed significantly more at all test periods during lactation. The difference of 15 pounds at birth was gradually increased to 29 pounds at about three months of age. The average daily gain was faster for the backcross between all test periods during early lactation except between 6-8 weeks of age. The largest difference in average daily gains was .34 pounds per day at 4-6 weeks with the lowest being .02 pounds per day in favor of the Angus calves at 6-8 weeks. These larger backcross calves were able to grow faster with more available milk. However, the smaller Angus calves had four pounds of milk per day less but gained only slightly slower indicating that they were probably more efficient gainers.

A summary of the weaning weights and grades is presented in Table 3. The backcross heifers averaged 419.5 pounds as compared to the Angus heifers at 343.5 pounds. The backcross steers averaged 430.5 pounds compared to 386.0 pounds for the Angus. These differences of 76 pounds for the heifers and 44 pounds for the steers were statistically significant. The conformation grades and condition scores were quite similar, all being near low choice. This would indicate that the dairy blood did not appreciably lower the quality or beefy appearance of the backcross calves.

## Rebreeding

The daily observations taken during the breeding season were quite discouraging. Very few of the crossbred heifers nursing calves were observed in heat. More Angus heifers were observed in heat but not as many as were expected. All heifers were pregnancy checked two months after the end of the 90 day breeding season. The results showed that only 3 out of 23 crossbreds or 13 percent were pregnant. There were 12 out of 27 Angus heifers diagnosed pregnant or 44 percent. This difference of 31 percent was statistically significant ($P<.05$). All heifers that had been open or that had lost calves were found pregnant. This would indicate that the feed was probably not good enough to support lactation, growth and rebreeding. Since a low conception rate with straight Angus heifers was not experienced in previous years in this locality, a year effect may have existed; however, the mature cows bred normally. The spring was a little late and the grass was watery. Much rain was received during the first half of the breeding season keeping the grass from firming up. Therefore, this may have lowered the efficiency of utilization of the grass. It is believed that a higher plane of nutrition was needed by all heifers for rebreeding, but the crossbreds showed the greatest effect because of their higher milk production.

Table 3. Adjusted 205 Day Weaning Weights and Grades of Calves

| Breed | Sex | No. | 205 day Wts. Ave. lbs. | SE | Weaning Conformation Grade | Weaning Condition Score |
|---|---|---|---|---|---|---|
| Crossbreds | Steers | 11 | 430.5 | 9.59 | 11.54 | 12.05 |
| | Heifers | 12 | 419.5* | 9.18 | | |
| Angus | Steers | 10 | 386 0 | 15.0 | 11.76 | 11.97 |
| | Heifers | 17 | 343.5* | 11.5 | | |

*Significant ($P < .01$)

## Cow Weight Change

Table 4 gives a summary of the weights and scores from before calving to after weaning of cows that nursed calves. The crossbreds weighing 110 pounds more than the Angus before calving. They lost 159 pounds to the beginning of the breeding season (May 1) while the Angus lost 131 pounds. This would indicate the sacrificing of body weight of the crossbreds for producing the higher milk yield. The Angus heifers did not lose much weight after the first two weeks following calving. The condition scores for both breeds changed in accordance with the weights. The weight change for the crossbreds from May 1 to weaning was a gain of 103 pounds while the Angus heifers gained 124 pounds. Both breeds made sizeable gains during May and continued to gain through the summer, but the crossbreds gained at a much slower

**Table 4. Means and Standard Errors of Weights and Scores from Before Calving to After Weaning of Cows that Nursed Calves**

| | Before Calving | | Before Breeding | | After Weaning | |
|---|---|---|---|---|---|---|
| | Weights (lbs) SE | Scores SE | Weights (lbs) | Scores (lbs) | Weights SE | Scores SE |
| Crossbreds | 869±14.6 | 3.26±.07 | 710 | 2.84 | 813± 6.25 | 2.43±.14 |
| Angus | 759±12.1 | 4.30±.13 | 628 | 3.54 | 752±15.86 | 4.04±.15 |

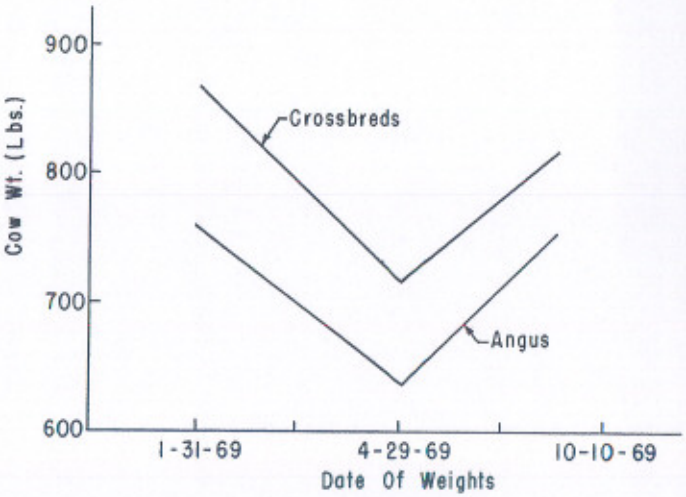


Figure 2. Weight change curves during lactation

rate. The condition score continued to drop for the crossbreds even though they were gaining weight. The total weight change from before calving to after weaning for the crossbreds was a loss of 56 pounds as compared to a loss of only 6 pounds for the Angus. Figure 2 shows the weight change curves during the lactation period. These curves point out that the Angus heifers were able to gain back almost their entire weight loss by weaning time while the crossbreds did not. The difference in condition scores was a loss of .83 for the crossbreds and a loss of .26 for the Angus. In conclusion, it appears that the crossbreds need a higher energy level than these range conditions provided to produce the large quantity of milk and the heavier calf and still maintain their body weight and rebreed.

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# Practical Usage of Freeze Branding in Oklahoma

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## Story in Brief

In the fall of 1969, 229 Hereford and Angus bulls and heifers were freeze branded at weaning time using the recommended procedure for Oklahoma. A 4 digit, 4 inch brand was applied to the right hip of each animal. Of the 916 total brand numbers only 6 were not clearly readable at 114 days after branding. Quality of brand was generally higher for cattle having the highest rate of gain. There was some evidence of difference in the time for brand quality to develop among different lines of cattle. Weaning condition of the animal did not effect the quality of brand. These results suggest that freeze branding with dry ice and alcohol provides a very satisfactory method of identifying animals under practical conditions if the recommended procedures are used.

## Introduction

Since the advent of freeze branding in 1966, many cattle have been branded with various degrees of success. Most of the failures have been

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caused by improper techniques or variations in the times needed for brand application.

The original work at Washington State University indicated that 30 seconds was adequate time to apply the copper iron when a surgical clippers was used to cut the hair and dry ice and alcohol was used as the coolant.

Practical results in Oklahoma have shown that 45 seconds was the best time to use on mature cows when copper irons were used with dry ice and alcohol coolant but with fine-headed and regular "fitting" clippers.

Work at Arizona indicated that readability of brands may be associated with age of the animals with 2-year-old heifers being branded more successfully than older cows.

The most opportune time to identify cattle is at birth, vaccination time or weaning time. Freeze branding could be done at one of these times. It is important for the rancher to have information concerning the results to be expected in terms of readable brands when recommended procedures are followed.

The purposes of this study were to determine the results of freeze branding when the recommended method for Oklahoma was used on weaned calves, to determine the time and cost of the practical use of freeze branding and to investigate factors causing variation in readability of freeze brands.

## Procedure

Two hundred twenty-nine 350 to 550 pound Hereford and Angus bulls and heifers were freeze branded at weaning time at the Fort Reno Experiment Station, El Reno, Oklahoma, on September 24, 1969. The cattle were clipped with fine-headed clippers or with clippers with a regular "fitting" head. Two sets of 4 inch copper branding irons were cooled with dry ice and 95 percent methyl alcohol as a coolant in styrofoam picnic baskets. Irons were cooled 20 minutes before first usage and were allowed to cool ½ minute or more between using the same iron. Brands were applied for 40, 45, 50 or 55 seconds on the hip. Forty to 45 seconds was used on animals clipped with fine-headed clippers and 50 to 55 seconds was used on animals clipped with regular clipper heads. A total of 4 numbers was applied to each animal 2 at a time with a result of 80 to 100 seconds total branding time. Before applying the brands, the clipped area was washed with methyl alcohol. The procedure used was that given in OSU Extension Fact Sheet 3250. At the time of branding, condition scores were placed on each animal and the time

of branding recorded. Four lines of Angus cattle and 2 lines of Hereford cattle were branded.

The quality of the brands was recorded on a 5-point system with 5 being dense white hair easily read and 1 being a light amount of hair not clearly read. The quality scores were made in November and December when the hair coat was long and often wet from frost or precipitation, 43 to 73 days after branding.

## Results

Only 13 of a total of 916 numbers branded were not easily readable in November and December. Of these only 6 were difficult to determine 114 days later in mid-January.

Immediately after branding the branded area became reddened and swollen. From 2 to 3 weeks later the hair in the branded area began to slough off. This occurred much faster on bulls on a high energy ration than on heifers fed to gain only 0.5 to 1.0 pound per day on native range grass. Some heifers did not finish sloughing hair from the branded area until November and December. White hair started appearing visibly on the bulls 30 to 45 days after branding and on the heifers from 40 to 60 days after branding.

The brands were readable at all times after branding even before the white hair grew in. Parts of numbers were not clearly visible at times because of long dark hair covering the white hair or because of light amounts of white hair in areas where the branding iron was not firm against the hide, such as the tailhead area.

Freeze branding took an average of 3.8 minutes per animal when dry ice and alcohol was used as a coolant and regular or fine-headed clippers were used. The cost per head was 17¢. The cost included 200 pounds of dry ice at 14¢ per pound and 10 gallons of 95 percent methyl alcohol at $1.15 per gallon. However, the alcohol was saved and can be used again.

### Sex and Nutrition

The bulls were placed on performance test after weaning and the heifers were wintered to gain about 0.5 to 1.0 pound per head per day so it is not possible to separate sex differences from level of nutrition. A difference was observed between brands caused by either sex differences or plane of nutrition, probably the latter.

Figures 1 and 2 show the quality of brand as plotted against the rate of gain for heifers and bulls, respectively. In both cases quality of brand increased as average daily gain increased. This is probably explained by the more rapid hair growth on cattle gaining weight as op-

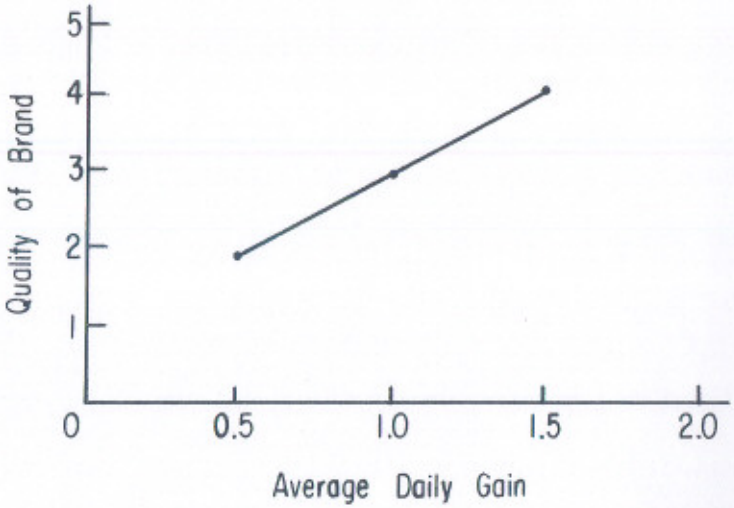


Figure 1. Quality of Brand Versus Average Daily Gain for Hereford and Angus Heifers

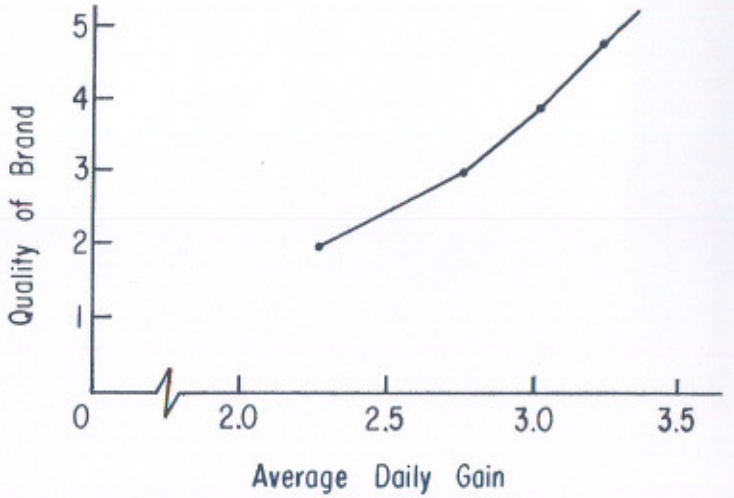


Figure 2. Quality of Brand Versus Average Daily Gain for Hereford and Angus Bulls

posed to cattle being maintained or losing weight and by longer hair in cattle gaining less. Exceptions to this could be found in cattle in poor health where hair growth is poor and the skin is dry. Scores will again be given when the heifers are gaining weight on green grass in May.

## Line Differences

There were some line differences shown for brand quality. Most of the difference was seen, however, 43 days after branding (Table 1). The differences diminished as time after branding increased. There was little difference in the quality of brands among lines 73 days after the brands were applied. The line designations refer to different selection times involved in a beef cattle breeding experiment.

The differences detected 43 days after brand apparently reflect a difference in the growth rate of white hair in the brand area which caused variation in the time required for brands to become clearly distinguishable. The time required for the white hair to appear in the brand does not seem to affect the final quality of the brand. This will be known when summer hair appears.

## Condition Scores

The visual condition scores given to the animals at branding time showed no significant correlation with brand quality. However, the cattle being weaned did not vary too much in condition. More critical measurements on condition may give different results.

## Hair Length

There was no differences in brands between animals clipped with regular "fitting" clippers or fine-headed clippers. However, the time of branding was increased 5 to 10 seconds when the hair was longer to compensate for the increased resistance to heat exchange.

**Table 1. Quality Brand Differences Among Lines 43 Days Postbranding (Both Sexes)**

| Brand Quality | Lines (Percent) | | | | | |
|---|---|---|---|---|---|---|
| | Angus | | | | Hereford | |
| | 7 | 8 | 9 | 10 | 5 | 6 |
| 1 | 21.0 | 15.1 | 2.7 | 7.0 | 0.0 | 0.0 |
| 2 | 29.0 | 45.4 | 54.0 | 45.0 | 35.0 | 22.8 |
| 3 | 47.0 | 33.0 | 35.0 | 38.0 | 40.5 | 65.7 |
| 4 | 2.6 | 6.0 | 5.4 | 7.1 | 24.3 | 10.8 |
| 5 | 0.0 | 0.0 | 2.7 | 2.3 | 0.0 | 0.0 |