the medium level or an additional 15 pounds of milk to produce an additional pound of weaning weight.

Milk production levels of cows of both breeds were similar and low during August when forage intake of the calves was estimated. The lack of a difference in milk production between the medium and high levels makes interpretation of the data difficult. Based on previous studies at this station, none of the milk production levels at the time of the trial would be expected to affect calf forage intake. The overall greater forage intake by the larger Charolais x Holstein calves may reflect their greater size and capacity to consume forage.

References:

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# A Comparison of Milk Production in Angus and Hereford Cattle Under Range Conditions

**M. A. Omar, R. R. Frahm, R. H. Mizell and A. B. Cobb**

## Story in Brief

For six consecutive summers from 1967 through 1972 milk production data and calf weights were obtained on 144 Hereford cow-calf pairs and 315 Angus cow-calf pairs. On the average, Angus cows produced 5.05 pounds more milk per day during the six-month lactation period than Hereford cows. The lactational pattern for both Hereford and Angus cows indicated that milk production tended to increase up to the third month of lactation and declined thereafter. On the average, Angus calves consumed 5.05 pounds more milk per day, gained 0.15 pounds more per day to weaning, weighed 32 pounds more at weaning and were fatter at weaning than Hereford calves. Hereford calves

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required 5.95 pounds of milk to produce a pound of gain while Angus calves consumed 8.25 pounds of milk for each pound of gain. Thus, Hereford calves required 27.7 percent less milk per pound of gain than Angus calves. Preweaning calf gain was highly correlated with average daily milk production of the dam in Herefords (0.78) and moderately correlated in the Angus (0.44).

## Introduction

The percentage of cows in the herd weaning calves and the weaning weight of those calves constitute the two most important traits affecting net income in a cow-calf operation. Calf weaning weight is jointly determined by the genetic potential of the calf for growth and the amount of milk received from the dam. Genetically improving calf growth rate and/or level of milk production of the cows should result in increased herd productivity as long as reproduction is not adversely affected in the process.

Most beef cattle herd improvement programs place some emphasis on increased growth rate. In order to achieve maximum production, cows in the herd must be capable of producing sufficient milk to allow the calves to attain their full genetic potential for growth. It is important that the cows in the herd, whether purebred or commercial, produce milk at a level sufficient to optimize total production under the management system imposed and for the kind of calves produced.

The purpose of this study was to estimate milk production of Hereford and Angus cows managed under range conditions and to determine the relationship between the cow's level of milk production and calf performance.

## Materials and Methods

The study involved 144 Hereford cow-calf pairs and 315 Angus cow-calf pairs. Cattle involved in this study were a sample from a long term genetic improvement study being conducted at the Southwestern Livestock and Forage Research Station, El Reno, Oklahoma. Calves were born in February, March, and April and remained with their dams without creep feed until weaning at an average age of 205 days. Cattle were managed on native range and bermuda grass pastures as a single herd except for a 60-day breeding season (May 1 to July 1) when they were allotted to single sire breeding pastures.

Milk production estimates were obtained at monthly intervals from April to September for a period of six years from 1967 to 1972. Milk production was estimated on Hereford cows in 1967 and 1970 and Angus cows in 1968, 1969, 1971, and 1972. The calf suckling technique was used to estimate daily milk yield of the dam. On the day prior to the milk production test, calves were separated from their dams around 10:00 a.m. Calves were returned to their dams at 6:00 p.m. and allowed to nurse. This was simply a pretest milkout in

order to place cows and calves on an equal basis relative to udder fill and hunger. After nursing, calves were immediately separated from their dams. At 6:00 a.m. and 6:00 p.m. on the following day, calves were weighed before nursing, allowed to nurse their dams (which took approximately 15-20 minutes) and reweighed immediately after nursing. Difference in pre- and post-nursing weights was used as an estimate of milk production of the dam for a 12-hour period. Thus, the sum of these two 12-hour milk production estimates (6:00 a.m. and 6:00 p.m.) provided an estimate of milk production of the dam for a 24-hour period.

## Results and Discussion

Milk production and calf performance vary greatly from year to year due to large fluctuations from one year to the next in general climatic conditions and its influence on the quantity and quality of forage available particularly during the lactation period. Comparisons between Angus and Hereford cattle in this study need to be made with some caution since different years were involved for each breed. However, since several years were involved, the year-to-year fluctuations tend to average out. Thus, the average over two years for Herefords and four years for Angus does provide some indication of the relative level of milk production and subsequent calf performance for these two breeds.

Daily milk yields, cow weights, and calf performances for Hereford and Angus cattle are presented in Table 1. Data have been averaged over two years (1967 and 1970) for Hereford, and fours years (1968, 1969, 1971, and 1972) for Angus. On the average, Angus cows gave 5.05 pounds more milk per day than Hereford cows during the 183-day lactation period measured. Daily milk yield

**Table 1. Average Angus and Hereford performances for various cow and calf traits**

| Trait | Hereford[1] | | Angus[1] | |
|---|---|---|---|---|
| | Average | St. deviation | Average | St. deviation |
| Number of cow-calf pairs | 144 | -- | 315 | -- |
| April ADMY[2], lbs. | 11.57 | 3.79 | 15.43 | 4.46 |
| May ADMY, lbs. | 10.67 | 3.28 | 17.10 | 4.53 |
| June ADMY, lbs. | 10.95 | 3.40 | 17.45 | 4.78 |
| July ADMY, lbs. | 9.94 | 3.44 | 14.58 | 4.42 |
| August ADMY, lbs. | 8.35 | 4.02 | 14.19 | 5.05 |
| September ADMY, lbs. | 7.60 | 3.44 | 11.10 | 3.83 |
| Total ADMY (Apr. to Sept.), lbs. | 9.88 | 2.46 | 14.93 | 2.78 |
| Preweaning calf ADG, lbs./day | 1.66 | 0.24 | 1.81 | 0.25 |
| Adjusted 205-day weaning weight, lbs. | 428 | 48 | 460 | 54 |
| Calf weaning condition score[3] | 4.04 | 0.69 | 4.57 | 0.75 |
| Fall cow weight, lbs. | 1007 | 116 | 980 | 121 |

[1]Data obtained for Hereford cattle in 1967 and 1970; data obtained for Angus cattle in 1968, 1969, 1971 and 1972.
[2]ADMY = Average Daily Milk Yield.
[3]Condition score equivalents: 1 = very thin to 9 = very fat.

increased gradually from the first to third month of lactation after which it began to decline; whereas, milk production in Herefords decreased slightly the second month, increased the third month, and declined gradually thereafter. Both breeds exhibited a decline in milk production from the first month to the sixth month. Hereford cows reduced their daily milk yield by 3.2 pounds during the lactation period; whereas, the Angus cows in the sixth month averaged only 1.2 pounds less milk per day than during the first month.

The general increase in milk production by the cows during the first three months of lactation coincided with lush growth of spring grass which provided energy needed to reach maximum milk production. As the lactation period progressed, less nutritious grass was available, and this resulted in a decline in daily milk yield.

Another factor that may influence decline in milk production is that calves tend to become less and less dependent on milk from their dams as a major nutritional source as they get older.

The higher level of milk production in Angus cows was reflected in the growth performance of their calves. On the average, Angus calves consumed 5.05 pounds more milk per day, gained 0.15 lb./day more from birth to weaning, were 32 pounds heavier at weaning, and were in fleshier condition at weaning. However, Hereford cows were heavier in the fall at the end of the lactation period than Angus cows.

Table 2 presents correlation coefficients between average daily milk yield of the dams and various cow and calf traits. Correlation coefficients measure the relationship between two traits and range in value from -1 to 1. A correlation of 0 indicates the two traits are unrelated, and a correlation of 1 or -1 indicates perfect correlation. A positive correlation indicates that as one trait increases the other trait also tends to increase; whereas, a negative correlation indicates that as one trait increases the other trait tends to decrease.

Average daily milk yield of the dam was highly correlated with calf preweaning gain and weaning weight (0.78 and 0.77) in Herefords and

**Table 2. Correlation coefficients of various traits with the average daily milk yield of hereford and Angus cows**

| Trait correlated with average daily milk yield | Hereford | Angus |
|---|---|---|
| Preweaning calf gain | .78** | .44* |
| Adjusted 205-day weaning weight | .77** | .46* |
| Calf weaning condition score | .59** | .35* |
| Fall cow weight | .26 | .25 |
| Average cow weight[1] | .32 | .25 |
| Cow weight change[2] | .31 | -.04 |

*Correlations significant at the .05 probability level.
**Correlations significant at the .01 probability level.
[1]Average of spring and fall cow weight.
[2]Cow weight change = fall weight minus spring weight.

moderately correlated (0.44 and 0.46) in Angus. These correlations were large enough to reinforce the idea that preweaning calf growth is highly dependent on milk production of the dam. These data would suggest that 59 percent and 21 percent of the variation in calf weaning weights could be attributed to differences in milk production of the dams for Hereford and Angus, respectively. Increased levels of milk production was associated with a higher degree of fleshiness in calves at weaning as evidenced by the correlations of 0.59 and 0.35 with weaning condition score for Hereford and Angus, respectively.

Although the correlations were not large, there was a tendency within a breed for the heavier cows to produce more milk. The relationship between the change in cow weight from spring to fall and milk yield is somewhat uncertain ranging from a modest 0.31 in Herefords to essentially no relationship -0.04 in Angus. Neither cow weight or weight change would be as useful as indicators of differences in milk production as calf preweaning gain or weaning weights would be.

Table 3 presents information on efficiency of Hereford and Angus calves in utilizing milk to produce weight gain. Efficiency of weight gain from milk consumption was measured as pounds of milk consumed to produce a pound of gain. Angus cows produced a larger amount of milk during the 183-day lactation period than Hereford cows (2732 pounds vs. 1808 pounds). Similarly Angus calves had more total weight gain, on the average, during the same period than Hereford calves (331 pounds vs. 304 pounds). Hereford calves required 5.95 pounds of milk to produce a pound of gain while Angus calves consumed 8.25 pounds of milk to produce a pound of gain. Thus, Hereford calves consumed 27.9 percent less milk per pound of gain than Angus calves. This may mean the Hereford calves were actually more efficient in converting milk to gain, or that Hereford calves consumed more feed other than milk, or a combination of the two. Another possibility is that a pound of milk from a Hereford may supply more nutrients to the calf than a pound of milk from Angus cows, i.e. milk from Hereford cows may have a higher fat content and/or more solids not fat.

In summary, these data provide evidence that Angus cows produced more milk, on the average, under range conditions than Herefords. This merely represents a biological difference between these two breeds and does not mean one or the other is necessarily better. Level of milk production is an important trait to the production efficiency of the herd. Whether or not increased milk production is advantageous depends upon the management

**Table 3. Efficiency of calf gain from milk consumption**

| | Hereford | Angus |
|---|---|---|
| Total 183-day milk yield, lbs. | 1808 | 2732 |
| Total calf preweaning gain, lbs. | 304 | 331 |
| Efficiency of gain, lbs. milk/lb. gain | 5.95 | 8.25 |

system (particularly quantity and quality of forage available) and the genetic potential for growth of the calves produced. If forage is abundant and the cows are being crossed to bulls from larger, growthier breeds, increased milk production may be desired. However, if forage is somewhat limited, increased milk production may result in cows with an inadequate nutritional level to reproduce normally. Whether or not it would be economically feasible to supplement the range nutrition of the cows to permit normal reproduction in this circumstance depends upon the prevailing feed costs and the selling price of additional weaning weight of calves. The producer should strive for a level of milk production in the cow herd that will provide adequate nutrition for the calves produced to maximize profit in most years.

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# Summer Performance and Forage Intake of Stockers Grazed on Bermudagrass

**B.R. Wilson, G.W. Horn and W.E. McMurphy**

## Story in Brief

Forage intakes of eight steers grazing a 5.4-acre Midland bermudagrass pasture were measured at approximately 28-day intervals from May 24 to September 15, 1976. Digestible dry matter intakes (lb./100 lb. steer body wt.) were not significantly correlated with average daily gains, and accounted for only two percent of the variation of stocker gains. Digestible protein intakes (lb. DP/head/day) were significantly ($P<.01$) correlated with average daily gains and accounted for 38 percent of the variation of gains. The results indicate (1) that protein supplementation for 30 to 45 days during the later part of the bermudagrass growing season, or (2) that pasture management practices that would maintain a high-quality bermudagrass forage throughout the summer may hold stocker weight gains to acceptable levels.

## Introduction

A major criticism of bermudagrass is that it will not support acceptable stocker weight gains after the first 60 to 75 days of the growing season. The

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