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Effect of Breed Group and Mating System on Weaning Production in Beef Cattle

M. D. Monfore
South Dakota State University

EFFECT OF BREED GROUP AND MATING SYSTEM ON WEANING PRODUCTION IN BEEF CATTLE

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Department of Animal and Range Sciences

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Summary

Records from 396 straightbred Hereford (HH), 421 Angus-Hereford (AH) and 562 Simmental-Hereford (SH) cows and their calves produced from 1974 through 1983 were utilized to evaluate effect of breed group and mating system on weaning production. Important differences were found between the three major breed groups for birth weight, weaning weight, fall cow weight and cow weight change during lactation. For each crossbred group, comparison of the various percentages of Hereford within each group indicated differences in calf birth weight, calf weaning weight, gestation length, calf birth date, fall cow weight and cow weight change during lactation. No differences were found between either breed classification system for calving percent, weaning percent, percent first service conception of cows calving, calf birth date or dystocia. Year significantly influenced calving percent, weaning percent, weaning weight, calf birth date, birth weight, fall cow weight and cow weight change during lactation. Sex of calf was important for birth weight and weaning weight.

Introduction

Straightbred Hereford, Angus-Hereford and Simmental-Hereford are popular cow breeds in South Dakota. Larger and/or higher milking crossbreds can be expected to require more energy input to support higher maintenance and lactation requirements. Realizing this, comparisons between breed groups and mating systems under realistic conditions are of interest to producers. This study was designed to evaluate how straightbred Herefords along with Simmental-Hereford and Angus-Hereford two-breed rotations perform under western South Dakota range conditions. All cattle were maintained at the Antelope Range Livestock Station near Buffalo, South Dakota, throughout the study.

Procedure

The project was initiated in 1972 with 50 straightbred Hereford heifers and 50 Simmental-Hereford cross heifers purchased at weaning. Their first calves were produced in 1974. Angus-Hereford cross heifers were added to the project in 1975 and produced their first calf crop in 1977. Both the Simmental-Hereford and Angus-Hereford crosses were bred in a two-breed rotation. This rotation was basically a system in which the daughters of one breed of bull were bred to the other breed of bull. The only deviation from this was the use of an Angus bull for heifer breeding in some years.

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Breeding was predominantly artificial insemination followed by a cleanup bull. The 1379 cow-calf records used in this analysis included mature cows bred artificially, cleanup bred cows and all heifers.

All replacements, except for initial introduction of the breed groups, were generated within the herd. All heifers conceiving during the first breeding season were saved for replacements. Cows were culled only for being open or for health related reasons. Sires (both cleanup and AI) were selected on the basis of being representative of their respective breeds. All cows were bred during an 8-week breeding season beginning in May. Male calves were castrated at birth. All steer calves were sold at weaning in early November. Additionally, all animals were included in a vaccination program for most common diseases. Calves were neither creep fed nor implanted. Records used in this analysis included the calving and weaning performance of each cow, calf birth weight, calf weaning weight, age of calf at weaning, calf birth date, gestation length of the cow, spring cow weight, fall cow weight, first service conception rate of the cow, cow age and year of record.

Analysis of the data involved two parts: first, a comparison of the three major breed groups and, second, a breakdown of each rotation based on percentage of Hereford blood in each crossbred cow. Hereford percentages within the Angus-Hereford group included 75%, 50% and 25%. Percentages within the Simmental-Hereford group included 75%, 50% and 38%. The first analysis allows a comparison of the breed groups as defined by the mating sytems, while the second analysis allows comparisons between the various combinations or stages within each mating system. It is important to note that crossbred cows have the benefit of any heterosis produced in the cross. Utilization of heterosis is one of the objectives of rotational crossbreeding.

Results

Calving Percent. Calving percent is defined as the proportion of cows calving of cows exposed in the breeding herd. Year was the sole important factor influencing this trait. Year effects (environmental effects) for calving percent ranged from 73.5% to 98.2%. Breed differences were not statistically significant. This indicates enough variation in the data that observed breed group differences cannot be expected to repeat in the future.

Weaning Percent. Weaning percent represents the proportion of calves weaned of cows exposed in the breeding herd. Year was the only important factor influencing weaning percent with a range of 67.0% to 94.1% across years. Breed group means for this trait were not statistically different in either analysis.

Birth Weight. Breed, year and sex of calf were important factors influencing calf birth weights for both analyses. Simmental-Herefords had the highest average birth weight (88.4 lb) followed by straight Herefords (78.5 lb) and Angus-Herefords (77.8 lb).

Within the Simmental-Hereford rotation, calves from 75% Hereford dams averaged heaviest at 91.5 lb, calves from 38% Hereford dams intermediate at 88.1 lb and calves from 50% Hereford dams lightest at 86.4 lb. Within the Angus-Hereford rotation, birth weight means were 79.8, 77.9 and 77.4 lb for calves from the 75%, 50% and 25% Herefords, respectively.

Bull calves were 5.5 lb heavier than heifer calves at birth. Average birth weight varied from 72.6 to 89.4 lb across years. The factor(s) causing these annual birth weight fluctuations has not been identified.

Weaning Weight. Breed, year and sex of calf were important factors in calf weight at weaning. Simmental-Hereford dams weaned calves averaging 38.1 lb heavier than calves from Angus-Hereford dams and 72.7 lb heavier than calves from straight Hereford dams. Average weaning weight for the three breed groups were Simmental-Hereford cross, 508.6 lb; Angus-Hereford cross, 470.7 lb and straight Hereford, 435.8 lb.

Within the Simmental-Hereford rotation, 38% Hereford dams weaned the heaviest calves at 516.4 lb followed by 50% Hereford dams at 513.5 lb and 75% Hereford dams at 502.0 lb. Within the Angus-Hereford rotation, weaning weight means were similar among all groups, with calves from 50% Hereford dams at 469.9 lb, calves from 75% Hereford dams at 468.1 lb and calves from 25% Hereford dams at 472.4 lb.

Annual average weaning weight for all calves ranged from a high of 535.0 lb to a low of 403.1 lb. Male calves averaged 484.8 lb at weaning, 26 lb heavier than female calves.

Gestation Length. Both breed of dam and sex of calf significantly influenced gestation length, but differences due to these factors were generally small. The Angus-Hereford rotation had the shortest average gestation length of 284.7 days. Straightbred Herefords were similar at 284.9 days. The Simmental-Hereford rotation was slightly longer at 286.6 days.

Average gestation lengths within the Angus-Hereford rotation were 285.0, 284.1 and 283.6 days for the 50%, 75% and 25% Herefords, respectively. Gestation lengths within the Simmental-Hereford rotation averaged 286.3, 287.0 and 289.6 days for the 50%, 75% and 38% Herefords, respectively. Cows of higher Angus breeding appeared to have slightly shorter gestation length, while higher levels of Simmental breeding appeared to slightly extend gestation length.

Male calves tended to be carried 1.3 days longer on the average than female calves. Year had little influence on gestation length.

Cow Weight Change During Lactation. This trait was measured as the difference between spring weight (taken postcalving) and fall weight (taken at weaning) of a cow. Breed of dam, sex of calf and year significantly affected this weight change. All breed classes gained weight during this period, indicating all breeds were able to meet production needs under range conditions. Straight Herefords gained the most weight during lactation (136 lb) followed by the Simmental-Hereford rotation (126 lb) and the Angus-Hereford rotation (115 lb).

Within rotations higher levels of Simmental breeding resulted in lower lactational weight change. This could be the result of the higher lactation energy requirements one might expect from higher levels of Simmental breeding. Within the Angus-Hereford rotation, the lowest lactational weight change occurred in the 50% Hereford group and the 25% Hereford group had the highest.

Not unexpectedly, year had a large effect on cow weight change, ranging from a high of +202 lb to a low of +70 lb. Sex of calf was found to be a statistically significant factor influencing lactation weight change. At weaning, dams of bull calves were +7 lb heavier than dams of heifer calves. This difference is of little practical importance and reasons for its existence are unknown.

Fall Cow Weight. Breed and year were important factors affecting fall cow weight. Simmental-Hereford cows averaged heaviest at 1141 lb, straight Herefords were intermediate at 1047 lb and Angus-Herefords were lightest at 982 lb. Within rotations, Simmental-Hereford cows averaged 1147, 1132 and 1163 lb for the 75, 50 and 30% Herefords, respectively. Angus-Hereford cows averaged 1083, 969 and 927 lb for the 75, 50 and 25% Herefords, respectively. Average fall cow weight increased through the study, reaching a high in 1981 and declining slightly thereafter.

Calf Birth Date. Year and sex of calf influenced calf birth date. Year effects are probably largely due to variation in breeding date from year to year, since gestation length was found to remain fairly constant. Variation in breeding date can be influenced by man (i.e., when the bull is turned out) or by biological factors (i.e., infertility at an earlier service). Male calves were consistently born 2.2 days later than female calves. This is partially accounted for by the 1.3 day longer gestation length of male calves. Breed group or rotation were not important factors in calf birth date. Within rotations there was a slight tendency for high percentage Angus cross cows to calve earlier than average and high percentage Simmental cross cows to calve later than average. Average calving date for the entire study was April 1.

Percent First Service Conception of Cows Calving. This trait measures conception rate at first service following calving. Differences in this trait could indicate differential recovery from calving in the postpartum interval from calving to resumption of fertile estrus. No significant differences were found among breeds, sex of calf or years for this trait. Considering little difference was found in calf birth date and gestation length was relatively stable among the breed groups, lack of difference in first service conception is not unexpected.

Dystocia was also examined during the analysis, but occurrence of calving difficulty was very low for all breed groups. The majority of observed dystocia was relatively minor. Breed differences were not important for this trait.

In conclusion, important breed group differences were found for birth weight, weaning weight, fall cow weight and cow weight change during lactation. Both rotational mating systems offered weaning weight advantages over the straightbred Herefords without important reduction in performance of other traits. Within systems, higher levels of Simmental breeding yielded lower weight change during lactation and higher weaning weight, birth weight, gestation length and fall cow weight. Higher levels of Angus breeding resulted in lower birth weights and fall cow weight. The results are summarized in tables 1 and 2. No important breed group or mating system differences were found for calving percent, weaning percent, calf birth date, gestation length, first service conception of cows calving or dystocia. These results indicate similar reproductive efficiency among the breed groups.

When considering the results of this analysis, it should be recognized that comparisons between breed groups or mating systems extend beyond weaning performance. Net return to an operation is dependent upon carrying capacity, reproductive efficiency, weaning weight, weaning price and weaning costs. The higher energy requirements of Simmental cross cows lowers their stocking rate relative to Angus cross or straight Hereford cows. This reduces the number of Simmental cross cows from which weaning weight advantages can be gained. At the same time, fewer cows offer the important advantage of reduced variable costs. Some breed groups also tend to bring higher prices at weaning. In evaluating breed groups or mating systems for a particular production or management situation, each net return factor should be carefully considered.

Table 1. Breed Group Averages for Weaning Production Traits (Analysis 1)

Trait	Breed group/(No.) Hereford (396)	Angus-Hereford (421)	Simmental-Hereford (562)
Calving percent[a]	85.9	89.1	90.7
Weaning percent[a]	80.0	85.7	83.1
Weaning weight, lb	435.8	470.7	508.6
Gestation length, days	284.9	284.7	286.6
First service conception, %[a]	86	82	80
Calf birth date, days[a]	91.3	90.2	92.4
Birth weight, lb	78.5	77.8	88.4
Fall cow weight, lb	1047	982	1141
Lactation wt change, lb	+136	+115	+126

[a] Statistically nonsignificant differences.

Table 2. Within Rotation Breed Group Averages for Weaning Production Traits (Analysis 2)

Trait	Breed group-Percentage Hereford/(No.) AH-75 (46)	AH-50 (325)	AH-25 (50)	SH-57 (158)	SH-50 (379)	SH-38 (25)
Calving percent[a]	86.2	89.8	90.4	93.8	89.6	87.7
Weaning percent[a]	81.9	86.4	84.5	84.4	82.7	81.1
Weaning weight, lb	468.1	469.9	472.4	502.0	513.5	516.4
Gestation length, days	284.1	285.0	283.6	287.0	286.3	289.6
First service conception, %[a]	72	84	84	78	82	67
Calf birth date, days	88.4	91.7	83.5	91.5	93.1	95.6
Birth weight, lb	79.8	77.9	77.4	91.5	86.4	88.1
Fall cow weight, lb	1083	969	927	1147	1132	1163
Lactation wt change, lb	+114	+107	+153	+156	+136	+107

[a] Statistically nonsignificant differences.