Kansas Agricultural Experiment Station Research Reports

Volume 0
Issue 1 *Cattleman's Day (1993-2014)*

Article 974

1987

# Calving and reproductive performance of Angus x Hereford and Brahman x Hereford heifers fed to prebreeding target weights

D.J. Patterson

L.R. Corah

J.R. Brethour

W.R. Negus

# Calving and reproductive performance of Angus x Hereford and Brahman x Hereford heifers fed to prebreeding target weights

**Abstract**

The effect of heifer development on first calving and subsequent reproductive performance was evaluated in Angus x Hereford (AxH) and Brahman x Hereford (BxH) females. Heifers were fed to reach either 55% or 65% of their projected mature body weight by the start of their first breeding season. After breeding, the heifers were managed as a typical commercial range beef cow herd. Angus x Hereford heifers developed to the higher prebreeding target weights: 1) were heavier (P<.05) at calving; 2) had larger (P<.05) total precalving pelvic areas; and 3) had higher (P<.05) average postcalving body condition scores. Precalving pelvic areas were also greater (P<.05) among BxH females developed to the higher prebreeding target weight. Angus x Hereford heifers fed to the low target weight experienced 23.5% more calving problems (52.3 vs 28.8%). Only 11.3% of the BxH heifers required assistance at calving, and calving difficulty was not related to nutritional level. Postpartum interval to estrus (PPJ) was longer among low target AxH heifers, but not in BxH heifers. Calf weaning weight was not affected by heifer development; however, weights were heavier for calves raised by the BxH heifers. These data suggest that differences in weight and condition prior to first breeding persist through to the heifer's first calving and postpartum period.

**Keywords**

Cattlemen's Day, 1987; Kansas Agricultural Experiment Station contribution; no. 87-309-S; Report of progress (Kansas State University. Agricultural Experiment Station and Cooperative Extension Service); 514; Beef; Calving; Reproductive performance; Target weights

# Calving and Reproductive Performance of Angus x Hereford and Brahman x Hereford Heifers Fed to Prebreeding Target Weights

D.J. Patterson, L.R. Corah, J.R. Brethour,[1] and W.R. Negus[1]


## Summary

The effect of heifer development on first calving and subsequent reproductive performance was evaluated in Angus x Hereford (AxH) and Brahman x Hereford (BxH) females. Heifers were fed to reach either 55% or 65% of their projected mature body weight by the start of their first breeding season. After breeding, the heifers were managed as a typical commercial range beef cow herd.

Angus x Hereford heifers developed to the higher prebreeding target weights: 1) were heavier ($P<.05$) at calving; 2) had larger ($P<.05$) total precalving pelvic areas; and 3) had higher ($P<.05$) average postcalving body condition scores. Precalving pelvic areas were also greater ($P<.05$) among BxH females developed to the higher prebreeding target weight. Angus x Hereford heifers fed to the low target weight experienced 23.5% more calving problems (52.3 vs 28.8%). Only 11.3% of the BxH heifers required assistance at calving, and calving difficulty was not related to nutritional level. Postpartum interval to estrus (PPI) was longer among low target AxH heifers, but not in BxH heifers. Calf weaning weight was not affected by heifer development; however, weights were heavier for calves raised by the BxH heifers.

These data suggest that differences in weight and condition prior to first breeding persist through to the heifer's first calving and postpartum period.


## Introduction

Properly managed replacement heifers must exhibit estrus and conceive early during their first breeding season, then continue developing until they are rebred following their first calf. Choosing a correct target weight for the beginning of the first breeding season, therefore, becomes critical.

We evaluated reproductive performance of two different biological types of beef females fed to reach target percentages of their projected mature body weight by the start of their first breeding season. The first year's reproductive data (puberty and pregnancy) were published in the 1986 Cattlemen's Day Report. The present report includes calving and postpartum data, weaning weight data, and fall pregnancy rates.

---

[1] Fort Hays Branch Experiment Station.

## Experimental Procedures

A project was designed in the fall of 1984 to evaluate the effects of breed cross and heifer development as affected by nutrition on lifetime productivity and reproductive performance. The trial began with 148 $F_1$ AxH and 148 $F_1$ BxH heifer calves from ranches throughout Kansas, east-central Colorado, and north-eastern Oklahoma.

At the start of the trial, heifers within each breed group were randomly allotted to one of two nutritional treatments based on origin and birth date. Within each treatment, heifers were divided into light (below average) and heavy weight (above average) groups based on initial weight. Two nutritional treatments were designed to allow both light and heavy heifers to reach either 55% or 65% of their projected mature body weight by the start of spring breeding. Frame scores were used to predict mature weights. Nutritional treatments began December 5, 1984 and continued through June 29, 1985. Following a 45-day AI period, the heifers were transferred to the Fort Hays Branch Experiment station for a 35-day natural service cleanup period. Heifers failing to become pregnant were removed from the herd.

Heifers were maintained on native pastures through the fall. Winter supplementation included range cubes (20% crude protein) and cane hay. All heifers were supplemented at the same rate and were maintained as a group on summer native range.

Prior to calving, heifers were divided by breed group and relocated to one of two 30-acre calving pastures. Sheltered areas were available at both sites and heifers calved on pasture, except in cases of dystocia.

Following calving and through day 45 of the breeding season, heifers were observed at 4 to 6-hour intervals during daylight hours to determine postpartum estrus. Sterilized bulls with marking harnesses were used to aid in estrus detection. Blood samples were taken 7 days following observed estrus from each heifer; progesterone levels over 1 ng/ml of serum confirmed cycling.

Sterilized bulls were replaced by intact Hereford bulls May 20, at which time a 70-day natural service breeding period began. Cows were pregnancy checked, weighed, and condition scored in October. Calves were weaned in November.

## Results and Discussion

Table 20.1 summarizes pre- and postcalving weights, precalving pelvic areas, and postcalving body condition scores of the 131 AxH and 102 BxH heifers that calved. Precalving weights for both breed groups were greater ($P<.05$) among heifers fed to the higher prebreeding target weights, with differences ($P<.05$) also seen between weight groups within treatment among the BxH heifers. Differences in precalving pelvic areas ($P<.05$) paralleled precalving weights for both breed groups. In addition, postcalving weights and body condition scores were greater ($P<.05$) for AxH heifers developed to the higher prebreeding target weight.

Table 20.1. Pre- and Post-calving Summary of Heifer Weights, Pelvic Areas, and Body Condition Scores[1]

| Energy Level and Weight Group | No. Calved (No.) | Precalving[2] Weight (lbs) | Precalving[2] Pelvic Area (sq cm) | Postcalving Weight (lbs) | Postcalving Body Condition[3] Score |
|---|---|---|---|---|---|
| | | Angus x Hereford | | | |
| Low Target Wt.[4] (55%) | 65 | $834^{A}$ | $221.7^{A}$ | $768^{A}$ | $4.4^{A}$ |
| Light group | 32 | 829 | 222.8 | 770 | 4.5 |
| Heavy group | 33 | 839 | 221.7 | 767 | 4.3 |
| High Target Wt. (65%) | 66 | $897^{B}$ | $229.0^{B}$ | $822^{B}$ | $5.0^{B}$ |
| Light group | 34 | 885 | 229.1 | 803 | 5.0 |
| Heavy group | 32 | 908 | 228.8 | 840 | 5.1 |
| Total | 131 | 864 | 225.4 | 795 | 4.7 |
| | | Brahman x Hereford | | | |
| Low Target Wt. (55%) | 49 | $906^{A}$ | $230.3^{A}$ | 886 | 4.9 |
| Light group | 24 | $880^{a}$ | 227.9 | $861^{ac}$ | 4.9 |
| Heavy group | 25 | $932^{bc}$ | 231.8 | $911^{bcd}$ | 5.0 |
| High Target Wt. (65%) | 53 | $946^{B}$ | $238.3^{B}$ | 904 | 5.2 |
| Light group | 27 | $913^{cb}$ | 234.5 | $877^{cab}$ | 5.3 |
| Heavy group | 26 | $978^{d}$ | 241.1 | $930^{db}$ | 5.1 |
| Total | 102 | 926 | 234.5 | 895 | 5.1 |

[1] Least squares means.

[2] Weights and measurements taken January 15, 1986.

[3] Body condition scoring scale: 1=thin, to 9=obese.

[4] Nutrition was manipulated so that heifers weighed 55 or 65% of their expected mature weight at the start of their first breeding season.

$^{AB}$ Means with different superscripts within column and breed group differ ($P<.05$).

$^{abcd}$ Means with different superscripts within column and breed group differ ($P<.05$).

Table 20.2 provides averages for gestation length, birth weight, calving ease, calf death loss, and weaning weight. Of the total number of calvings, 89% resulted from artificial insemination using semen from a single Hereford sire. Cleanup bulls were half brothers to the AI sire. Thus, variation from sire was not included in the statistical analysis. No differences occurred between treatment groups regarding average gestation length or birth weight among calves born to heifers of either breed.

Calvings requiring assistance were nearly doubled ($P<.05$) among AxH heifers developed to the lower prebreeding target weight. Factors contributing to the increased incidence of dystocia included body condition score at calving and precalving pelvic areas, both of which differed ($P<.05$) between high and low groups (Table 20.1). In addition, dystocia occurred more frequently ($P<.05$) among births involving male calves and calves with heavier birth weights.

Although pre- and postcalving weights and body condition scores differed between high and low target BxH heifers, there were no differences in the incidence of dystocia. Furthermore, there was less dystocia among BxH than AxH females (11.3 vs 40.5%). This may be partially explained by larger precalving pelvic areas and lighter calf birth weights in relationship to cow weight.

There were no differences in calf loss attributable to breed, treatment, or weight groups. Nor were there any differences within breed regarding calf weaning weight. Weaning weights were heavier ($P<.05$), however, among calves raised by the BxH heifers.

Table 20.3 summarizes postpartum reproductive and rebreeding performance for both breed groups. A higher ($P<.05$) percentage of high target weight AxH females had cycled by the start of spring breeding compared to their low target contemporaries. In addition, heifers in the light-weight groups showed more rapid returns to estrus than those in the heavier-weight groups, based on percent cycling by day 21 of the breeding season.

AxH heifers that were assigned, based on weaning weight, to the low target-weight treatment group exhibited a trend toward longer postpartum intervals to estrus (85.3 vs 81.4) and reduced ($P<.05$) fall pregnancy rates. Similar differences were not seen in the BxH heifers.

The trend toward shorter postpartum intervals among the BxH heifers may have been due to the reduced incidence and severity of dystocia, and increased precalving weight and body condition. Fall pregnancy rates of the BxH heifers showed improvement over the previous year's results, suggesting that problems with cyclicity and subsequent pregnancy occur largely in their first year.

These data illustrate the importance of establishing target weights for use in heifer development, since those targets influence calving and subsequent reproductive performance, especially in the first postpartum reproductive cycle.

Table 20.2. Calving and Weaning Summary[1]

| Energy Level and Weight Group | Gestation Length[2] (days) | Birth Weight (lbs) | Incidence of Dystocia[3] (No.) | (%) | Calf Death Loss[4] (No.) | (%) | Weaning Weight[5] (No.) | (lbs) |
|---|---|---|---|---|---|---|---|---|
| | | | Angus x Hereford | | | | | |
| Low Target Wt.[6] (55%) | 281.9 | 70.9 | 34/65 | 52.3$^{A}$ | 4 | 6.2 | 60 | 386 |
| Light group | 281.8 | 70.6 | 16/32 | 50.0$^{a}$ | 1 | 3.1 | 30 | 382 |
| Heavy group | 282.2 | 71.3 | 18/33 | 54.5$^{a}$ | 3 | 9.1 | 30 | 390 |
| High Target Wt. (65%) | 281.4 | 73.3 | 19/66 | 28.8$^{B}$ | 3 | 4.5 | 61 | 392 |
| Light group | 281.4 | 72.6 | 10/34 | 29.4$^{b}$ | 2 | 5.9 | 32 | 388 |
| Heavy group | 281.4 | 74.0 | 9/32 | 28.1$^{b}$ | 1 | 3.2 | 29 | 397 |
| Total | 281.7 | 72.3 | 53/131 | 40.5 | 7 | 5.3 | 121 | 389 |
| | | | Brahman x Hereford | | | | | |
| Low Target Wt. (55%) | 282.3 | 70.3 | 6/49 | 12.2 | 1 | 2.0 | 47 | 454 |
| Light group | 282.8 | 69.1 | 2/24 | 8.3 | 1 | 4.2 | 23 | 446 |
| Heavy group | 281.7 | 71.5 | 4/25 | 16.0 | - | -- | 24 | 461 |
| High Target Wt. (65%) | 282.8 | 71.3 | 6/53 | 11.3 | 3 | 5.7 | 50 | 450 |
| Light group | 282.8 | 69.8 | 1/27 | 3.7 | 1 | 3.7 | 26 | 442 |
| Heavy group | 282.8 | 72.7 | 5/26 | 19.2 | 2 | 7.7 | 24 | 459 |
| Total | 282.6 | 70.8 | 12/102 | 11.8 | 4 | 3.9 | 97 | 452 |

[1] Least squares means.
[2] Based on breeding and calving dates, 125 of 131 AxH heifers and 82 of 102 BxH heifers conceived during the 45-d artificial insemination period; therefore, 207 of 233 calves born were half sibs. Breeding dates were unavailable for 7 heifers that conceived during the natural service cleanup period.
[3] Calving difficulty scores: 1=normal unassisted delivery, 2=hand pull, 3=mechanical puller, 4=cesarean section, 5=abnormal presentation.
[4] Of total death losses, 8 occurred at parturition, and 3 within 7d following calving. One BxH and three AxH heifers were removed from the trial for abandoning their calves.
[5] Calves were weaned Nov. 13, 1986.
[6] See footnote 4, table 20.1.
[AB] Means with different superscripts within column and breed group differ (P<.05).
[ab] Means with different superscripts within column and breed group differ (P<.05).

Table 20.3. Postpartum Reproductive and Fall Pregnancy Summary[1]

| Energy Level and Weight Group | Number of Animals | Percent cyclicity: Breeding[2] Season Day 1 (%) | Breeding Season Day 21 (%) | Breeding Season Day 45 (%) | PPI[3] (days) | Fall Pregnancy[4] Rate (%) |
|---|---|---|---|---|---|---|
| | | Angus x Hereford | | | | |
| Low Target Wt. (55%) | 60 | $15.0^{A}$ | 81.7 | 90.0 | 85.3 | $85.0^{A}$ |
| Light group | 30 | $23.3^{a}$ | $90.0^{a}$ | 93.3 | $80.1^{a}$ | $93.3^{a}$ |
| Heavy group | 30 | $6.7^{b}$ | $73.3^{b}$ | 86.7 | $90.5^{b}$ | $76.7^{b}$ |
| High Target Wt. (65%) | 61 | $32.8^{B}$ | 91.8 | 98.4 | 81.4 | $93.4^{B}$ |
| Light group | 32 | $40.6^{c}$ | $100.0^{a}$ | 100.0 | $78.4^{a}$ | $96.9^{a}$ |
| Heavy group | 29 | $24.1^{ad}$ | $82.8^{b}$ | 96.6 | $84.3^{ab}$ | $90.0^{a}$ |
| Total | 121 | 24.0 | 86.8 | 94.2 | 83.0 | 89.3 |
| | | Brahman x Hereford | | | | |
| Low Target Wt. (55%) | 47 | 8.5 | 61.7 | 91.5 | 75.9 | 91.5 |
| Light group | 23 | 4.3 | $52.2^{a}$ | 91.3 | 77.4 | 95.7 |
| Heavy group | 24 | 12.5 | $70.8^{b}$ | 91.7 | 74.4 | 87.5 |
| High Target Wt. (65%) | 50 | 2.0 | 60.0 | 84.0 | 77.6 | 92.0 |
| Light group | 26 | 0.0 | $50.0^{a}$ | 80.8 | 75.9 | 92.3 |
| Heavy group | 24 | 4.2 | $70.8^{b}$ | 87.5 | 79.2 | 91.7 |
| Total | 97 | 7.5 | 60.8 | 87.6 | 76.7 | 91.8 |

[1]Least squares means.

[2]Breeding season began May 20, 1986.

[3]Average postpartum interval lengths represent only females exhibiting estrus by day 45 of the breeding season.

[4]Cows losing calves were removed from the herd.

[AB]Means with different superscripts within column and breed group differ ($P<.05$).

[abc]Means with different superscripts within column and breed group differ ($P<.05$).