Sources of Maternal Replacement Heifers When Using a Terminal Crossbreeding System

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INTRODUCTION

Matching the cow to the environment is very important to range livestock producers throughout the west. Research shows that in areas with limited feed a moderate-framed, moderate-milking, easy-fleshing, high-fertility cow is the most profitable. A common example is the Hereford-Angus cross cow, commonly known as the black baldy. The moderate size and black baldie’s heterosis advantages over straight breds, make her the choice of many western beef producers. To produce replacement heifers that maintain the desired maternal traits and fit available feed resources, producers often make sire and breed selections based largely on maternal traits. Maternal breeding programs produce maternal steers (steers that have maternal traits but not feedlot traits). Their performance in the feedlot is only average, and on the rail are thin to moderately muscled and usually have excess carcass fat.

An alternative to the traditional maternal breeding program is a terminal sire-crossbreeding program. A terminal crossbreeding program selects breeds, and/or bulls within breeds, solely on traits economically important in the feedlot and packer phases. These bulls are bred to the mature maternal cow herd. All offspring, including heifers, go to slaughter because no emphasis was placed on maternal traits when selecting sires. The females should not be retained as replacement heifers, as milking ability and frame size have been compromised.

This paper addresses the obvious question of how and where to get replacement heifers to maintain and manage the maternal cow herd when a terminal crossbreeding program is implemented.

A six-year research trial initiated in 1993 at the University of Nevada Gund Research and Demonstration Ranch is the background for ideas outlined in this paper. Companion papers discuss the economics and performance of terminal cross calves at the ranch, feedlot and packer phases versus maternal bred calves, and risk management and marketing strategies for terminal cross calves.

REPLACEMENT RATE

Many cattlemen replace their mature cows at a ten percent rate. This only allows for culling cows based on failure to conceive, age and obvious health reasons. A National Cattleman’s Beef Association (NCBA) Standardized Performance Analysis survey revealed that operations that are the most profitable have a replacement rate of approximately twenty percent per year. This allows a ranch to cull mature cows for reasons other than failure to breed, old age or health. Poor producing cattle can be replaced with a superior cow raising the long-term performance of the entire herd when these higher replacement rates are used.

The UNR Gund Research and Demonstration Ranch replaces at a 15 percent rate. This study examined the following methods of meeting that 15 percent replacement rate when a terminal crossbreeding program was implemented. The terminal cross program reduced the reservoir of potential replacement heifers.
SOURCES OF REPLACEMENT HEIFERS
WITH A TERMINAL CROSSBREEDING
SYSTEM

A. Breed Yearling Replacement Heifers to
   Maternal Bull
   1. Disadvantage
      a. Light weaning weights
      b. Not enough volume to meet
         replacement numbers required
      c. Maternal steers still being
         produced
   2. Advantage
      a. Rapid turnover of genetics
      b. Access to artificial insemination
         and superior genetics
      c. Requires minimal effort

B. Select superior early calving maternal
cows and breed for one heat cycle or
heat synchronize and breed. Clean up
with terminal sires.
   1. Disadvantages
      a. Extra breeding pasture required
      b. Cow sorting required (labor)
      c. Best cows are not available for
terminal program
      d. Takes volume away from terminal
program
      e. Maternal steer still produced
   2. Advantages
      a. Does not require additional
breeding pastures
      b. Minimizes implementation impact
of terminal program
      c. Can easily adjust bull breed
percentages to increase or
decrease number of maternal
heifers as required

C. Run Terminal and Maternal Bulls
   Simultaneously in Breeding Pasture
   1. Disadvantage
      a. May not have enough heifers to
select from to maintain quality
      b. Lose profit potential on maternal
steers
      c. Lose volume and uniformity of
steers (terminal)
      d. Cannot select superior maternal
cows to breed to maternal bulls
      e. On range operations where
individual records cannot be kept,
producers may not be able to
distinguish terminal females from
maternal at weaning
      f. Tempted to save terminal heifers
bigger and sharper looking at
weaning
      g. Terminal bulls may dominate
breeding or vise versa
      h. Still producing some maternal
steers
   2. Advantages
      a. Maintains volume in terminal
group
      b. Reduces breeding pastures
required when producing your own
heifers

D. Purchase replacement heifers or
mature bred cows
   1. Disadvantage
      a. Finding a consistent source that is
affordable and of high quality
      b. May lack consistency in quality
and type from year to year
      c. Loss of control of genetics
      d. Adaptability to range and ranch
may be questionable
      e. Heifer development, vaccination,
and past management may be
questionable
      f. Risk of purchasing someone
else’s problems
   2. Advantages
      a. Maintains volume in terminal
group
      b. Reduces breeding pastures
required when producing your own
heifers
c. Can form an alliance that could result in better cowherd genetics from A.I. and possibly F1 females

d. Production and marketing of maternal steers

2. Advantages
a. Volume
b. Can capitalize on profit potential of a terminal program

H. Remain Maternal and Produce Replacement Heifers for Terminal Ranches
1. Disadvantage
a. Lose out on the advantages of a terminal program
b. Market maternal steers
2. Advantages
a. May be an opportunity to form an alliance to produce F1 heifers for a terminal breeder
b. No requirement for retooling of ranch operation

CASE STUDY RESULTS
Limousin sires were used on the UNR Gund Ranch terminal crossbreeding demonstration project during the years of 1995 to 1997. This produced terminal cross calves for marketing during the years of 1996 to 1998. The sources of replacement heifer scenarios as described previously were tested during the same years (Table1).

Table 1. Number of heifers retained as replacements from each method described.

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<tbody>
<tr>
<td></td>
<td>A/Replace Heifer</td>
<td>15*</td>
<td>15*</td>
<td>15*</td>
</tr>
<tr>
<td></td>
<td>B/Hand Pick Cows</td>
<td>20**,</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>C/Percent-age Bulls</td>
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<tr>
<td></td>
<td>D/Purchased Heifers</td>
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<td></td>
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<tr>
<td></td>
<td>E/1st Cycle Maternal</td>
<td></td>
<td></td>
<td>30*</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>45**</td>
<td>45**</td>
<td>45*</td>
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*Excellent quality, age and weight
**Marginal quality, age and weight
Scenario A: Breed yearling replacement heifers to maternal bulls. This was the simplest and most practical method of securing replacement females with a terminal crossbreeding program in place.

During each of the three years all replacement heifers were properly developed, heat synchronized and artificially inseminated (A.I.) to a maternal bull with highly accurate EPD’s. The A.I. sires selected posted superior maternal EPD’s that matched a desert range environment. They also posted above breed average EPD’s for marbling. Superior Angus clean up bulls with the same EPD criteria were used to secure additional replacement females.

Replacement heifers were bred 30 days prior to the main cow herd in an effort to produce females of sufficient age and size for retention the following year. Calving heifers 30 days prior to the mature cow herd also allowed these young females a 30 day increased postpartum interval prior to second conception. This allowed them to enter the mature cow herd as “early calvers” and reduced the number of cows culled at three and four-years-of-age. The researchers suggested that when heifers are calved 30 days early, it reduces the number of replacement heifers required to maintain numbers due to reduced attrition.

The UNR Gund Ranch replaces at a 15 percent rate, and maintains 300 mature cows. This rate requires 45 heifers be retained each year. Unfortunately only one-third, or 15 head of the 45 required replacement heifers, were produced through Scenario A. Of the possible 45 calves produced by two-year-old replacement heifers, 42 were weaned. One-half of them were maternal steers, leaving 21 heifers in the pool. Of the 21 heifers produced, six were born late or were not sufficient quality for retention, which left 15 head as replacements. The researchers observed that these 15 head were superior quality and at the top end of the replacement heifers retained each year. This became further evident as these females progressed in age and produced as mature cows.

Scenario B: Select superior early-calving cows and natural breed for one heat cycle to top-quality, maternal bulls, then clean up with terminal sires. This system was tested in 1995 and produced the second best result for securing replacement heifers with a terminal crossbreeding program.

Selection criteria for this breeding group included only early calving mature cows, resulting in first-cycle conception to maternal bulls of approximately 90 percent. Ninety calves were born and 84 weaned. Of the 84 weaned, 42 were heifers. Of the 42 heifers weaned, twenty were of excellent replacement quality and 15 were of marginal replacement quality and seven were unacceptable.

Securing the necessary 30 heifers required sorting pairs, separate breeding pastures and individual identification of cows in the group so potential replacement heifers could be identified at calving.

Scenario C: Run in common, terminal and maternal bulls. This method was easy to manage at breeding but very difficult at heifer selection time.

Seventy-five percent terminal sires and 25 percent maternal bulls were run in common in 1996. This resulted in approximately 70 maternal calves born and approximately 64 maternal calves were weaned, of which 32 were heifers. Of the 32 potential replacement heifers, 12 were born late or were not of replacement quality, leaving 20 heifers as replacements. These 20 were of marginal quality as observed by the researchers.

At weaning (6 months) and heifer selection time (7 months) many heifers sired by the terminal cross Limousin bulls were difficult to distinguish from the straight bred Angus heifers. Many of these terminal cross heifers were selected as replacements based on the assumption that they were of Angus breeding. A large number were black and conformationally similar to Angus heifers of the same age. Until 8 to 10 months of age, it did not become apparent that Limousin bulls sired these heifers. This was mainly due to
the later physiological maturity of the continental Limousin heifers.

Experience from range sheep producers would overcome this problem. Sheep producers run white-faced rams as a source of replacement ewes, and Suffolk rams as terminal sires. At shipping, all white-faced lambs are in the pool as potential replacement ewes and all speckle-faced lambs are sent to slaughter. Identification between terminal and maternal lambs is simplified. If for example Charolais were utilized as a terminal sire, instead of Limousin, the replacement pool could be identified with confidence due to color identification.

Scenario D: Purchase replacement heifers for mature bred cows. This scenario was used in the fall of 1997 to supplement the replacement heifer pool generated by Scenario C. Ten weaned black baldie heifers were purchased and delivered to UNR Gund Ranch as five-hundred pound, weaned calves in the fall of 1997. The purchased heifers were mixed with the native heifers, developed and run in common.

Retention rate of the purchased heifers was a concern due to acclimation problems associated with introduced cattle. The heifers were introduced to the new ranch at weaning to reduce acclimation problems. However, an attrition rate of twenty percent occurred the first year and thirty percent the second year on the purchased and introduced heifers. In contrast, only five percent of the native heifers were culled the first year and ten percent the second year. Because of limitations in experimental design, it is impossible to determine what caused this higher attrition rate. Aside from potential acclimation problems, there could be differing genetics and differing management treatments prior to the calves’ purchase.

Scenario E: Use maternal bulls the first cycle then rotate to terminal bulls. This scenario was tested in the 1997 breeding season. Approximately fifty percent of the mature cow herd conceived during the first heat cycle yielding 150 maternal calves the following year, of which, 143 were weaned. Seventy of the 143 weaned maternal calves, were heifers and 35 of these were of excellent quality, 25 were marginal and 10 were poor quality. Thirty quality replacement females were easily identified due to the added age and larger pool of heifers to select from although this was at the expense of a reduced pool of terminal calves.

Scenarios F, G and H were not tested in this study due to logistics and feasibility of implementation. Due to the nature of a rangeland operation, facilities, labor and feed availability become major obstacles and limit implementation. On the ranches where these factors are not an obstacle, perhaps Scenarios F and G are viable options for sources of replacement heifers.

SUMMARY

The terminal crossbreeding program reduced the pool of potential replacement heifers to the point of jeopardizing quality.

The 1997 breeding season concluded the terminal cross breeding portion of this study. The UNR Gund Ranch reverted back to an all English-bred (Angus and Hereford) maternal bull breeding program.

Bull selection criteria now centers around maternal traits; although some emphasis is also placed on terminal traits in an attempt to balance out the best of all traits.

Terminal cross calves are superior to calves from maternally bred cattle in the feedlot in performance, in carcass characteristics, and are more profitable (see companion paper “Maternal vs. Terminal Crossbreeding Systems”). However, these benefits did not outweigh the added cost in labor, facilities, and bulls to secure the required maternal replacement heifers and maintain adequate quality.

With future technologies of cloning (particularly quality bulls), electronic identification and particularly sexed semen, the terminal cross program will require further research and development.