Introduction

Age, weight and breed of cattle influences puberty. Of the three, inadequate body weight is usually the cause of non-cycling heifers at breeding. This paper discusses the importance of target weight and looks at a case study that shows cycle rates on various weights of English bred heifers. The University of Nevada Gund Research and Demonstration Ranch located near Austin, Nevada, was the study site.

Determining Target Weight

The "65 percent of adult weight" rule of thumb is a handy way of determining the correct target breeding weight for English-bred replacement heifers (70 percent for continental and Brahman influence breeds). This is how it works. Determine the weight of the mature cow herd in average flesh. Simply multiply the average mature cow weight by 0.65 or 65 percent. For example, if the average mature cow weight on a ranch is 1,000 pounds, then the minimum target weight for replacement heifers at breeding is 650 pounds (1,000 x.65).
Determine the Required Average Daily Gain to Reach Target Weight

The next step is to determine the average daily gain (ADG) required for heifers to reach target weight. The authors suggest test weighing replacement heifers at the start of the development phase. Subtract the starting weight from the target weight and divide that figure by the days in the developing period. For example, if heifers weigh 500 pounds on December 1 and the desired April 15 target weight is 650 pounds, then a 150 pound gain is needed to reach target weight. The developing period is 136 days (December 1 to April 15). By dividing 150 pounds by 136 days we determine that it will take 1.10 pound per day gain to reach the target weight on April 15. The longer the development phase, the easier it is to reach target weight. Waiting until a few weeks (or months) before breeding to add several hundred pounds can be a nearly impossible task.

Research indicates that conception rates are higher on the second and third heat cycles of heifers compared to the first heat after reaching puberty. This suggests that getting heifers to their desired target weight at least one month prior to breeding may increase first conception rates.

Developing a Ration to Reach Target Weight

There are many combinations of feedstuffs that can be successfully used during the development phase. A popular ration fed in northeastern Nevada has been free choice early cut, high quality grass hay and 3 pounds of wheat middlings. Wheat middlings are approximately 14 percent protein and 78 percent energy. When feeding this ration, gains of one to one and a quarter pound per day are obtainable. This ration requires the development phase to start early enough so target weights are reached with a lower ADG (more days on feed). It is often more cost effective to feed a cheaper ration for a longer period of time. It is important that the diet be balanced. One that is short in either energy or protein will not produce the desired gain.

Another popular ration which yields a higher A.D.G. is free-choice alfalfa hay and three to four pounds of ground corn. Gains of 1.25 to 1.5 pounds per day have been realized when feeding this ration. This ration requires fewer days on feed to reach target weight than the grass hay wheat-mid ration. Producers often wait until early winter to initiate a heifer development program. By doing so, the days on feed are shortened thereby increasing the ADG required to reach target weight.

Parasite control at the start of the development phase along with the addition of an ionophore to the ration will increase ADG thereby reducing required days on feed to reach target weight. It is also suggested to feed a calcium phosphorous trace mineral mix during the development and breeding period.

There are many computer ration balancing programs available that can help you develop a least cost ration utilizing the feedstuffs available on your ranch and in your area. It is also very important to have your feedstuffs tested for nutrient content to properly balance diets. Your local extension agent or nutritionist should be able to help you in this area. The critical point to keep in mind when developing a ration is that heifers must reach target weight prior to breeding.

It is suggested that ranchers weigh heifers throughout the developing period to ensure the ration is adequate. Adjustment in the ration may be required. Too much weight as fat is costly and is as detrimental to fertility as not enough weight. Additionally, excessive fat deposition in the mammary glands can reduce future milk production.
Case Study

A two year study conducted at the University of Nevada Gund Research and Demonstration Ranch shows the importance of winter feeding replacement heifers to reach target weight prior to breeding. Sixty weaned English bred heifer calves were selected for replacements in the fall of 1995 and again in 1996. Heifers were synchronized for estrous for ease of heat detection and artificial insemination in both the 1996 and 1997 groups. Heat detection involved the use of "HEAT WATCH," an electronic heat detection system.

Winter nutrition from weaning to breeding included alfalfa hay and three pounds of ground corn. Hay quality was poor in the 1996-97 heifer group which resulted in fewer heifers reaching target weight at breeding. The two years of data were pooled for analysis and are presented in Table 1.

![Table 1. Body weights of heifers showing estrus at the University of Nevada Gund Research and Demonstration Ranch on April 15 of 1996 and 1997.](image)

<table>
<thead>
<tr>
<th></th>
<th>Not Ready &lt; 600 pounds</th>
<th>Marginally Ready 600 to 650 pounds</th>
<th>Ready &gt;650 pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of heifers</td>
<td>23 head</td>
<td>27 head</td>
<td>70 head</td>
</tr>
<tr>
<td>Number in Estrus</td>
<td>0</td>
<td>7</td>
<td>50</td>
</tr>
<tr>
<td>Percent in Estrus</td>
<td>0%</td>
<td>26%</td>
<td>71%</td>
</tr>
</tbody>
</table>

Results of the University of Nevada study are supported by similar trials conducted by Texas A&M University in 1979. The Texas study showed estrus as high as 90 percent in heifers exceeding target weight. Those heifers not reaching target weight showed no estrus, while marginally developed heifers showed a 50 percent cycle rate. The Texas data suggest that if you are going to error, it is better to error on the high side of target weight rather than the low side.

It is important to mention that the heifers classified as marginally developed (600-650) in the 1996 Nevada heifer group did cycle and conceived within 45 days of the April 15 heat detection date. Not ready heifers (under 600) did not conceive within the 45-day breeding season. This was evident by the 45-day calving period in 1997. This would suggest that the nutritionally high values of green grass plays an important role in bringing marginal heifers to target weight and estrus.

Conclusion

Feeding heifers to reach target breeding weight (65 percent of mature weight) is the best management practice to follow when early conception of first-calf yearling replacement heifers is the goal. Starting the development phase early in the year allows ranchers to feed heifers to reach target weight with a less expensive ration that results in a lower ADG (more days on feed). Test weighing heifers in the middle of the development phase and adjusting the ration accordingly is recommended. For best results only those heifers that have attained target weight should be included in an artificial insemination and heat synchronization program.
References


Issued in furtherance of cooperative extension work in agriculture and home economics, Acts of May 8 and June 30, 1914, by the Cooperative Extension Systems at the University of Arizona, University of California, Colorado State University, University of Hawaii, University of Idaho, Montana State University, University of Nevada/Reno, New Mexico State University, Oregon State University, Utah State University, Washington State University and University of Wyoming, and the U.S. Department of Agriculture cooperating. The Cooperative Extension System provides equal opportunity in education and employment on the basis of race, color, religion, national origin, gender, age, disability, or status as a Vietnam-era veteran, as required by state and federal laws. Second edition; Fall 1998 Update