Impact of Post-Weaning Beef Heifer Development System on Average Daily Gain, Reproduction, and Feed Efficiency

Stetson P. Weber  
*University of Nebraska-Lincoln*

Adam F. Summers  
*University of Nebraska-Lincoln*

Tonya L. Meyer Meyer  
*University of Nebraska-Lincoln*, tl.meyer@live.com

Richard N. Funston  
*University of Nebraska-Lincoln*, rfunston2@unl.edu

Follow this and additional works at: https://digitalcommons.unl.edu/animalscinbcr

Part of the *Animal Sciences Commons*

This Article is brought to you for free and open access by the Animal Science Department at DigitalCommons@University of Nebraska - Lincoln. It has been accepted for inclusion in Nebraska Beef Cattle Reports by an authorized administrator of DigitalCommons@University of Nebraska - Lincoln.
Impact of Post-Weaning Beef Heifer Development System on Average Daily Gain, Reproduction, and Feed Efficiency

Stetson P. Weber
Adam F. Summers
T.L. Meyer
Rick N. Funston

Summary

This experiment evaluated the impact of post-weaning heifer development system on ADG, reproduction, and subsequent feed efficiency during late gestation. Shortly after weaning, heifers were developed on one of two winter grazing systems: corn residue (CR) followed by winter range, or winter range followed by drylot (DL). Heifer BW was greater for DL heifers prior to breeding, at breeding, and prior to first parturition. There were no differences in reproductive performance despite CR heifers having lower BW at breeding. Feed efficiency was similar during late gestation between CR and DL heifers. Extending winter grazing decreased BW without impacting reproductive performance.

Introduction

Increasing harvested feed costs have producers seeking alternative resources for heifer development. Heifers developed on corn residue exhibited lower percentage cycling before breeding, compared to drylot (Funston, et al., Journal of Animal Science, 2011, 89:1595-1602). Heifers grazing corn residue gain less during winter months but compensate during the summer months (2008 Nebraska Beef Cattle Report, pp. 8-10). Jenkins et al. (Animal Production, 1986, 43:245-254) suggested that lighter cows have reduced liver mass, and cows with improved G:F were reported to have smaller liver mass (DiCostanzo, et al., Journal of Animal Science, 1991, 69:1337-1348). The objective of the current study was to evaluate effects of winter development system on reproductive performance and feed efficiency in beef heifers.

Procedure

The University of Nebraska–Lincoln Institutional Animal Care and Use Committee approved the procedures and facilities used in these experiments. The effect of post-weaning heifer development system on reproductive performance and feed efficiency was evaluated in a three-year study conducted at the University of Nebraska–Lincoln West Central Research and Extension Center (WCREC), North Platte, Neb. Each year (Year 1 = 40; Year 2 = 38, Year 3 = 40) heifers were transferred to the WCREC from a commercial beef herd February 16 and bred to AI 21 days later. Heifers were offered a diet formulated to achieve a 2.2% daily protein requirement. Individual feeding started with ad libitum protein mixture (21.8 % CP; DM). Years 2 and 3, heifers received ad libitum protein mixture (21.8 % CP; DM). Years 2 and 3, heifers received ad libitum protein mixture (21.8 % CP; DM). Years 2 and 3, heifers received ad libitum protein mixture (21.8 % CP; DM). Years 2 and 3, heifers received ad libitum protein mixture (21.8 % CP; DM). Years 2 and 3, heifers received ad libitum protein mixture (21.8 % CP; DM).

Results

Winter development system did not affect BW (P = 0.38) or ADG (P = 0.47) during winter treatment (Table 1). However, DL heifer BW was greater (P < 0.01) after the DL period, compared to CR heifers beginning in (Continued on next page)
April and continued to be greater ($P = 0.05$) until final pregnancy was determined. Heifers developed on CR had lower ($P = 0.02$) BW at time of breeding with similar ($P \geq 0.43$) percent cycling, AI conception, AI pregnancy, and overall pregnancy rates compared to DL heifers. These findings agree with research conducted by Freely et al. (Journal of Animal Science, 2001, 79:819-826) indicating reduction of harvested feeds can impact ADG without impacting subsequent reproductive performance. Heifers developed on CR had similar ($P \geq 0.32$) DMI, ADG, G:F, and residual feed intake compared to DL heifers, during individual 80 day feeding trial (Table 2). Heifers developed on CR had reduced BW at the start of the breeding season and prior to calving, CR heifers had similar reproductive performance, feed efficiency, and ADG during late gestation.

| Table 1. Effect of winter heifer development on ADG and reproductive performance. |
|---------------------------------|-----------------|----------|-----------|
| Treatment                        | DL              | CR       | SEM       | $P$-value |
| n                               | 150             | 149      |           | 0.81      |
| Initial BW, lb                  | 546             | 543      | 10        |           |
| Dec – Feb ADG, lb               | 0.42            | 0.22     | 0.28      | 0.47      |
| BW after winter grazing, lb     | 390             | 566      | 32        | 0.38      |
| Prebreeding BW, lb              | 737             | 640      | 23        | $< 0.01$  |
| Feb – April ADG, lb             | 2.27            | 1.14     | 0.23      | 0.07      |
| Breeding BW, lb                 | 773             | 691      | 20        | 0.02      |
| April – May ADG, lb             | 1.09            | 1.54     | 0.22      | 0.29      |
| First ultrasound BW, lb         | 824             | 772      | 26        | 0.04      |
| June – July ADG, lb             | 1.04            | 1.67     | 0.19      | 0.08      |
| Final pregnancy BW, lb          | 940             | 897      | 17        | 0.05      |
| Cycling %                       | 68              | 52       | 12        | 0.43      |
| Synchronization %               | 89              | 91       | 3         | 0.60      |
| Conceived to AI %               | 67              | 71       | 6         | 0.66      |
| Pregnant to AI %                | 60              | 65       | 6         | 0.58      |
| Pregnant %                      | 93              | 93       | 2         | 0.86      |

$^1$DL = heifers grazed winter range then fed in drylot; CR = heifers grazed corn residue then grazed winter range.

$^2$ADG while grazing CR or grazing WR.

$^3$ADG between winter development and prebreeding.

$^4$ADG between prebreeding and breeding.

$^5$ADG between breeding and first ultrasound.

$^6$ADG between first ultrasound and final pregnancy diagnosis.

| Table 2. Effect of winter heifer development on ADG and feed efficiency during late gestation. |
|---------------------------------|-----------------|----------|-----------|
| Treatment                        | DL              | CR       | SEM       | $P$-value |
| n                               | 58              | 60       |           |           |
| Initial BW, lb                  | 986             | 959      | 6         | $< 0.01$  |
| Final BW, lb                    | 1107            | 1085     | 7         | 0.03      |
| ADG, lb                         | 1.5             | 1.6      | 0.05      | 0.52      |
| DMI, lb                         | 23.0            | 22.7     | 0.24      | 0.42      |
| RFI$^2$, lb                     | -0.64           | -0.59    | 0.08      | 0.76      |
| G:F                             | 0.069           | 0.072    | 0.00      | 0.32      |

$^1$DL = heifers grazed winter range then fed in drylot; CR = heifers grazed corn residue then grazed winter range.

$^2$Residual Feed Intake = predicted DMI – actual DMI.