

Alternative pasture development system and breeding weight for beef heifers

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Introduction

Proper development of replacement beef heifers is critical and needs to be accomplished at lower costs without sacrificing reproductive performance. The current recommendations indicate heifers should reach approximately 65% of mature body weight (MBW) at breeding for successful reproduction (Patterson *et al.* 1992; NRC 1996). Meeting heifer maintenance and gestation nutrient requirements are getting more economically challenged for beef producers in western Canada. Therefore, producers are moving from drylot development systems where cattle are housed and fed in pens to the adoption of extensive grazing systems (Kelln *et al.* 2011) in field paddocks. Limited research has been conducted to determine whether inherent differences in development systems affect reproductive efficiency of heifers. The most commonly used extensive dormant season grazing system in western Canada is pasture grazing forage bales in field paddocks (Kelln *et al.* 2011).

The objectives of this study were to determine: (1) the effects of developing heifers to a pre-breeding targeted body weight (BW) of either 55 or 62% MBW on dry matter intake (DMI), nutrient intake and reproductive efficiency; and (2) the effects of developing heifers in either field pasture paddocks (PG) or conventional drylot pens (DL) on development system cost over 2 seasons (2010-2012).

Methods

A 2 × 2 factorial study was conducted at the Western Beef Development Centre located at Lanigan, Saskatchewan, Canada (51°51' N, 105°02' W). Each year, spring-born Black Angus heifers (year 1, n = 80, 251 kg±4 kg; year 2, n = 94, 254 kg±3 kg) were randomly allocated to 1 of 2 targeted levels of gain, to reach either: (1) 55% (low gain, LG); or (2) 62% (high gain, HG) of mature body weight (MBW) (637 kg) before a 63 d breeding season. Each group was further assigned (4 subgroups) to 1 of 2 replicated (n = 2) development systems, either: (1) pasture grazing forage bales in field paddocks (PG); or (2) drylot pen feeding

forage bales (DL). During each development period (203 d) heifers grazed smooth brome grass (*Bromus inermis*)-alfalfa (*Medicago sativa*) hay *ad-libitum* in field paddocks or were fed similar quality forage in drylot pens. High gain and LG heifers were supplemented with rolled barley grain (TDN=86.4%; CP=12.4%) at 0.7 and 0.5% of BW, respectively. Pregnancy rates through the second pregnancy were determined. Study site for PG system was a 4 ha pasture which was further divided into 4 paddocks (50 m × 200 m) located opposite each other with a centralized watering system. Additionally, 4 pens (50 m × 50 m) surrounded by wooden slated fences were used for each DL system. Within each replicate paddock and pen, DMI was estimated as the difference between pre and post-grazed forage by heifers using the herbage disappearance method (Jasmer and Holechek 1984).

Following development, heifers were managed as a single group on crested wheatgrass (*Agropyron cristatum* (L.) Gaertn.) pasture during the breeding season and until the following year. Pregnant heifers then grazed windrowed barley (*Hordeum vulgare* L.) forage during early gestation and then fed smooth brome grass-alfalfa hay and supplement in drylot pens during late gestation until calving. Reproductive data collected included pregnancy rate, calf birth weight and calving pattern. Development system costs were calculated using similar procedure as described by Kelln *et al.* (2011). Statistics were completed using SAS (2002) Mixed Model and means were separated using Tukey's multiple range test when P<0.05.

Results

Dry matter and nutrient intake

During the pasture development period (203 d), HG heifers had greater ($P<0.05$) DMI (6.8 vs. 6.0 kg/d; SEM = 0.22), crude protein intake (0.75 vs. 0.62 kg/d, SEM = 0.04) and digestible energy intake (19.86 vs. 15.9 Mcal/d, SEM = 0.64) compared to LG heifers.

Heifer performance and development cost

High gain heifers had greater ($P<0.05$) average daily gain (0.71 vs. 0.49 kg/d; SEM = 0.02), final BW (396.3 vs.

353.2 kg; SEM = 5.48) and frame score (3.2 vs. 2.8; SEM = 0.08) than LG heifers. Heifer groups were not different ($P>0.05$) for pregnancy rate ($85.8 \pm 1.7\%$), first calf birth weight (35.2 ± 0.50 kg), or calving pattern. Daily and total development costs for HG and LG were \$1.53 and \$1.17/d and \$306 and \$232/heifer, respectively. In addition, development costs for PG were 24% (\$74/heifer) lower when heifers were developed to 55% compared to 62% of MBW at pre-breeding.

Conclusion

This study suggests that using extensive dormant pasture grazing systems to develop beef heifers to lower pre-breeding body weights has no negative effect on reproduction and provides a cost effective alternative to conventional drylot heifer development systems in western Canada.

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