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Effects of Winter Supplementation on Cow Performance and Post-Weaning Management on Steer and Heifer Progeny in a Late Spring Calving System

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Summary

The objective of this experiment was to evaluate the effects of winter supplementation while grazing dormant Sandhills winter range or meadow on cow performance and the effects of post-weaning management on steer and heifer progeny. Winter treatment had no effect on cow BCS or BW at precalving, prebreeding, and weaning. Steers and heifers fed hay gained more BW during winter treatment compared to those grazing meadow, but post-weaning management had no subsequent effects on steer or heifer progeny.

Introduction

The nutritional requirements of a spring-calving beef cow grazing dormant Sandhills range during late gestation typically exceed the nutrient content of the grazed forage. Protein is commonly supplemented to maintain cow BCS during winter grazing. Supplementing protein also increases weaning BW and the proportion of live calves at weaning (2006 Nebraska Beef Cattle Report, pp. 7-9). Supplementing beef cows during late gestation has been shown to affect the lifelong productivity of the calf by altering post-weaning growth and carcass composition (2009 Nebraska Beef Cattle Report, pp. 5-8). The objectives of the current study were to evaluate the effects of winter supplementation while grazing dormant Sandhills winter range or meadow on cow performance and effects of post-weaning management on steer and heifer progeny in a late spring calving herd.

Procedure

All animal procedures and facilities were approved by the University of Nebraska–Lincoln Institutional Animal Care and Use Committee.

Cow-Calf Management

An ongoing trial is being conducted utilizing composite Red Angus × Simmental cows and their progeny at the Gudmundsen Sandhills Laboratory (GSL), Whitman, Neb., and the West Central Research and Extension Center (WCREC), North Platte, Neb. Cows grazed either dormant upland winter range or meadow from December 1 to March 29 and received 0 or 1 lb/day of a 28% CP (As-fed basis) supplement. Supplement was prorated and delivered three times/week on a pasture (88 acres) basis. Cows were managed as a common group the remainder of the year. Cows were estrous synchronized with a single injection of PGF2α (Lutalyse®) five days after being placed on one of two winter treatments: grazed winter meadow with 1 lb/day supplement (MDW), or offered meadow hay (ad libitum) and 4 lb/day supplement (HAY).

Heifer Management

After January weaning, heifers were blocked by dam treatment and BW. They were then assigned to either MDW or HAY treatment until May 15. Winter treatments were replicated twice. Following winter treatment, heifers were managed as a single group. Blood samples were collected 10 days apart prior to the breeding season to determine luteal activity. Heifers were considered pubertal if serum progesterone concentrations were >1 ng/mL. Heifers were moved to upland range pastures for the breeding season. Heifers were estrous synchronized with a single injection of PGF2α (Lutalyse®) five days after being placed with bulls (1:20 bull to heifer ratio) on approximately July 25 for 45 days. Pregnancy was determined via transrectal ultrasonography in late October. Data reported was collected in 2011 (n = 65) and 2012 (n = 65).

Steer Management

After January weaning, steers were blocked by dam treatment and BW. They were then assigned to either MDW or HAY treatment. Winter treatments were replicated twice. On May 15 one-half of the steers from each winter treatment were placed in a feedlot at WCREC (calf-fed system). The remaining steers were implanted with Revalor®-G (Merck Animal Health, Summit, N.J.) and subsequently grazed upland summer range until approximately August 30, and then placed in the feedlot (yearling-fed system). Upon feedlot
entry, steers were limited-fed five days 
at 2.0% BW, weighed two consecutive 
days, and adapted (21 days) to a com-
mon finishing diet of 48% dry rolled 
corn, 40% wet corn gluten feed, 7% 
prairie hay, and 5% supplement. In 
the calf-fed system, Synovex Choice 
(FT Dodge Animal Health, Overland 
Park, Kan.) was administered at feed-
lot entry and Synovex Plus (FT Dodge 
Animal Health, Overland Park, Kan.) 
approximately 100 days later. In the 
yearling-fed system, Ralgro (Merck 
Animal Health, Summit, N.J.) was 
administered at feedlot entry, fol-
lowed by Synovex Plus approximately 
60 days later. Steers were slaughtered 
when estimated visually to have 0.5 in 
fat thickness over the 12th rib. Steers 
were slaughtered at a commercial 
abattoir, and carcass data were col-
lected after a 24-hour chill. Final BW 
was calculated from HCW using a 
standard dressing percentage (63%). 
Data reported were collected in 2011 
(n = 68) and 2012 (n = 54).

Statistical Analysis

Cow and progeny winter treat-
ments and steer feedlot treatment 
were applied on a pasture or group 
basis. Pasture (n = 4/year) served as 
experimental unit for cow perfor-
ance and reproductive data. Win-
ter treatment (n = 4/year) served as 

Table 1. Effects of winter grazing treatment on cow BCS, BW, pregnancy rate, and calf BW.

<table>
<thead>
<tr>
<th>Item</th>
<th>MNS</th>
<th>MS</th>
<th>RNS</th>
<th>RS</th>
<th>SE²</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cow BCS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January</td>
<td>4.4</td>
<td>4.4</td>
<td>4.5</td>
<td>4.4</td>
<td>0.2</td>
<td>0.76</td>
</tr>
<tr>
<td>Winter change</td>
<td>-0.2</td>
<td>0.0</td>
<td>0.0</td>
<td>0.2</td>
<td>0.1</td>
<td>0.16</td>
</tr>
<tr>
<td>Pre-calving</td>
<td>4.5</td>
<td>4.6</td>
<td>4.8</td>
<td>4.8</td>
<td>0.2</td>
<td>0.31</td>
</tr>
<tr>
<td>Pre-breeding</td>
<td>5.3</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>0.1</td>
<td>0.81</td>
</tr>
<tr>
<td>Cow BW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>January BW, lb</td>
<td>988</td>
<td>999</td>
<td>992</td>
<td>985</td>
<td>9</td>
<td>0.97</td>
</tr>
<tr>
<td>Winter BW gain, lb</td>
<td>106b</td>
<td>119b</td>
<td>75b</td>
<td>112b</td>
<td>9</td>
<td>0.03</td>
</tr>
<tr>
<td>Pre-calving BW, lb</td>
<td>1,054</td>
<td>1,069</td>
<td>1,027</td>
<td>1,058</td>
<td>23</td>
<td>0.54</td>
</tr>
<tr>
<td>Pre-breeding BW, lb</td>
<td>1,080</td>
<td>1,101</td>
<td>1,100</td>
<td>1,102</td>
<td>15</td>
<td>0.87</td>
</tr>
<tr>
<td>Pregnancy rate, %</td>
<td>84</td>
<td>88</td>
<td>73</td>
<td>77</td>
<td>1</td>
<td>0.60</td>
</tr>
<tr>
<td>Calf BW</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Birth BW, lb</td>
<td>79</td>
<td>77</td>
<td>75</td>
<td>77</td>
<td>2</td>
<td>0.45</td>
</tr>
<tr>
<td>Pre-breeding BW, lb</td>
<td>223</td>
<td>214</td>
<td>213</td>
<td>225</td>
<td>7</td>
<td>0.47</td>
</tr>
<tr>
<td>Weaning BW, lb</td>
<td>437</td>
<td>434</td>
<td>423</td>
<td>439</td>
<td>9</td>
<td>0.58</td>
</tr>
</tbody>
</table>

1Treatments: MNS = grazed meadow without supplement, MS = grazed meadow and 1 lb 28% CP supplement, RNS = grazed winter range without supplement, RS = grazed winter range and 1 lb 28% CP supplement.

abWithin a row, means without common superscript differ at P < 0.05.

Results

Cow-Calf Results

Cows that grazed meadow with supplement had greater (P = 0.03) BW gain over the treatment period compared with cows grazing range without supplement (Table 1). Winter treatment did not affect BCS over the treatment period. Winter treatment also did not affect cow BW or BCS at precalving, prebreeding, or weaning. Calf birth BW, calving difficulty, calf vigor, and subsequent pregnancy rates were not affected by supplementation or winter treatment. There was a difference of 21 percentage points (± 17 %) in pregnancy rates between the youngest (3-year-old) cows compared with older cows despite a lack of significance (67 vs. 88% for young and old cows, respectively; P = 0.24), which is likely a result of limited data at this point. Moving to a late-spring calving season results in a breeding season that begins in late summer, coinciding with declining forage nutrient quality, which may have a greater impact on pregnancy rates in young cows.

Heifer Progeny Results

The effects of winter manage-
ment system on heifer progeny are 
presented in Table 2. Heifers on HAY 
treatment had greater (P = 0.03) 
winter ADG than MDW heifers and 
tended (P = 0.10) to have increased 
BW in May and July. Percent pubertal 
at the beginning of the breeding sea-
on and pregnancy rates were similar 
between treatments. Heifers on HAY 
treatment had a numerically greater 
proportion of heifers pubertal prior to 
breeding (78 vs. 69%) and numerically 
greater pregnancy rate (68 vs. 61%) 
compared with MDW heifers despite 
a lack of significance (P ≥ 0.39). Again, 
this may be related to limited data. 
Pregnancy rates were approximately 
20 percentage points lower than preg-
nancy rates in March-born heifers 
on the same ranch, which may be a 
function of declining nutrient qual-
ity during the later breeding season. 
Younger cows and heifers may require 
supplemental nutrition during the 
breeding season to achieve similar 
pregnancy rates as beef females in an 
earlier spring calving herd.

Steer Progeny Results

The interaction between winter 
treatment and feedlot system was 
not significant (P > 0.10). Therefore, 
only main effects of winter treatment 
and feedlot system will be presented 
(Table 3). Steers on HAY treatment 
had greater (P = 0.03) ADG com-
pared with steers on MDW treatment 
during treatment period and tended 
(P = 0.07) to have increased BW at 
end of winter treatment in May. In the 
calf-fed system, steers on HAY treat-
ment tended to have greater (P = 0.06) 
feedlot entry BW than steers on MDW
treatment and tended \( (P = 0.06) \) to have greater BW at second implant in August. Winter treatment did not influence \( (P > 0.10) \) final BW or carcass characteristics in the calf-fed system (Table 3). In the yearling-fed system, steers on HAY treatment had greater \( (P = 0.05) \) BW entering the feedlot in September until time of second implant \( (P = 0.02) \) in November. Winter treatment had no effect \( (P > 0.10) \) final BW or carcass characteristics in the calf-fed system. In the yearling-fed system, steers on HAY treatment had greater \( (P = 0.05) \) BW entering the feedlot in September until time of second implant \( (P = 0.02) \) in November. Winter treatment had no effect on final BW or carcass characteristics in the yearling-fed system. At present, with 2-year data, steers from the calf-fed and yearling-fed systems have similar feedlot ADG and carcass characteristics.

Currently, winter management systems for cows or progeny have not had significant effects on subsequent dam or progeny performance. Additional data and economic analysis are required to make specific recommendations relating to management strategies for a late spring calving herd in the Nebraska Sandhills.

\[ \text{HAY MDW}^1 \text{ SE P-Value} \]
\[ \text{Winter ADG, lb} \]
\[ \text{May BW, lb} \]
\[ \text{June BW, lb} \]
\[ \text{July BW, lb} \]
\[ \text{Summer ADG}^3, \text{ lb} \]
\[ \text{October BW, lb} \]
\[ \text{October BCS} \]
\[ \text{Pubertal, %} \]
\[ \text{Pregnancy rate, %} \]

\[ \text{1Winter grazing treatments: HAY = meadow hay (ad libitum) and 4 lb 28% CP supplement; MDW = grazed winter meadow and 1 lb 28% CP supplement.} \]
\[ \text{2Calculated from January weaning date to end of winter treatment on May 15 (126 days).} \]
\[ \text{3Calculated from removal of winter treatment on May 15 to July 14 (60 days).} \]

\[ \text{Table 3. Effects of winter treatment}^1 \text{ and feedlot system}^2 \text{ on steer performance.} \]

\[ \text{HAY MDW}^1 \text{ SE P-Value} \]
\[ \text{Winter ADG, lb} \]
\[ \text{May BW, lb} \]
\[ \text{Feedlot entry BW, lb} \]
\[ \text{Feedlot ADG}^3, \text{ lb} \]
\[ \text{Final BW, lb} \]
\[ \text{HCW, lb} \]
\[ \text{Marbling score}\text{6} \]
\[ \text{12th rib fat, in} \]
\[ \text{LM area, in}^2 \]
\[ \text{Yield grade} \]
\[ \text{USDA Choice, %} \]
\[ \text{1,000 lb carcass, %} \]

\[ \text{1Winter grazing treatments: HAY = meadow hay (ad libitum) and 4 lb 28% CP supplement; MDW = grazed winter meadow and 1 lb 28% CP supplement.} \]
\[ \text{2Feedlot system: Calf-fed steers entered feedlot on May 15; Yearling-fed steers entered feedlot on August 30.} \]
\[ \text{3Weaning (January) to end of winter treatment (May 15, 126 days).} \]
\[ \text{4May 15 to December 11 (210 days) for calf-fed system and September 14 to February 28 (167 days) for yearling-fed system.} \]
\[ \text{5Calculated from HCW, adjusted to a 63% dressing percentage.} \]
\[ \text{6Small00 = 400.} \]