

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 amount of harvested and purchased feed required to sustain a Nebraska Sandhills cow herd can be reduced by calving late in the spring, better matching the cow's nutrient requirement with grazed forage resources. Altering the calving date may provide additional enterprise opportunities and timing when the calves are marketed, which may be economically advantageous, allowing producers the flexibility to sell calves at different ages and BW.

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 PGF_{2α} (Lutalyse®, Pfizer Animal Health, New York, N.Y.) five days after being placed with bulls (1:20 bull to cow ratio), approximately August 1, for 45 days. Pregnancy was determined via rectal palpation or ultrasonography at weaning in early January. Cows were removed from the study for reproductive failure,

calf death, or injury. Approximately five days post-weaning, calves were placed on one of two winter treatments: graze 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 PGF_{2α} (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

Table 1. Effects of winter grazing treatment¹ on cow BCS, BW, pregnancy rate, and calf BW.

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

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.

^{a,b}Within a row, means without common superscript differ at $P < 0.05$.

entry, steers were limit-fed five days at 2.0% BW, weighed two consecutive days, and adapted (21 days) to a common 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 feedlot 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, followed 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 collected 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 treatments and steer feedlot treatment were applied on a pasture or group basis. Pasture (n = 4/year) served as experimental unit for cow performance and reproductive data. Winter treatment (n = 4/year) served as

experimental unit for heifers. Winter treatment × feedlot treatment served as the experimental unit for the steers. Data were analyzed with the GLIMMIX procedure of SAS (SAS Institute, Inc., Cary, N.C.). Model fixed effects for cow data included winter treatment and age. Winter treatment, feedlot system, and appropriate interactions ($P < 0.05$) were included in the progeny model. Year was considered a random effect for cow and calf variables.

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 ($\pm 17\%$) 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 management 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 season 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 ($P \geq 0.39$). Again, this may be related to limited data. Pregnancy rates were approximately 20 percentage points lower than pregnancy rates in March-born heifers on the same ranch, which may be a function of declining nutrient quality 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 compared 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 treatment tended to have greater ($P = 0.06$) feedlot entry BW than steers on MDW

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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 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.

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Table 2. Effects of winter grazing treatment¹ on heifer progeny.

	HAY	MDW ¹	SE	P-Value
Winter ADG ² , lb	1.52	0.84	0.04	0.03
May BW, lb	615	525	7	0.07
June BW, lb	686	615	9	0.12
July BW, lb	719	650	9	0.10
Summer ADG ³ , lb	1.76	2.07	0.06	0.18
October BW, lb	816	754	9	0.12
October BCS	5.7	5.5	0.05	0.22
Pubertal, %	78	69	7.7	0.47
Pregnancy rate, %	68	61	3.6	0.39

¹Winter grazing treatments: HAY = meadow hay (ad libitum) and 4 lb 28% CP supplement; MDW = grazed winter meadow and 1 lb 28% CP supplement.

²Calculated from January weaning date to end of winter treatment on May 15 (126 days).

³Calculated from removal of winter treatment on May 15 to July 14 (60 days).

Table 3. Effects of winter treatment¹ and feedlot system² on steer performance.

	HAY		MDW		SE	P-Value	
	Calf-fed	Yearling-fed	Calf-fed	Yearling-fed		Winter treatment	Feedlot System
Winter ADG ³ , lb	1.50	1.57	0.79	0.79	0.04	0.03	0.64
May BW, lb	637	650	556	547	11	0.07	0.86
Feedlot entry BW, lb	637	809	556	743	15	≤0.06	0.09
Feedlot ADG ⁴ , lb	3.90	4.19	4.18	4.14	0.02	0.47	0.39
Final BW ⁵ , lb	1,470	1,508	1,446	1,430	29	0.28	0.77
HCW, lb	926	950	911	902	15	0.28	0.77
Marbling score ⁶	520	555	521	544	8.4	0.71	0.43
12th rib fat, in	0.56	0.59	0.56	0.58	0.03	0.90	0.65
LM area, in ²	14.7	14.8	14.4	14.3	3	0.41	0.94
Yield grade	3.17	3.36	3.25	3.35	0.12	0.83	0.43
USDA Choice, %	93	96	90	100.0	0.06	0.95	0.34
1,000 lb carcass, %	11	28	18	4	0.09	0.42	0.83

¹Winter grazing treatments: HAY = meadow hay (ad libitum) and 4 lb 28% CP supplement; MDW = grazed winter meadow and 1 lb 28% CP supplement.

²Feedlot system: Calf-fed steers entered feedlot on May 15; Yearling-fed steers entered feedlot on August 30.

³Weaning (January) to end of winter treatment (May 15, 126 days).

⁴May 15 to December 11 (210 days) for calf-fed system and September 14 to February 28 (167 days) for yearling-fed system.

⁵Calculated from HCW, adjusted to a 63% dressing percentage.

⁶Small⁰⁰ = 400.