Effects of Wintering System on Cow and Calf Performance in a Summer-Calving Intensive Production System

Shelby E. Gardine
Jason M. Warner
Curtis J. Bittner
Robert G. Bondurant
Karla H. Jenkins
Rick J. Rasby
Matt K. Luebbe
Galen E. Erickson
Terry J. Klopfenstein

Summary with Implications

A study evaluated the effects of two wintering systems (cornstalk grazing and drylot feeding) on cow-calf performance in a summer-calving intensively managed cowherd at two locations. Grazing cow-calf pairs on cornstalks resulted in lower ending BW of cows and reduced ADG of calves when compared to drylot cow-calf pairs at weaning. A partial budget of incorporating winter cornstalk grazing into an intensive production system suggests that cows wintered on cornstalks were $136.85 more profitable when compared to cows wintered in the drylot.

Introduction

The conversion of grassland to crop production has stimulated the cattle industry to seek alternative production systems. Research has shown that intensive management of cows can be utilized as an alternative system to traditional pasture beef production (2015 *Nebraska Beef Cattle Report*, pp. 16-18). More acres used for grain crop production has also resulted in greater availability of corn residue for fall/winter grazing. An economic analysis of an alternative production system would suggest that integrating cornstalk residue grazing in a partial intensive management system could reduce production cost for a cow-calf enterprise (2015 *Nebraska Beef Cattle Report* pp. 19-21). However, research is limited on the performance of a lactating cow and her calf while grazing cornstalk residue. Therefore, the objective of this study was to investigate a winter management system incorporating winter cornstalk residue grazing on cow and calf performance in a summer-calving intensively managed cow-calf production system.

Procedure

A study was conducted within two locations: the Eastern Nebraska Research and Extension Center (ENREC) feedlot and the Panhandle Research and Extension Center (PREC) feedlot. Seventy-six (n=47 at ENREC; n=29 at PREC) lactating, composite (Red Angus x Red Poll X Tarentaise x South Devon x Devon) beef cows with summer-born calves were utilized in the study. Within each location, cow-calf pairs were blocked by cow BW (ARDC=4; PREC=3 blocks for drylot and 2 blocks for cornstalk grazing), stratified by calf age, and assigned randomly to one of two treatments: 1) dry lot feeding (DL) or 2) cornstalk grazing (CS).

Prior to trial initiation, cows were grouped in a single drylot pen within location during the summer calving season (mean calving date: ENREC=July 7; PREC=July 11). A distillers and corn residue based diet was limit-fed to cow-calf pairs during this time.

Trial initiation corresponded to the beginning of cornstalk grazing within each location (ENREC=Nov 11 and PREC=Dec 4). Cow-calf pairs assigned to the CS treatment were hauled to irrigated cornstalk fields, while cow-calf pairs assigned to DL treatment remained in drylot pens.

Drylot pairs within location were limit-fed a common diet (Table 1) formulated to maintain a lactating cow in early gestation. Dry matter offered increased monthly throughout the study to account for the increasing intake of the growing calves.

Stocking rate for cow-calf pairs grazing cornstalks was calculated using estimated residue intakes of the cow and calf (2009 *Nebraska Beef Cattle Report*, pp. 13-14) and assuming 8 lb of husk and leaf residue (DM) were available per bushel of corn yield.

Table 1. Ingredient and nutrient composition of diets fed to cow-calf pairs in drylot by location[1]

	Location	
Ingredient, %	ENREC	PREC
Modified wet distillers grains plus solubles	55.0	
Wet distillers grains plus solubles	—	58.0
Wheat Straw	40.0	40.0
Supplement	5.0	2.0
Calculated Composition		
DM, %	62.4	47.0
CP, %	19.3	18.8
TDN, %	79.1	81.0
NDF, %	54.0	54.9
ADF, %	31.0	21.6
Ca, %	0.79	0.77
P, %	0.52	0.49

[1]All values presented on a DM basis
[2]Supplements included limestone, trace minerals, and vitamin A,D,E premix

A dried distillers grain based pellet (Table 2) was supplemented in bunks (space: 2 linear feet per pair) to pairs wintered on cornstalks at a rate of 5.3 lb. (range of 3.7 lb. to 7.1 lb.) DM/pair daily. The amount supplemented each day was calculated to provide the pairs on cornstalks the same energy intake of the DL pairs. Estimated DM intake of the cow and calf (*2009 Nebraska Beef Cattle Report*, pp. 13-14) and estimated digestibility values of the cornstalk residue throughout the grazing period (*2004 Nebraska Beef Cattle Report*, pp. 13-15) were used to calculate supplementation rate. Supplemental feed was only fed to grazing pairs if snow cover prevented grazing.

The trial was completed when winter cornstalk grazing ended on April 12 (ENREC) or April 14 (PREC). Weaning of the calves also coincided with the completion of the grazing season.

Cow BW and body condition score (BCS) were recorded over two consecutive days at trial initiation and completion to determine changes in BW and BCS. Calf weights were also collected over two consecutive days at trial initiation and completion to calculate gain.

Prior to being weighed at trial initiation, all pairs were limit-fed for a minimum of 5 consecutive days to reduce weight variation due to gastrointestinal tract fill. At trial completion, cow and calves were separated and limit-fed a minimum of 5 days before being weighed.

Cows were exposed to bulls (approximately 1 bull: 10 cows) from Sept 25 to Nov 30 for a 66 day breeding season at both locations. All bulls were examined for breeding soundness and approved by a licensed veterinarian prior to breeding season.

Results include 2 years of data from ENREC (1 year of previous data; *2016 Nebraska Beef Cattle Report*, pp. 5-7) and 1 year of data from PREC. Data were analyzed as a randomized block design using the mixed procedure of SAS. The model included pen or paddock as the experimental unit, wintering system as the fixed effect, and block as a random effect. Significance was declared at $P \leq 0.05$.

Table 2. Supplement fed to cow-calf pairs grazing cornstalks

Ingredient, %	
Dried distillers grains plus solubles	94.06
Limestone	5.49
Pelleting binder (urea formaldehyde polymer and calcium sulfate)	0.21
Vitamin A,D,E	0.12
Trace mineral[3]	0.11

[1]All values presented on a DM basis
[2]Fed at 5.3 lb per pair per d (DM)
[3]Cobalt, Copper, Manganese, Zinc, Iodine, Limestone Carrier

Table 3. Performance of cows by wintering system[1]

Item	CS[2]	DL[3]	SEM	*P*-value
Cow BW, lb				
Initial	1183	1187	62	0.93
Ending	1121	1322	57	<0.01
Cow BW Change, lb	-64	132	16	<0.01
Cow BCS[4]				
Initial	5.3	5.3	0.3	0.92
Ending	4.6	5.9	0.2	<0.01
Cow BCS change[4]	-0.7	0.5	0.2	<0.01

[1]Two years of data from ENREC and 1 year of data from PREC
[2]CS= pairs wintered on cornstalks
[3]DL= pairs wintered in drylot
[4]BCS on a 1 (emaciated) to 9 (obese) scale

Table 4. Performance of calves by wintering system[1]

Item	CS[2]	DL[3]	SEM	*P*-value
Initial age, d[4]	125	129	5	0.49
Ending age, d[5]	282	284	3	0.51
Calf BW, lb				
Initial	331	326	9	0.68
Ending	541	642	13	<0.01
Calf ADG, lb	1.33	2.04	0.1	<0.01
BW•d^{-1}•age^{-1}, lb[6]	1.96	2.32	0.1	<0.01

[1]Two years of data from ENREC and 1 year of data from PREC
[2]CS= pairs wintered on cornstalks
[3]DL= pairs wintered in drylot
[4]Initial age= age at initiation of cornstalk grazing period
[5]Ending age= age at collecting weights following weaning
[6]Weight per d of age at collecting weights following weaning

Table 5. Partial budget of winter cornstalk grazing

Inputs, $/pair/day	CS[1]	DL[2]
Cornstalk rent[3]	0.20	—
Yardage	0.30	0.50
Ration[4]	—	1.66
Supplement[4]	0.37	—
Net cost, $/pair/day	0.87	2.16
Net cost, $/pair/wintering season	143.55	356.40
Extra post-weaning feed, $/pair[5]	16.00	—
Lighter weaning wt, $/pair[6]	60.00	—
Net change, $/pair	136.85	

[1]CS= pairs wintered on cornstalks
[2]DL= pairs wintered in drylot
[3]Cornstalk rent = $12 per acre
[4]Distillers priced at 100% of corn assuming $3.50 per bu of corn
[5] Cost to feed an additional 3.6 lb. (DM) of ration at $0.06 per lb. for 75 days to compensate for body condition reduction of cow
[6]The difference in calf value at weaning between treatments; calf price, April 30; $20/cwt price slide

Results

Cow-calf pairs at ENREC grazed from Nov 11 to April 19 (160 d). An ammoniated corn stalk bale was fed (approximately 147 lb DM per pair) due to snow cover. The cornfield at ENREC produced a grain yield of 217 bu per acre. Estimated removal of available corn residue was 32%. At PREC, the grazing period was 133 days (Dec 4 to April 15). The average yield for the cornfield was 245 bu per acre. Cow-calf pairs removed approximately 20% of the available residue.

Drylot cow-calf pairs were limit-fed 27.9 lb DM (ENREC) or 28.3 lb DM (PREC) throughout the trial. Drylot cows had a greater ending BW and BCS compared to cows grazing cornstalks (Table 3). Cows wintered on cornstalks lost BW and had a 0.7 unit decrease in BCS, while cows in the drylot gained BW and had a 0.5 unit increase in BCS. Calves in the drylot had a greater ending BW compared to calves grazing cornstalks (Table 4). Similarly, DL calves had greater ADG and BW per d of age compared to CS calves. The breeding season was nearly complete before the experimental treatments were applied. Therefore, the effect of treatment on reproduction could not be measured until the following breeding season. Only 29 cows (of the total 112) meet these criteria. Overall, pregnancies were 90%, but the number of cows was too small to make a treatment comparison.

A partial budget (Table 5) was utilized to economically compare the reduced performance, as well as decreased winter production cost of the CS wintering system. Winter production inputs for grazing cornstalks were estimated to be approximately $0.87 per pair per day, resulting in a total of $143.55 per pair for a 165 winter grazing season. In contrast, the DL wintering system was estimated at $2.16 per pair day or $356.40 per pair per grazing season.

In the CS wintering system, additional feed was required for the cow to compensate for BW and body condition reductions observed throughout the winter. Consequently, additional post-weaning feed for the CS cow cost approximately $16. The lighter weaning weight of CS calves resulted in a reduced return of $60 per calf when a $20/cwt price slide is used between the calf weaning weights of the CS and DL wintering systems. A net change of $136.85 per pair was observed when winter cornstalk grazing was incorporated into an intensive production system.

Conclusion

Cow-calf pairs winter grazing cornstalks had poorer performance than pairs fed a complete diet throughout the winter in the drylot. However, lower winter production inputs may be significant enough to compensate for the reduced performance of calves when cow-calf pairs are wintered on cornstalks.

Shelby E. Gardine, graduate student

Jason M. Warner, graduate student

Curtis J. Bittner and Robert G. Bondurant, research technicians, Department of Animal Science, Lincoln

Karla H. Jenkins, assistant professor, Panhandle Research and Extension Center, Scottsbluff

Rick J. Rasby, professor, Department of Animal Science, Lincoln

Matt K. Luebbe, assistant professor, Panhandle Research and Extension Center, Scottsbluff

Galen E. Erickson and Terry J. Klopfenstein, professors, Department of Animal Science, Lincoln