Comparison of Semi-confined and Pasture-based August Calving Beef Cow Systems

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Summary with Implications

Limited pasture availability and increased pasture rental rates have generated a need to evaluate alternative cow-calf production systems. The current study compared cow and calf performance in two August-calving cow systems that combined corn residue grazing with 1) perennial forage grazing and hay or 2) summer drylot feeding and fall cover crop grazing. Differences in pregnancy rates between systems within year were not observed; however, the effect of production system on cow body condition and calf body weight at different time points varied across years. Overall, cow and calf performance were not negatively impacted in the drylot/cropland system, suggesting that it is a potential alternative to a perennial forage-based system.

Introduction

Grass availability has decreased in Nebraska and in most of the Northern Plains region because of increased conversion of pasture acres to cropland, which has caused pasture rental rates to rise. The reduction in pasture resources and increased pasture rental rates has prompted a need to evaluate alternative feeding and management strategies for cow-calf production. Previous work has demonstrated that adequate cow body condition can be maintained on rations containing by-products and low quality forages (*2012 Nebraska Beef Cattle Report*, pp. 13–14).

A forage option for fall grazing that has increased in popularity is cover crops planted in late summer following wheat or corn silage harvest. In addition to the soil health benefits and weed control cover crops provide, late summer planted oats and brassica can provide a high-quality forage that maintains its nutritive value through the fall and into winter. When late summer planted oats were incorporated as a fall grazing option for an August-calving cow system with summer confinement and compared to a traditional, April-calving system with perennial pasture grazing, no differences in cow reproductive performance were observed (*2022 Nebraska Beef Cattle Report*, pp. 10–14). In the same study, however, calves in the summer confinement system had lighter weaning weights compared to calves in the spring-calving system, a result which may have been related to the time of year the calves were born. The objective of this study was to compare beef cow and calf performance in August-calving cow systems that utilized perennial pasture or summer drylot with fall cover crop grazing.

Procedure

Multiparous beef cows were utilized in a 3-year study conducted at the U.S. Meat Animal Research Center. In Year 1, cows bred to calve in August were stratified by age (n = 229; 5.3 ± 2.0 yr) and randomly assigned to 8 different herds. Each herd was then randomly assigned to a production system (i.e, 4 herds/system) utilizing either perennial forage and corn residue grazing (PF) or a system that incorporated summer drylotting, fall grazing of a late-summer planted cover crop, and corn residue grazing (DC). Cows remained in the herd that they were assigned to for the duration of the study and were removed from the study if they were diagnosed to be open at palpation, if they or their calf were seriously ill or injured, or died before weaning.

General management of cattle

In the first year, the study began in February. Calving each year began in August and lasted approximately 63 d. Cows in the PF and DC system calved while on pasture or in the drylot, respectively. Herds within PF and DC treatments were combined into 1 or 2 groups, respectively, during the breeding season in November. When calves were weaned (January/February), cows were sorted back into their herds and turned out on corn residue. Free choice mineral supplement was provided to cows while on corn residue. The new production year began in subsequent years when cows finished grazing corn residue (February/March) and were returned to either pasture or the drylot. If cows were removed from study, replacements were added at this time in a way that kept age stratification similar across herds. Body condition scores (BCS; 1 to 9) were collected on cows at the start of each production year (February), pre-calving (July), and breeding (October). Pregnancy diagnosis via rectal palpation occurred in February. Weights on calves were collected at birth, breeding, and weaning.

Management Year 1

Cows were placed on study February 15. The calving season began on August 4 and concluded on September 26. Bulls were turned in on November 5 for 44 d, and the cow to bull ratio was 25:1. Calves were weaned on January 14 at 143 days of age (DOA), and cows were subsequently turned out onto corn residue for 30 d. Pregnancy diagnosis occurred on February 13 following corn residue grazing. Due to limited residue availability, cows were offered free-choice alfalfa/grass hay for the duration of the corn residue grazing period.

Perennial forage-based system

Cows were placed on dormant forage pastures and fed free-choice alfalfa/grass hay starting in February until the middle of April and herds were managed as separate treatment groups. In April, cows grazed pastures until October 25, at which

Table 1. Dietary and nutrient composition of rations fed to cows in the drylot.

	Year 1 and 2		Year 3	
Ingredient, % of DM	Gestation[1]	Lactation[2]	Gestation[3]	Lactation[4]
Corn stalks	75.2	60.4	-	-
WDGS[5]	22.5	22.4	-	-
Corn silage	-	-	48.4	48.3
Alfalfa hay	-	-	48.4	48.3
Corn, dry-rolled	-	14.6	-	-
Supplemental pellet[6]	2.3	2.6	3.2	3.4
Diet nutrient content, % of DM				
CP	11.5	11.9	14.0	
TDN	63.3	69.0	61.5	

[1]Fed at a rate of 25.8 lb DM/cow/d from February to two weeks prior to the start of calving to cows on DC treatment.

[2]Fed at a rate of 27.9 lb DM/cow/d from two weeks prior to calving until late October to DC cows; cows on PF treatment fed from late October to late January in Year 2.

[3]Fed at a rate of 20.1 lb DM/cow/d from February to two weeks prior to the start of calving to cows on DC treatment.

[4]Fed at a rate of 20.8 lb DM/cow/d from two weeks prior to calving until November 1 to DC cows.

[5]Wet distillers grains with solubles.

[6]Pellet provided vitamins, minerals, and supplied 103 and 205 mg Rumensin/cow/d when fed in gestation and lactation rations, respectively.

time all herds were then combined into a single group and moved to a stockpiled field of brown mid-rib forage sorghum for breeding. Calves were creep fed ad libitum alfalfa hay surrounded by a single-wire fence beginning on October 31. When bulls were turned in on November 5, cows were offered free-choice alfalfa/grass hay.

Drylot/cropland system

Cows were placed in the drylot beginning in February and fed a total mixed ration (TMR; Table 1) that consisted of corn stalks and wet distillers grains with solubles (WDGS). Additionally, cows received 0.5 lb/hd of a supplemental pellet that contained vitamins, minerals, and 205 mg Rumensin/lb dry matter. Starting two weeks before expected calving date, dry-rolled corn was added to the diet, and supplemental pellet amount was increased to 1 lb/hd.

Starting October 1 while cows were in the drylot, calves were creep fed ad libitum alfalfa hay. Cows were sorted into two breeding groups such that DC treatment groups were equally represented within each breeding group. Cover crop was planted late in this year and was not ready for grazing by October 25, so one group was placed on an alfalfa/orchard grass mix pasture and the other group was placed on an alfalfa/endophyte-free tall fescue mix pasture.

Management Year 2

The production year started on February 14. Calving season started on July 25 and ended on September 26. Bulls were placed with cows on November 5 for 46 d, and cow to bull ratio was 20:1. Calves were weaned at 157 DOA on January 28, and cows were palpated on February 1 before being turned out to corn residue for 43 d. Supplemental alfalfa/grass hay was provided free-choice to cows while grazing corn residue starting on February 9.

Perennial forage-based system

On February 14, cows were placed on dormant forage pastures and fed free-choice alfalfa/grass hay until April, and grazed summer pasture until the end of October. Because of limited pasture availability due to drought, cows were maintained in their treatment groups and moved to the drylot on October 29 for breeding. Cows were fed a TMR that consisted of corn stalks, WDGS, and dry-rolled corn to meet energy requirements (Table 1). In addition, cows received 1 lb/hd/d of a supplemental pellet that supplied vitamins, minerals, and 205 mg Rumensin. Starting on October 30, calves were allowed ad libitum access to alfalfa hay via a single-wire fence creep area.

Drylot/cropland system

From February 14 through October 27 rations and management of cows was as described in Year 1. Calves were creep fed alfalfa hay as described in Year 1 beginning September 29 until cattle were moved to cover crops. Cows were sorted into two breeding groups such that DC treatment groups were equally represented within each breeding group and placed on a cover crop. The cover crop was planted August 22–23 using 55 lb/acre oats, 20 lb/acre cereal rye, and 3 lb/acre rapeseed. Breeding groups starting grazing cover crop on October 28 for 85 days until calves were weaned and cows were moved to corn residue. Beginning December 28, cows were provided free-choice alfalfa hay while they were on cover crops. Cows were returned to the drylot after corn residue grazing ended on March 12.

Management Year 3

The final year of the study began in mid-March when the corn residue grazing ended from the previous year. Calving season went from August 2 to September 27, and calves were weaned at 164 DOA on February 4. Bulls were placed with cows for breeding on November 16 and the breeding season lasted for 49 d, and the cow to bull ratio was 11:1. The study ended after cows were palpated on February 9.

Perennial forage-based system

Cows were placed on pasture and received no additional forage supplementation until December 1 during breeding, at which time they began receiving free-choice alfalfa/grass hay. On October 25, all herds in the PF treatment were combined into a single group for breeding and were moved to a single dormant forage pasture. Calves were ad libitum creep fed alfalfa hay as described in Years 1 and 2 starting January 1.

Drylot/cropland system

Cows received a TMR that consisted of corn silage, ground alfalfa hay, and supplemental pellet (Table 1). The cover crop was

Table 2. Effect of August-calving cow-calf system on pregnancy rates by year. Systems were 1) perennial forage and corn residue grazing (PF) or 2) summer drylot, fall cover crop grazing, and corn residue grazing (DC).

	Treatment			
Item	PF	DC	SEM[1]	*P*-value[2]
Pregnancy rate, %				
Year 1	81.5	77.2	4.28	0.48
Year 2	96.4	95.9	2.31	0.87
Year 3	92.4	85.0	3.54	0.16

[1]Average SEM across treatments within each year.

[2]*P*-value for main effect of treatment (PF or DC) within year shown. Treatment by year interaction was not significant ($P = 0.72$). Main effect of treatment not significant ($P = 0.22$).

Table 3. Effect of August-calving cow-calf system on cow and calf performance. Systems were 1) perennial forage and corn residue grazing (PF) or 2) summer drylot, fall cover crop grazing, and corn residue grazing (DC).

	Treatment			
Item	PF	DC	SEM[1]	*P*-value[2]
Year 1				
Cow BCS[3]				
Pre-calving (July)[4]	7.02	5.42	0.060	<0.01
Breeding (October)[5]	6.27	5.42	0.061	<0.01
Post-Weaning (February)	5.45	5.09	0.055	<0.01
Calf BW, lb				
Birth	85.7	86.0	3.91	0.96
Weaning (January)[6]	403	391	4.00	0.03
Year 2				
Cow BCS[3]				
Pre-calving (July)[4]	6.69	6.05	0.059	<0.01
Breeding (October)[5]	6.63	6.10	0.060	<0.01
Post-Weaning (February)	6.34	6.45	0.048	0.12
Calf BW, lb				
Birth	81.8	88.0	3.79	0.25
Weaning (January)[6]	442	466	3.93	<0.01
Year 3				
Cow BCS[3]				
Pre-calving (July)[4]	7.71	7.26	0.059	<0.01
Breeding (October)[5]	6.84	6.84	0.061	0.98
Post-Weaning (February)	5.89	7.13	0.061	<0.01
Calf BW, lb				
Birth	89.5	81.3	3.88	0.14
Post-Weaning (February)[6]	474	482	4.00	0.17

[1]Average SEM across treatments within each time point.

[2]*P*-value for main effect of treatment within time point. 3-way interaction between treatment, time point, and year was significant ($P < 0.01$) for cow BCS and calf BW.

[3]Body condition score (1 = emaciated to 9 = obese).

[4]PF cows grazing perennial forage, DC cows limit-fed in drylot to meet energy requirements.

[5]Body condition prior to bull turn-out for breeding. In Year 1, PF cows placed on stockpiled forage sorghum and DC cows placed on alfalfa/grass pivots. In Year 2, PF cows placed in the drylot and DC cows placed on cover crop. In Year 3, PF cows placed on dormant perennial grass pastures and DC cows placed on cover crop. Breeding season was 44, 46 and 49 d in Years 1 through 3, respectively.

[6]Age of calves at weaning in Year 1 through 3 was 143, 157, and 164 d, respectively.

planted August 27 using the same oat, rye, and rapeseed mix as described in Year 2, and cows grazed cover crop 92 days. Beginning September 22 until cattle were moved to cover crops on November 2, calves were creep fed alfalfa hay as described in Years 1 and 2.

Results

Pregnancy rates did not differ ($P < 0.72$; Table 2) between treatments within year. There was a treatment × time × year interaction ($P < 0.01$) observed for cow BCS and calf BW (Table 3). In Year 1, BCS was greater ($P < 0.01$) at pre-calving (July), breeding (October), and post-weaning (February) time points for PF compared to DC cows; however, cows in the DC treatment never dropped below a BCS 5 and were still considered to be in adequate condition. Differences in BCS between treatments were expected because PF cows could easily gain body condition when they were on summer pasture and not lactating, whereas DC cows were fed to maintain a BCS of 5 while in the drylot. Birth weights of calves were not different ($P = 0.96$) between treatments, with average weight being 86 ± 4 lb. At weaning, however, BW of PF calves was 12 lb greater ($P = 0.03$) than DC calves (403 vs. 391 lb, respectively).

In Year 2, cow BCS was greater ($P < 0.01$) for PF than DC cows at pre-calving and breeding but was not different ($P = 0.12$) between the treatments at weaning. Cows in the DC treatment in Year 2 never fell below a BCS 6. Like Year 1, calf birth 0.25 BW was not statistically different ($P = 0.12$) between PF (81.8 lb) and DC (88.0 lb) groups, but unlike Year 1, weaning weights were greater ($P < 0.01$) for calves in DC compared to PF by 24 lb. The greater weaning weights observed in DC calves may be attributed to the feed resource available to pairs. Prior to breeding, pairs in the DC treatment were in the drylot and PF pairs were on pasture. From breeding until weaning, DC pairs were grazing a high-quality cover crop and pairs in the PF treatment received a TMR in the drylot. It is possible the different quantity and quality of feedstuffs pairs had access to in each system, especially from breeding to weaning, impacted calf performance.

In Year 3, BCS was greater ($P < 0.01$) for PF (7.7) at the pre-calving time point but was lower ($P < 0.01$) than DC cows at weaning (5.9 vs. 7.1). Cow BCS was not different ($P = 0.98$) between treatments at breeding in October. Body weight of calves at birth and weaning was not different ($P \geq 0.14$) between PF or DC, with average weaning weight across treatment groups being 478 ± 4 lb.

Conclusion

Cow and calf performance were not sacrificed in the semi-confined cow-calf system. Although differences in cow BCS were sometimes observed between the two production systems across years, all cows maintained adequate body condition throughout the study and no differences were observed in pregnancy rates. Based on these performance data, a semi-confined production system combining summer drylotting, fall cover crop grazing, and corn residue grazing could be a viable alternative when perennial forage is limiting but ample cropland is available. However, viability of this system will ultimately depend on costs, which will vary between producers.

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