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Utilizing Corn Residue or Fall Double Cropped Forages for Winter Backgrounding of Calves

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Summary

The impact of three backgrounding systems: grazing corn residue with distillers supplementation at 0.86% BW/d, grazing an oats-brassica forage, or feeding a grower ration in a drylot were evaluated. Calves grazing oats-brassica forage had a greater average daily gain (2.25 lb/d) during the 65 d grazing period than calves grazing corn residue (1.77 lb/d). During the entire growing period (end target weight of 800 lbs) which included 21 days of grower ration for the grazing treatments, gains of calves put directly in the drylot and fed a grower ration (3.58 lb/d) were greater than both grazing treatments and the calves grazing oats-brassica forages had greater gains (2.65 lb/d) than calves grazing corn residue (2.22 lb/d).

Introduction

In Nebraska there is significant opportunity to background spring born calves in the winter using forages produced from crop acres, including crop residues and double cropped annual forages. Calf gain response to differing levels of distillers supplementation when grazing irrigated corn residue has been well documented (*2015 Nebraska Beef Cattle Report*, pp. 25–26). On the contrary, less information is available regarding gain of calves grazing fall double cropped forages, such as oats and brassicas (turnips and radishes) planted after corn silage. Therefore, the objective of this study was to evaluate the performance and economics of backgrounding spring born calves by 1) grazing corn residue and feeding a distillers grains based supplement at 0.86% BW/d, 2) grazing an oats, turnip, radish mix double crop planted after corn silage harvest, or 3) drylotting calves on a corn silage based grower ration.

Procedure

This experiment was conducted at the Meat Animal Research Center near Clay Center, Neb., utilizing 355 spring born, MARC II composite steer calves. All calves were weaned in the third week of September and moved to the feedlot where they were fed the grower ration (Table 1). An initial BW was taken prior to feeding on November 17, 2014. Calves were stratified by BW (610 ± 1.1 lb) and genetic line on November 17, 2014 and then assigned to 1 of 3 treatments: 1) corn residue grazing with distillers supplementation (CRD), 2) oat-brassica forage grazing (OBF) or 3) consuming a grower ration in the drylot (DGR). Each treatment had 4 replicates. On November 20, 2014, calves were sorted to their assigned group and were started on their treatment.

Calves on CRD were placed in an irrigated corn field that was divided into 4 quarters with 31 acres and 30 calves per quarter. The corn yield from this field averaged 225 bu/ac. Calves were supplemented 6 days a week with 6.1 lb DM/hd of dried distillers grains mixed with limestone at 2% on DM basis. Calves on OBF were placed in an irrigated field that was planted after corn silage. The double-crop was planted on September 8, 2014 with 84 lb/ac of oats, 2 lb/ac of daikon radish, and 1.5 lb/ac of purple top turnips. Nitrogen was split applied via pivot on September 15th and 24th (48 lb of N/ac total). This field was divided into 31 acre quarters and initial forage mass was measured on November 6, 2014. Each quarter was stocked at a rate 3617 ± 21 lb DM/hd and there were 25, 30, 30, and 30 calves per quarter. Samples of the oats-brassica forage mixture were taken on November, 6th and December 9th. Samples were composited within date and sent to Dairyland Laboratories to be analyzed for nutrient composition.

Both CRD and OBF calves were given access to a free choice mineral with Rumensin (1,320 g monensin per ton). The CRD and OBF calves were removed from grazing after 64 d when the OBF biomass was 1287 ± 93 lb DM/ac. Each group was placed into a separate feedlot pen and calves were fed the grower ration (Table 1). After 6 days on the grower ration CRD and OBF calves were weighed (d 71). Calves continued to be fed the grower ration for an additional 15 days (d 86), to reach a targeted average BW of 800 lb. At which point they were implanted with Revalor®-XS (Merck Animal Health) and transitioned onto the finishing diet (Table 1).

Calves in the DGR treatment were placed in 4 feedlot pens with 30 calves per pen. They were backgrounded on the grower ration (Table 1) for 54 days, to meet a targeted average BW of 800 lb. At which point they were weighed, implanted with Revalor®-XS and transitioned onto the finishing diet.

A partial budget analysis was conducted to evaluate the costs of each backgrounding system. The feed cost in the budget included: distillers supplementation ($129/ton), and corn residue cost ($0.20/hd/d) for CRD calves, seed plus seeding costs ($38.90/ac or $41.58/hd), and N fertilizer ($27.36/ac or $29.25/hd) for OBF calves as well as costs of the grower ration ($114/ton DM) for all treatments. During the backgrounding period CRD and OBF calves were charged $0.10/d for yardage (fence

Table 1. Composition of grower ration

Ingredient	DM basis, %
Corn Silage	51.0
Alfalfa Hay	25.0
WDGS[a]	20.0
Supplement[b]	4.0
Analyzed composition	
NEm, Mcal/lb	0.75
NEg, Mcal/lb	0.47

[a]Wet distillers grains plus solubles.
[b]Supplement provided Rumensin at 28 g/ton of diet DM.

and water maintenance) and CRD calves were charged an additional $0.10/d for the extra labor to feed their supplement. The yardage cost for feed calves in the feedlot was charged at $0.40/d.

Results

OBF Production

Total DM yield of the oats, turnip and radish mixture was 3353 ± 140 lb/ac with 93% (3110 ± 135 lb/ac) being leaf and stem and the remaining 244 lb being tubers of the radish and turnips. Of the forage produced, the oats made up the greatest ($P < 0.01$) proportion (54.5% of DM produced), turnips were intermediate (30.5% of DM produced) and radishes produced the least amount of DM (15.0% of DM). However, the lower seed cost of the turnips resulted in a lower cost per ton of DM produced (Table 2) than both the oats and radishes. The nutrient analysis of the mix is shown in Table 3. The forage produced was high quality and appeared to maintain its quality after frost kill, although some loss of sugar did occur resulting in an increase in fiber (NDF and ADF).

Cattle Performance

Cattle performance during the grazing periods for CRD and OBF is shown in Table 4. Calves consuming OBF had a greater ($P < 0.01$) ADG (2.25 lb/d) during the grazing period than CRD calves (1.77 lb/d). At the end of the grazing period, both treatments were fed a grower ration for 15 days. When fed the grower ration they gained an average of 4.4 lb/d.

When comparing the total growing period ADG across all three treatments (Table 5), DGR calves had the greatest rate of gain (3.58 lb/d), while OBF was intermediate (2.65 lb/d), and CRD had the lowest rate of gain (2.22 lb/d). Therefore, the growing period for CRD and OBF calves was 22 days longer (86 days total) than DGR calves (54 days). The BW of OBF (838 lb) was greater at the end of the growing period than both CRD and DGR (802 vs. 803 lb for CRD and DGR, respectively).

Table 2. Forage production of oats, purple top turnip and daikon radish when planted in a mix after corn silage

	Oats	Turnip	Radish	Total
Seeding rate, lb/ac	84	1.5	2	87.5
Cost of seed, $/ac	25.2	2.7	5.0	32.9
Forage yield, lb DM/ac	1827	1023	503	3353
Forage yield, % of DM	54.50	30.50	15.00	100
Cost of seed, $/ton DM[a]	27.59	5.28	19.88	19.62

[a]Seed cost ($/ac) divided by forage produced (lb DM/ac) × 2000 lb = cost per ton of forage DM.

Table 3. Nutrient content of the forage mix containing oats, daikon radish, and purple top turnips planted September 8th and sampled on November 6th and December 9th

	November	December
DM, %	15.5	59.5
	%, DM basis	
CP	23.2	22.9
TDN	77.8	67.4
ADF	19.9	27.7
NDF	29.9	44.0
Sugar	15.8	7.9

Table 4. Growing performance of calves backgrounded by grazing corn residue plus supplemented with dry distillers at 0.86% of BW (CRD) or grazing fall planted oats and brassica forage (OBF) during the winter

Growing Phase	CRD	OBF	SEM[b]	*P*-value
Grazing Period (71 d period)[a]				
Initial BW, lb	611	609	1.4	0.28
End Grazing BW, lb	737[d]	770[c]	5.9	< 0.01
ADG, lb	1.77[d]	2.25[c]	0.084	< 0.01

[a]Grazed for 65 days on backgrounding treatment and were then feed grower ration for 6 days (d 66–71) prior to weighing (to achieve similar weighing conditions when the initial weight was recorded and to reduce weight variation due to gut fill).
[b]Standard error of the least squares mean.
[c,d]Means within row lacking common superscript differ.

Table 5. Growing performance of calves backgrounded by grazing corn residue plus supplemented with dry distillers at 0.86% of BW (CRD), grazing a fall oats and brassica forage (OBF) or fed a grower ration in drylot (DGR)

Growing Period[a]	CRD	OBF	DGR	SEM[b]	*P*-value
Initial BW, lb	611	609	610	1.4	0.51
End Growing BW, lb	802	838	803	5.3	
ADG, lb	2.22e	2.65d	3.58c	0.067	< 0.01

[a]The CRD and OBF calves grazed for 65 days and were fed grower ration for 21 days (86 d period) while DGR was fed grower ration for 54 days before being implanted and transitioned to the finishing ration.
[b]Standard error of the least squares mean.
[c,d,e]Means within a row lacking common superscript differ.

Economics

A partial budget comparison of the treatments can be found in Table 6. These comparisons do not include veterinary costs, interest, or transportation. During the growing period the cost of gain for CRD was the lowest at $0.35/lb ($P < 0.01$), while the cost of gain for DGR calves was intermediate ($0.40/lb), and OBF had the greatest cost of gain ($0.46/lb). The greater cost of the OBF than that of the CRD and DGR is the result of high forage cost which is due to the cost of inorganic nitrogen ($29.25/hd). For producers that have access to manure as a nitrogen source, and will already be applying it to crop land in the fall for next year's grain crop, no inorganic nitrogen would be needed for forage production. In this scenario (no fertilizer cost) the cost of gain for the OBF ($0.35/lb) and CRD are not different. Likewise when the seed cost is offset by payments ($20 to 30/ac) for planting these cover crops as a part of conservation stewardship program cost of gains would be competitive with CRD.

Table 6. Partial budget economic analysis1 of three backgrounding systems: grazing corn residue plus supplemented with dry distillers at 0.86% of BW (CRD), grazing a fall oats and brassica forage (OBF) or fed a grower ration in drylot (DGR)

	CRD	OBF	DGR	SEM[e]	P-value
Growing period					
Grazing period					
Feed cost[a,b], $/hd	22.97	71.89	—	—	—
Yardage[c], $/hd	12.10	6.50	—	—	—
Drylot period					
Feed cost[d], $/hd	22.70	23.45	56.06	—	—
Yardage[c], $/hd	8.40	8.40	21.60	—	—
Total cost, $/hd	66.17	110.24	77.66	—	—
Cost of gain, $/lb	0.35[h]	0.46[f]	0.40[g]	0.015	< 0.01

Note. Excludes vet cost, interest and transportation.
[a]Distillers supplement $110/ton and corn residue $0.20/hd/d.
[b]Seed plus seeding $38.90/ac ($41.58/hd) and N fertilizer $27.36/ac ($29.25/hd).
[c]Yardage: drylot $0.40/d; feeding supplement $0.10/d and checking fence, water and calves while grazing $0.10/d.
[d]Grower ration $114/ton DM.
[e]Standard error of the least squares mean.
[fgh]Means within row lacking common superscript differ.

Implications

Grazing corn residue and supplementing distillers at 0.86% BW is a cost effective way of backgrounding calves during the winter and ADG of 1.8 lb/d can be expected. When grazing oat-brassica forage, relatively high gains (2.2lb/d) can be achieved. However, the cost effectiveness is dependent on the production scenario. Producers that are already planting oats and brassicas for soil benefits as a part of a conservation stewardship program or those that typically apply manure in the fall for the next season's crop, the cost of gain is competitive with using corn residue and less expensive than feeding a grower ration. However, when both the cost of seed and 50 lb of inorganic nitrogen is included, the cost of gains is greater than both corn residue grazing or feeding a grower ration in drylot.

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