Effect of alternative winter feeding methods on cow performance and production costs

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Winter feeding is a major expense in cow-calf operations in the Northern Plains. The objectives of this study were to compare cow performance and associated costs of nontraditional feeding programs in southwestern ND. Young beef cows (n=49; BW = 560.2 ± 59.9 kg; body condition score [BCS] = 5.9 ± .6) were randomly assigned to one of three treatments. Treatments included grazing of swathed oat (*Avena sativa*; SW), grazing of unharvested corn (*Zea mays*; CO) or oat hay feeding in dry lot (DL). Number of cows allocated to each replicate was based upon amount of forage available at the initiation of the study and an intended 8-wk feeding period beginning in mid October. Cumulative changes in BW and BCS averaged 49.9 kg and .02 units, respectively. Hay fed in DL was provided ad libitum (19.0 ± .23 kg/d). Number of grazing days per cow (P = .94) was similar across treatments (51.3, 52.5 and 51.0 for SW, CO and DL, respectively). Number of grazing days per ha (P = .4) was numerically greater for CO (159.6), intermediate for DL (122.4) and least for SW (99.8). Cumulative ADG (kg/d, P=.05) was reduced in SW (.59) compared to CO (1.09) and DL (.95). Cumulative change in BCS (P=.2) was similar across treatments (-.10, .25 and -.19 for SW, CO and DL, respectively). Total production and use costs per ha were $68.50, $195.10 and $95.93 for SW, CW and DL respectively. Costs per cow grazing day (P=.29) and per kg of BW gain (P=.70) did not differ among treatments. Numerically, however, costs per day were least in SW ($.67), greatest in CO ($1.31) and intermediate in DL ($.89). Likewise, numerically cost per unit of gain was least in DL ($.93) compared to SW ($.1.19) and CO ($.1.19). Results suggest that each feeding alternative is feasible in southwestern ND. However, other elements of nontraditional systems (e.g. manure disposal, machinery and labor requirements) will need to be valued if they are to be adopted as "better" alternatives.

Key words: Beef cows, Unharvested corn, Swathed oat

Justification

Agricultural (arable and grazable) land dominates the landscape in the Northern Plains. Appropriate integration of crop and livestock systems within this landscape can be a valuable tool in increasing rural economic development. Inclusion of feed and forage production in cropping rotations would provide flexibility in developing cropping systems to help enhance the general sustainability of the underlying ecosystem. Coupling this feed and forage production with resident and value-added ruminant livestock production offers a tremendous spring board for capturing the real value of agricultural production and stimulating additional economic development in the region in an environmentally friendly fashion.

Annual forage production is increasing in importance in the agricultural economy of the Northern Plains. Innovative farmers are seeking ways to enhance crop diversity, control pests and increase crop water use efficiency without assuming the risks often associated with continuous cropping. However, a viable market for annual forage production is often critical for enhancing its impact on regional economies.

Ruminant livestock constitutes a primary economic engine in this region with cow/calf production a major component. The winter management program of traditional cow/calf production accounts for up to 60% of annual production expenses in these operations. Two-thirds of this expense is for harvested and stored feeds typically fed in total or semi confinement feeding facilities. Appropriate integration of crop and livestock systems within the region could conceivably use cattle to create a ready market for annual forage production while simultaneously reducing the overall environmental and economic costs associated with traditional winter management programs.

Objective

Determine the effect of winter feeding method on beef cow performance and production and use costs in southwestern North Dakota.

Procedures

Three feeding methods initiated in mid October for an 8-week evaluation.

- Swath grazed (SW): oat fields (3.2 ha/replicate) were seeded in mid April and swathed in late July and left in field for later grazing.

- Corn grazed (CO): corn fields (3.2 ha/replicate) were seeded in early May and left standing in field for later grazing.

- Hay fed (DL): oat hay fed ad libitum in drylot (previously mob grazed fields; 4.0 ha/replicate). Hay was obtained from adjacent fields that were similar in variety, seed and swathing dates to SW and baled in early August.

Forty-nine 2- and 3-year old dry beef cows (BW = 560.2 ± 59.9 kg; body condition score [BCS] = 5.9 ± .6) were blocked by weight and randomly assigned within weight block to one of 6 replicates (2 replicates per feeding method). Number of animals per grazing replicate was determined by amount of forage available at the start of the experiment, 50% harvest efficiency, 10.0 kg/cow/d consumption rate and a 56 d feeding period. Replicates of DL had 8 cows.

Cows were weighed and body condition scored every 14 d until replicate removal from experiment. One SW and one CO replicate was removed after grazing for 49 d due to a reduction in visual forage available and in period animal gain. Experimental days for each feeding method were either an average of actual grazing days (SW and CO) or an estimate of days available (DL; hay available in swath minus harvest and storage losses divided by actual daily DM deliveries per replicate).

Forage and animal data were analyzed as a randomized complete block design using method replicate as the experimental unit.

Costs of feed production per acre were estimated using FINBIN 10-yr averages (http://www.finbin.umn.edu/CropEnterpriseAnalysis/Default.aspx; accessed March, 2005) for North Dakota Western Missouri Slope region. Cost of corn production was estimated as average costs for reporting farms in the region that produced corn. Cost of hay production was estimated as average costs for oat hay production plus a hauling charge ($1.25/bale). Cost swath production was assumed to equal the estimated cost of DL production minus a baling ($6.30/bale) and hauling charge. A use charge of $4.94/ha for electric fencing was applied to grazing methods (SW and CO) and $0.10 per head per day for feeding was applied to DL.

Conclusions

Table 1:

- DL cows were delivered 19.0 kg/head/d.
- Days grazed/fed per cow were similar across feeding methods (P=.94).
  [numerically: CO ≈ SW ≈ DL]
- Days grazed/fed per ha were similar across feeding methods (P=.40).
  [numerically: CO > DL > SW]

Table 2:

- Cumulative average daily gain (kg/d) differed across feeding methods (P=.05).
  [CO ≈ DL > SW]
- Cumulative change in body condition score was similar across feeding method (P=.20).
  [numerically: CO > SW ≈ DL]

Table 3:

- Production and use cost per head per day were similar across feeding method (P=.29).
  [numerically: CO > DL > SW]
- Production and use costs per kg of gain were similar across feeding method (P=.70).
  [numerically: CO ≈ SW > DL]

Summary

When comparing the grazing of swathed oat or standing corn to oat hay feeding in southwestern North Dakota, average daily gain was the only variable significantly affected by feeding method. Grazing of swathed oat reduced individual cow average daily gain. Numerical difference suggest that when compared to feeding oat hay, grazing of corn appears to support good animal performance but may be an expensive forage to produce, while grazing of oat swaths appears to be marginal with respect to animal performance but may be cost effective if body weight and condition score are monitored closely.

Implication

Results suggest that each feeding alternative is feasible in southwestern ND. However, other elements of nontraditional systems (e.g. manure disposal, machinery and labor requirements) will need to be valued if they are to be adopted as “better” alternatives.

Table 1. Effect of feeding method on forage available, hay intake, stocking rate and number of days grazed/fed.

	Feeding Method[a]			
Item	DL	SW	CO	P-value
Forage available (kg/ha)				
August 2	2594	2594	-	-
September 9	-	-	3706	-
October 21[b]	2390[c]	2142	3291	-
Hay intake (kg/d)	19.0	0.0	0.0	-
Stocking rate (ha/cow)	**	.54	.32	-
Number of days				
Per cow	51.0	51.3	52.5	.94
Per ha	122.4	99.8	159.6	.40

[a] DL = oat hay fed, SW = grazed oat swaths and CO = grazed standing corn.
[b] Initiation of experiment.
[c] Assumes a 5% baling loss and a 3% storage loss for oat hay production.
[**] 8 cows per replicate fed oat hay ad libitum.

Table 2. Effect of feeding method on average daily gain and cumulative body condition score change.

	Feeding Method[a]			
Item	DL	SW	CO	P-value
Average daily gain (kg/d)	.95[b]	.59[a]	1.09[b]	.05
Body condition score change (kg/d)	-.19	-.1	.25	.2

[a] DL = oat hay fed, SW = grazed oat swaths and CO = grazed standing corn.

Table 3. Effect of feeding method on production and use costs.

	Feeding Method[a]			
Item	DL	SW	CO	P-value
Per ha	$95.93	$68.50	$195.10	-
Per head per day	$0.89	$0.67	$1.31	.29
Per kg of BW gain	$0.93	$1.19	$1.19	.70

[a] DL = oat hay fed, SW = grazed oat swaths and CO = grazed standing corn.