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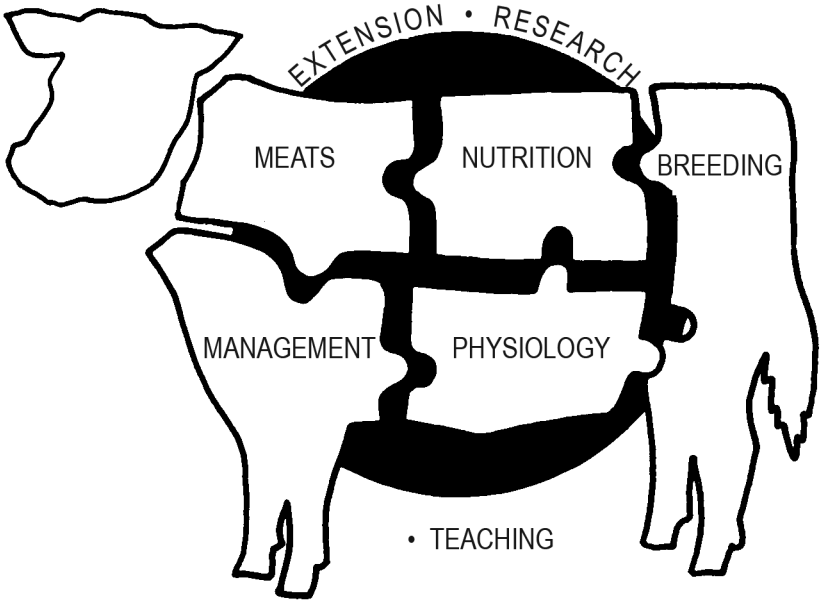

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An Economic Analysis of Conventional and Alternative Cow-Calf Production Systems

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Summary

Profitability through weaning was predicted for conventional and alternative cow-calf production systems using various input price scenarios. At base input price levels, conventional systems were more economical than alternative systems. As pasture price increased, alternative systems became cost effective. Feeding cows year-round in a confinement setting appeared the least economical; however, an alternative system combining summer drylot feeding with cornstalk grazing is projected to be economically competitive given an increasing abundance of corn residue.

Introduction

In recent years, numerous factors related to grain prices and interest rates have strengthened land values and stimulated the conversion of pastureland to cropland. When these changes in land use are combined with drought, the availability of grass for pasture and hay production for maintaining the beef cow-calf enterprise becomes challenged. However, crop residue from increased grain production represents the only forage resource for beef cattle that is increasing in Nebraska and the Midwest. There is also excess feeding capacity within the cattle industry. Therefore, alternative production systems involving partial or total intensive management (confinement) of cows using crop residues as forage resources may be economically viable alternatives to conventional cow-calf systems. The objectives were to model profitability through the weaning phase of production of seven (four conventional and three alternative) different cow-calf production systems under current and projected forage and feed price scenarios.

Procedure

The seven cow-calf systems analyzed were selected to represent various production environments across Nebraska. The first three systems represent conventional Nebraska Sandhills production using data from March (GSL-MA), June (GSL-JU), and August (GSL-AU) calving cowherds collected over four years at the University of Nebraska–Lincoln Gudmundsen Sandhills Laboratory (*Professional Animal Scientist,* 28:249-259). Cows in the GSL-MA herd grazed native range from May through October followed by cornstalks until the end of February. During the last 45 days of the cornstalk grazing period, cows were fed 1.0 lb/cow daily (DM) a distillers-grains-based supplement. From March 1 through April, GSL-MA cows were fed grass hay in a drylot. Calves were weaned in late-October. Cows in the GSL-JU herd grazed native range from April through October followed by cornstalks until the end of March. Cows were also supplemented (1.0 lb/cow/day, DM) from Aug. 1 until April 1. Cows in the GSL-AU herd also grazed native range from April through October and then cornstalks until the end of March. However, August calving cows were supplemented from Oct. 1 through May 30 (1.0 lb/cow/day, DM). In both the GSL-JU and GSL-AU systems, cows were not fed hay during the year unless snow cover prevented grazing, and calves remained with their dams while grazing cornstalks (April weaning).

The fourth system represents conventional southeast Nebraska production using data from a spring (March and April) calving cowherd in three years at the University of Nebraska–Lincoln Dalbey-Halleck (DH) Research Unit (*Journal of Animal Science*, 83:694-704). Cows in this system grazed cool- and warm-season pastures from April 1 through October followed by cornstalks until February, and were fed grass hay during calving. Weaning occurred in mid-October. The first alternative system evaluated (DH-SUPP) is similar to this, with the exception that cow-calf pairs are double stocked during summer grazing and half of the grazed forage is replaced by distillers grains and crop residue fed as a supplement (*2015 Nebraska Beef Cattle Report,* pp. 14-15).

The final two alternative production systems are total intensive management (INT) in which cows are confined to a drylot year-round, and an intensive management system with fall/winter cornstalk grazing (INTSG). The INT system (*2015 Nebraska Beef Cattle Report,* pp. 16-18) represents two years of data from a summer (June and July) calving cowherd fed distillers grains and crop-residue-based diets with calves weaned in February. The INTSG system is a proposed production system that will be researched in coming years, and is a combination of the INT and GSL-JU and GSL-AU systems. Cows will be maintained in confinement from April through October, and then will graze cornstalks until approximately the end of March. Therefore, calving will be in summer and weaning will occur when pairs return from cornstalk grazing. The logic for summer calving in the INT and INTSG systems was improved pen conditions during June and July, and calves would be marketed in the spring at historically higher prices. To meet protein requirements while on cornstalks, INTSG pairs would be fed 3.0 lb daily (DM) a distiller-grains-

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based supplement. Weaning weights in the INTSG system are projected to be approximately 100 lb greater than INT calves given they will be approximately 60 days older at weaning.

A spreadsheet for calculating total annual cow costs was developed by incorporating production data reported from all seven cow-calf systems (Table 1). Total annual cow costs were divided by actual calf weaning BW for each system to calculate a breakeven calf sale price or unit cost of production (UCOP, $/lb) through weaning. Unit cost of production was then adjusted to a common 95% weaning percentage (calves weaned per pregnant cow). Thus, we assume equal reproductive and weaning rates across all systems. Unit costs of production, including both steer and heifer calves, were first calculated using base input prices (Table 2) and then under various pricing scenarios.

Additional assumptions regarding analysis were: 1) Costs associated with cow ownership and management was similar across all systems at $250/cow/year. Of that cost, $50 is attributed towards breeding, with the remaining portion charged to cover expenses for replacement females, interest, depreciation, marketing, insurance, and taxes; 2) All calves produced in each system were marketed at weaning and no replacement heifers were retained. Marketing weights were based on actual weaning weights (not adjusted to 205 days of age) since three systems were designed to leave calves on the cow longer than 205 days; 3) Mature bred cows were purchased into the system annually as replacements as opposed to purchasing or retaining replacement heifers. Labor/yardage was equal between dry cows or cow-calf pairs and assessed at $0.10/cow/day for cows in conventional systems; $0.20/cow/day if supplemented on pasture or cornstalks and $0.45/cow/day for cows in intensive management. Feeds were priced on a 100% DM basis and included $5/ton for delivery and $15/ton for grinding of baled crop residue.

Table 1. Annual production inputs and calf weaning weights by cow-calf system.

	GSL MA[1]	GSL JU[1]	GSL AU[1]	DH[2]	DH SUPP[3]	INT[4]	INTSG[5]
Summer grass, day	180	215	215	200	100	—	—
Grazed cornstalks[6], day	120	195	180	105	105	—	188
Hay, lb DM	1645	—	—	1500	1500	—	—
Harvested residue, lb DM	—	—	—	—	2600	2738	1674
Distillers grains, lb DM	45	240	240	—	1100	4106	2961
WW, lb	521	557	504	500	502	486	580

[1]Gudmundsen Sandhills Laboratory March, June and August calving systems.
[2]Dalbey-Halleck system.
[3]Dalbey-Halleck system with half of summer grazing replaced with supplement.
[4]Intensive management system (year-round drylot confinement).
[5]Intensive management system with fall/winter cornstalk grazing.
[6]Includes days assigned to calves.

Table 2. Base prices for economic analysis.

Grass, $/pair/day	1.33
Cornstalk grazing, $/cow/day	0.60
Distillers grains[1], $/lb DM	0.11
Hay[2], $/lb DM	0.08
Baled residue[3], $/lb DM	0.05
Mineral/salt, $/cow/year	10.00
Labor/yardage, $/head/day	0.10
Cow ownership and management, $/cow/year	250.00

[1]115% of $4.50/bu corn plus delivery.
[2]$130/ton hay at 90% DM plus delivery.
[3]$67/ton residue at 90% DM plus delivery and grinding.

Table 3. Unit cost of production (calf breakeven sale price; $/lb) at several input price scenarios by cow-calf system.

	GSL MA	GSL JU	GSL AU	DH	DH SUPP	INT	INTSG
Base prices	1.50	1.42	1.55	1.55	1.80	2.19	1.65
Grass[1], $50	1.62	1.56	1.70	1.70	1.88	2.19	1.65
Grass[2], $72	1.89	1.85	2.03	2.00	2.03	2.19	1.65
Distillers[3], 100	1.50	1.41	1.54	1.55	1.77	2.07	1.58
Distillers[4], 85	1.49	1.40	1.53	1.55	1.74	1.94	1.50
Stalks[5], 0.35	1.44	1.33	1.45	1.50	1.75	2.19	1.57

[1]Grass at $50/pair/month.
[2]Grass at $72/pair/month.
[3]Distillers grains at 100% of $4.50/bu corn.
[4]Distillers grains at 85% of $4.50/bu corn.
[5]Grazed cornstalks at $0.35/cow/day.

Results

In the conventional systems (GSL-MA, GSL-JU, GSL-AU, DH), UCOP ranged from $1.42 to $1.55/lb of calf at weaning under base prices (Table 3). The June calving Sandhills system had the lowest UCOP largely because calves are older and heavier at weaning, no hay was fed, and cows grazed cornstalks for about five months. The GSL-AU and DH systems had the highest UCOP ($1.55/lb of calf at weaning), and the Sandhills March calving system was intermediate. However, the differences among these systems are small and given our assumptions may not be different. At the assumed base prices, UCOP for all conventional systems is less than all alternative systems. The year-round INT system had clearly the highest UCOP of all systems at $2.19/lb of calf at weaning. Although the current projected price of feeder cattle is high,

this system appears to be the least economical. The proposed INTSG system appears to be more competitive with traditional systems mostly because cornstalk grazing is a more economical feed resource.

Our base pasture price of $1.33/pair/day represents a statewide reported average by the University of Nebraska–Lincoln Department of Agricultural Economics. As the price of pasture increases relative to other feed costs, UCOP for all conventional systems increase. Interestingly, UCOP for the alternative DH-SUPP system also increases, but to a lesser extent than the conventional systems because half of the grazed forage is replaced with a distillers and crop residue supplement. When the price of pasture is over $2.40/pair/day, alternative DH-SUPP and INTSG systems that rely less on summer grass appear to be economically viable.

The price of distillers grains, and any other feedstuff used as a protein and energy source, is a critical factor in the cost of alternative systems. Distillers grains and other commodities tend to follow corn price. As the price of distillers grains decreases from 115 to 100 or 85% of $4.50/bu corn, UCOP for conventional systems utilizing less distillers grains remain relatively unchanged while UCOP for alternative systems decrease more rapidly. This demonstrates that the potential profitability for alternative systems appears to be strongly related to the price of distillers grains. Cornstalk grazing represents an economical resource, and given the abundance of residue in Nebraska, it should remain cost effective. However, several factors including winter weather and the proximity of cattle to cornfields can influence this. While the beef cattle industry is challenged by diminishing traditional forage resources, there is an increasing supply of corn residue for use in alternative systems. Feeding cows in an intensive management or confinement system year-round does not appear to be competitive with conventional systems. A proposed alternative system of summer drylot with fall/winter cornstalk grazing appears to be economical when grass prices are elevated and cornstalk grazing is available.

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