Economics of a Stockpiled Bermuda grass Grazing System

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Story in Brief

Harvested forage costs are a large part of the productions costs associated with cow-calf enterprises. Our objective was to economically evaluate three different 100-d feeding programs including stockpiled Bermuda grass (SB), stockpiled native tall grass prairie (TGP), and Bermuda grass hay (HAY) for sensitivity to various environmental and managerial inputs. Inputs such as harvest efficiency, stocking density, N fertilization and supplemental feed type and amount were taken from previous research by our group. All systems were assumed to achieve similar animal performance and HAY was assumed to provide adequate nutrients when fed alone. When compared with the SB system, cost/cow was 8 and 45% higher for TGP and HAY, respectively. The SB system was most sensitive to changes in hay price, forage accumulation, and harvest efficiency when compared with the HAY system. During periods of low hay prices, growing conditions for SB must approach ideal. In contrast, during times of high hay prices, SB can be more economically efficient, even under suboptimal growing conditions.

Key Words: Stockpiled Forage, Costs, Bermuda grass

Introduction

Grazing and feed costs make up approximately 40% of the total cost of production in a cow/calf operation. Recent financial data indicates that the most profitable 25% of cow/calf operations spend $66 less per year on grazing and feed costs, compared to the least profitable 25% operations. Furthermore, harvested forage costs can account for 18 to 24% of the total cost per weaned calf (Adams et al. 1994). More dependence on the cow, rather than machines to harvest forage is one method to reduce winter feed costs. Stockpiled forage systems offer the opportunity to extend the grazing season and reduce reliance on harvested forage. Stockpiling forage for fall and (or) winter grazing has been practiced most extensively with the mixed native warm-season prairie grasses and fescue. The feasibility of using stockpiled Bermuda grass deserves additional research to determine the potential of this practice to reduce winter feeding costs. Our objective was to evaluate wintering costs for three fall/winter forage systems and to determine the most sensitive factors in a stockpiled Bermuda grass system that influence cow wintering cost.

Materials and Methods

Over a 2-yr period, animal performance was determined for mature beef cows grazing stockpiled Bermuda grass (SB) or stockpiled native tall grass prairie (TGP) during fall and early winter. In each of 2-yr, spring-calving beef cows grazed SB or TGP from late October through early February. Bermuda grass pastures were grazed or clipped during late August to remove existing forage and 50 lb of N/ac was applied. Grazing in TGP pastures was completely deferred from February through October. Cows grazing TGP were continuously grazed and received 2 lb daily of a 38% protein supplement. Cows grazing SB pasture were given sequential access to fresh forage at weekly intervals by moving a temporary fence. Cows grazing the SB pasture received 2 lb daily of a 25% protein supplement. Set stocking rate was .49 animal units (AU)/ac for native pasture and variable stocking rate was .64±.1 AU/ac for Bermuda grass pasture. Harvest efficiency for SB pasture was 62.1±1.9%. Weight change and body condition score change did not differ (P>.1) among pasture types.

Economic simulation and sensitivity analyses were conducted comparing three 100-d systems: SB, TGP and Bermuda grass hay (HAY). All systems were assumed to achieve equal animal performance and hay was assumed to provide adequate protein and energy (when fed alone) to meet animal requirements. Harvest efficiency, stocking density, N fertilization and supplemental feed type and amount were taken from those observed in the experiment described above. Average fall forage availability (2,756 lb/ac) was taken from Wheeler et al. (1998, 1999) and Johnson et al. (2001), representing three consecutive years of forage data from two locations each year. Pasture rental costs, N fertilizer price, hay price, and feed prices were consistent with fall 1999 and winter 2000 costs in central Oklahoma (NASS, 2000). Native pasture annual rental rate was $10/ac and it was assumed that this entire cost was associated with the 100 d wintering period. Bermuda grass pasture rental rate was $18/ac annually and rental costs were allocated to 120 d of summer grazing and 100 d of fall and winter grazing (October 24 through February 1). Total cost for the stockpiled Bermuda grass pasture was $20.18/ac for the winter grazing phase. Medium protein supplement (25% CP) was priced at $130/ton and the supplemental feeding period was 70 d. Native pasture rent was $10/ac with an annual stocking rate of 10 ac/cow. High protein supplement (38% CP) was priced at $170/ton and the supplemental feeding period was 75 d. Hay feeding waste was 15% of DMI and hay was valued at $50/ton.

Sensitivity of input variables for the SB system was determined by changing one variable, while holding all other variables constant, until the total cost for the 100-d period equaled that of the hay system. Sensitivity was considered to be the difference in percentage of change for each input variable required to reach the cost of the hay system.

Results and Discussion

Because weight and body condition did not differ among pasture types, it was assumed that the wintering systems would produce equal calf weaning weight and pregnancy rate for the purpose of economic analysis. Total feed and forage costs/cow for the 100-d period were $39.61, $42.80 and $71.88 for SB, TGP and HAY, respectively.

The SB system was most sensitive to changes in hay price, forage production, and harvest efficiency (Table 1). In other words, if the price of hay declined by 46% from $50 to $27/ton, with all other prices and production coefficients unchanged, the cost of the hay system would be equal to the cost of the SB system. Similarly, pasture rental costs for the fall and winter period could increase 261% from the budgeted $8.10/ac to $29.24/ac before the HAY system would be more economical than the SB system.

Table 1. Percentage of change to equalize stockpiled Bermuda grass and hay feeding systems for various traits of economic importance

Trait	Base value[a]	Percent[b]	SB equivalent[c]

Hay price	$50/ton	46	$27/ton
Forage production	2,756 lb/ac	51	1,350 lb/ac
Harvest efficiency	60%	51	29%
Nitrogen fertilizer	$.24/lb	179	$.43/lb
Fall and winter pasture rental	$18/ac	261	$47/ac
Days of supplemental feeding	70 d	354	248 d
Amount of supplement fed daily	2 lb/d	355	7 lb/d
Supplement feed price	$130/ton	355	$462/ton

[a]Base values assumed for each input variable.

[b]Percentage of change for each input variable in the stockpiled Bermuda grass winter feeding system required to equal the cost of the Bermuda grass hay feeding system.

[c]Value of each input variable required to equalize the cost of the stockpiled Bermuda grass and the hay feeding system. Each variable was changed independently, while all others were set to the baseline value.

Since hay prices and forage accumulation were the most sensitive input variables, a second sensitivity analysis was conducted to determine the influence of varying hay prices and forage accumulation on the difference in cost of these two systems over a 100-d period (Table 2). In this analysis, it was assumed that 1,160 lb biomass/ac was available at the initiation of fall grazing when no fertilizer was applied (714 lb available on September 1 and 446 lb produced through October 24) and that stockpiled Bermuda grass pastures were grazed to a constant 892 lb/ac biomass residual (harvest efficiency varied with level of biomass accumulation). All other variables used in the analysis were as described in the previous analysis. This data demonstrates that N fertilization reduces the cost of the stockpiling system because fewer acres are required per animal, and that this effect is magnified with higher forage response to N fertilization (more optimal growing conditions during the stockpiling period). In the presence of low hay prices, growing conditions must be near ideal to achieve significant savings. Alternatively, in the presence of high hay prices, considerable savings can be achieved by grazing stockpiled forage compared to feeding hay, even in the presence of limiting climatic conditions.

Table 2. Difference in cost of stockpiled Bermuda grass system and hay feeding system at various hay prices and fall forage availabilities ($/cow)[a]

Forage availability, lb/ac [b]	Hay price, $/ton				
	30	40	50	60	70
0 lb N/ac					
1,160	-42.30	-27.92	-13.55	.83	15.20
50 lb N/ac					
1,660	-31.76	-17.38	-3.01	11.37	25.74
2,160	-5.8	8.58	22.95	37.33	51.70
2,660	5.46	19.83	34.21	48.58	62.96
3,160	11.76	26.13	40.51	54.88	69.26

[a]Values in the table were calculated as cost of hay feeding system minus cost of stockpiled Bermuda grass wintering system, each for 100-d periods.

[b]Forage availability was determined assuming 714 lb/ac residual forage at initiation of stockpiling period and 446 lb/ac accumulation with 0 lb N/ac fertilizer applied in late summer. Remaining values in the range were calculated by using 10, 20, 30, and 40 lb biomass accumulation/lb N fertilizer applied and adding to the forage available when

0 lb N/ac was applied (1,160 lb/ac).

Implications

Stockpiling Bermuda grass forage for fall and winter grazing has the potential to reduce cow-calf production costs. The cost of a stockpiled native tall grass prairie grazing system was similar to that of the stockpiled Bermuda grass system. The stockpiled systems cost 43% less compared to the hay feeding system. However, the costs associated with the stockpiled Bermuda grass system are very sensitive to forage accumulation during the stockpiling period, forage utilization and the cost of hay.

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