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1089 State Avenue
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Pasture Costs-Returns of Grazing Management Strategies for Range Cows and Calves during the Lactation Production Period

Llewellyn L. Manske PhD
Range Scientist

North Dakota State University
Dickinson Research Extension Center

Introduction

The beef production industry in the Northern Plains has a low profit margin. A logical response to this situation is the scientific evaluation of management-practice effectiveness in reducing production costs by reducing pasture and forage costs, which constitute the greatest portion of the total annual production costs for a beef cow and calf. Because the daily requirements for cows differ with production period, proper evaluation of management strategies requires two steps: evaluation of pasture and forage costs related to each production period and evaluation of the management strategies for livestock production periods as components within a complete 12-month pasture-forage management system. Achieving reductions in livestock production costs for range cows during the lactation production period requires knowledge of the biological processes of grass plants and of grassland ecosystems and an understanding of the production costs of common traditional practices and the costs of alternative management practices. The most biologically effective pasture management strategy will have the lowest production costs.

An effective grazing management strategy for the Northern Plains must meet the biological requirements of the plants, facilitate the functioning of ecological processes at potential levels, and counterbalance problematic biological conditions inherent in the grassland ecosystems. The grazing management strategy producing the most biological advantages and the fewest biological disadvantages is the most biologically effective. Evaluating the success of a grazing management strategy is difficult because numerous complex interrelated factors of plant growth and livestock performance are involved. However, since cost per pound of accumulated calf weight is the culmination of a grazing management strategy's positive and negative effects on grass plant and livestock performance, this value functions as a reliable indicator of a grazing strategy's overall effectiveness.

Grazing management practices affect plant biological mechanisms and rates of ecological processes, and, in turn, the quantity and quality of herbage produced. These factors of herbage production affect the cow-calf weight performance quantified as stocking rates, total acres allotted per cow-calf pair, average daily gain, and gain per acre. Differences in livestock performance among grazing management treatments are reflected in total pasture costs per cow-calf pair, gross value of the accumulated weight per calf, and net return per cow-calf pair and per acre when pasture rent value and calf weight economic value are the same for all treatments. Total pasture costs and calf weight gain determine cost per pound of accumulated calf weight. In this report, cow performance, calf performance, and cost per pound of accumulated calf weight are compared to evaluate the relative effectiveness of grazing management strategies. The management strategy costs evaluated during this study were pasture rent per acre, production costs per acre, costs per unit of forage dry matter, costs per unit of nutrient, land area per animal unit, and forage feed costs per day or per month. The management strategies are identified by the type of grazing system used during the native rangeland period: 6.0-month seasonlong, 4.5-month seasonlong, 4.0-month deferred, and 4.5-month twice-over rotation.

Procedure

This study was conducted at the NDSU Dickinson Research Extension Center, located in western North Dakota. Average annual precipitation is 16.0 inches, with 13.6 inches (84.6%) falling as rain between April and October. Mean annual temperature is 40.7^{o}F. January is the coldest month, with a mean temperature of 10.9^{o}F. July and August are the warmest months, with mean temperatures of 68.6^{o}F and 66.9^{o}F, respectively. The native rangeland vegetation is the Wheatgrass-Needlegrass Type (Barker and Whitman 1988) of the mixed grass prairie. The dominant native range species are western wheatgrass, needle and thread, blue grama, and threadleaved sedge. Crested wheatgrass and Altai wildrye pastures were seeded as monocultures, but a small assortment of forb and other grass species developed as minor components.

Commercial Angus-Hereford cows with Charolais-sired calves were allocated to treatments each spring on the basis of cow age and calf age and sex. The average calf birth date was 16 March, and the average birth weight was 95 pounds. Individual animals were weighed on and off each treatment, at 15-day intervals during the early portion of the season, and at 30-day intervals during the later portion of the season. Weight performance of cows and of calves was calculated for each treatment, and differences between means were analyzed by a standard paired plot t-test (Mosteller and Rourke 1973). Pasture rent values used were the mean of reported rent paid in the 15 counties of southwestern North Dakota: rent per acre was $8.76 for native rangeland and domesticated grass pastures. One treatment of crested wheatgrass was fertilized annually with 50 pounds of nitrogen per acre, at an average cost of $12.50 per acre. An assumed price of $0.70 per pound was used to determine the economic value of calf accumulated weight.

Pasture and forage costs of feed to meet livestock dry matter and crude protein requirements were determined during this study. Production costs per acre were determined from the average land rent per acre. Costs per ton of forage dry matter (DM) were determined by dividing production costs per acre by pounds of forage dry matter yield per acre and multiplying the quotient by 2000 pounds. Costs per pound of crude protein (CP) were determined in two stages: first, pounds of forage dry matter per acre were multiplied by percentage of

forage crude protein to derive pounds of crude protein per acre; then, production costs per acre were divided by pounds of crude protein per acre. Pasture land area per animal unit per month was determined in two stages: first, pounds of forage dry matter per acre were divided by pounds of forage dry matter required per animal unit per day to derive number of grazing days per acre; then, the average number of days per month was divided by the number of grazing days per acre. Harvested-forage land area per animal unit per month or per production period was determined in two stages: first, pounds of crude protein required per animal per day during a production period were divided by percentage of crude protein of forage type to derive pounds of forage dry matter to provide as feed per animal unit per day; then, pounds of forage dry matter to feed per day were divided by pounds of forage dry matter per acre, and the quotient was multiplied by 30 days per month, 30.5 days per month, or the number of days per production period. Forage feed costs per animal per day, per month, or per production period were determined in three stages: first, production costs per acre were divided by pounds of forage dry matter per acre, and that quotient was divided by percentage of forage crude protein to derive cost per pound of crude protein; next, the cost per pound of crude protein was multiplied by pounds of crude protein required per animal per day during a production period; then, the feed costs per day were multiplied by 30 days per month, 30.5 days per month, or the number of days per production period. Costs per pound of calf weight gain were determined in two stages: first, accumulated calf weight gain was determined by subtracting calf live weight at the beginning of a growth period from calf live weight at the end of a growth period; then, total pasture costs or forage production costs for a calf growth period were divided by the accumulated calf weight for the growth period.

Grazing Treatments

The grazing portion of the 6.0-month seasonlong (6.0M SL) management strategy started on 16 May. Livestock were moved to a single native range pasture stocked at 0.25 animal unit months (AUMs)/acre. Livestock grazed on the pasture for 183 days, until 15 November, when the calves were weaned.

The grazing portion of the 4.5-month seasonlong (4.5M SL) management strategy started on 1 May. For the first 46 days livestock grazed an unfertilized crested wheatgrass pasture stocked at 0.55 AUMs/acre. On 15 June livestock were moved to one native range pasture stocked at 0.35 AUMs/acre. Livestock grazed on this pasture for 137 days, until 30 October, when the calves were weaned.

The grazing portion of the 4.0-month deferred (4.0M Def) management strategy started on 1 May. For the first 76 days livestock grazed an unfertilized crested wheatgrass pasture stocked at 0.60 AUMs/acre. On 15 July the livestock were moved to one native range pasture stocked at 0.45 AUMs/acre. Livestock grazed on this pasture for 122 days, until 15 November, when the calves were weaned.

The grazing portion of the 4.5-month twice-over rotation (4.5M TOR) management strategy started on 1 May. For the first 31 days livestock grazed a fertilized (50 lbs N/acre on 1 April) crested wheatgrass pasture stocked at 1.33 AUMs/acre. The livestock were then moved to one of three native range pastures stocked at 0.49 AUMs/acre. Livestock remained on native range for 137 days, grazing each pasture for two periods, one 15-day period between 1 June and 15 July (when lead tillers of grasses were between the third-leaf stage and flowering stage) and one 30-day period after 15 July (after secondary tillers of grasses reached the third-leaf stage) and prior to mid October. The first pasture grazed in the sequence was the last pasture grazed the previous year. On 15 October the livestock were moved to an Altai wildrye pasture stocked at 0.72 AUMs/acre. Livestock grazed on this pasture for 30 days, until 15 November, when the calves were

weaned.

Results

Native Rangeland

Cow and calf weight performance generally did not differ among native range treatments during the early grazing period of June and July, but during the later portion of the grazing period, after early August, animal weight performance was greater on the twice-over rotation treatment than on the seasonlong and deferred treatments.

Cow average daily gain on the seasonlong and deferred treatments steadily decreased as the grazing period progressed. Cows gained weight during the early portion of the grazing period but lost weight during the later portion. Weight loss during the later portion of the grazing season occurred at a greater rate on the deferred treatment. Cows on the twice-over rotation treatment gained weight at a greater rate than did cows on the seasonlong and deferred treatments. Cows on the twice-over rotation treatment gained weight during the early and middle portions of the grazing period and lost a small amount of weight at the end of the grazing period. Cow daily gain, accumulated weight, and gain per acre were greater on the twice-over rotation treatment than on the seasonlong and deferred treatments.

The greatest differences in calf performance on the native range treatments occurred during the later portions of the grazing period. Calf average daily gain on the seasonlong and deferred treatments decreased as the grazing season progressed. The decrease in calf average daily gain was greater on the deferred treatment than on the 4.5-month seasonlong treatment. Calf accumulated weight was greater on the 4.5-month seasonlong treatment than on the deferred treatment. The decrease in calf daily gain during the later portion of the grazing period was smaller on the twice-over rotation treatment than on the seasonlong and deferred treatments. Calf accumulated weight gain was greater on the twice-over rotation treatment than on the 4.5-month seasonlong and deferred treatments.

Crested Wheatgrass

Cow and calf performance was strong on unfertilized crested wheatgrass during May and June but decreased considerably when grazing continued until mid July. Fertilization on crested wheatgrass pastures during the first week of April increased the amount of herbage produced but shortened by several weeks the period during which livestock performed well. Weight performance for cows and calves during May and early June was greater on fertilized crested wheatgrass pastures than on unfertilized pastures, but livestock performance on fertilized crested wheatgrass pastures decreased earlier, in mid June.

Altai Wildrye

Cow and calf weight performance on Altai wildrye pastures between mid October and mid November was favorable, but not as impressive as livestock weight performance on fertilized crested wheatgrass during May. Weight gains of cows and calves grazing Altai wildrye were considerably greater than those of livestock grazing native range or crop aftermath during the same period. Lactating cows on 6.0-month

seasonlong and deferred native range grazing treatments and on crop aftermath treatments of annual cereal stubble lost weight during the period between mid October and mid November, and calves with those cows gained little weight.

Calf performance and cow performance on grazing management strategies are shown in tables 1 and 2, respectively. Pasture costs and returns for grazing management strategies are shown in table 3. Costs per pound of calf weight gain are shown in table 3. Pasture and forage costs of pasture management strategies for range cows during the lactation production period are shown in table 4.

6.0-Month Seasonlong

The native range period of the 6.0-month seasonlong treatment was 183 days. Cow weight gain was 0.12 lbs per day and 0.91 lbs per acre; accumulated weight gain was 21.96 lbs. Calf weight gain was 1.80 lbs per day and 13.59 lbs per acre; accumulated weight gain was 329.40 lbs. Each cow-calf pair was allotted 24.24 acres, at a cost of $212.34. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $230.58 per calf, and the net returns after pasture costs were $18.24 per cow-calf pair and $0.75 per acre. Grazing for 6.0 months on the 6.0-month seasonlong strategy, a lactating cow and her calf used 4.04 acres per month, at a cost of $1.16 per day, or $34.86 per month. Each accumulated pound of calf weight cost $0.64 on the 6.0-month seasonlong strategy.

4.5-Month Seasonlong

The native range period of the 4.5-month seasonlong treatment was 137 days. Cow weight gain was 0.34 lbs per day and 3.67 lbs per acre; accumulated weight gain was 46.58 lbs. Calf weight gain was 2.09 lbs per day and 22.55 lbs per acre; accumulated weight gain was 286.33 lbs. Each cow-calf pair was allotted 12.70 acres, at a cost of $111.25. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $200.43 per calf, and the net returns after pasture costs were $89.18 per cow-calf pair and $7.02 per acre on native range. The spring crested wheatgrass complementary pasture period was 46 days. Cow accumulated weight gain was 89.70 lbs. Calf accumulated weight gain was 87.86 lbs and cost $23.92 per calf. The combined pasture-forage types for the entire 4.5-month seasonlong strategy yielded an accumulated cow weight gain of 136.28 lbs and an accumulated calf weight gain of 374.19 lbs on 15.43 acres in 183 days, at a cost of $135.17 per cow-calf pair. When calf accumulated weight was assumed to have a value of $0.70 per pound, the net returns after pasture costs were $126.76 per cow-calf pair and $8.22 per acre for all portions of the grazing season. Grazing for 6.0 months on the 4.5-month seasonlong strategy, a lactating cow and her calf used 2.57 acres per month, at a cost of $0.74 per day, or $22.16 per month. Each accumulated pound of calf weight cost $0.36 on the 4.5-month seasonlong strategy.

4.0-Month Deferred

The native range period of the 4.0-month deferred treatment was 122 days. Cow weight gain was 0.32 lbs per day and 4.40 lbs per acre; accumulated weight gain was 39.04 lbs. Calf weight gain was 1.80 lbs per day and 24.73 lbs per acre; accumulated weight gain was 219.60 lbs. Each cow-calf pair was allotted 8.88 acres, at a cost of $77.79. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $153.72 per calf, and the net returns after pasture costs were $75.93 per cow-calf pair and $8.55 per acre on native range. The spring crested wheatgrass complementary pasture period was 76 days. Cow accumulated weight gain was

69.16 lbs. Calf accumulated weight was 136.04 lbs and cost $36.44 per calf. The combined pasture-forage types for the entire 4.0-month deferred strategy yielded an accumulated cow weight gain of 108.20 lbs and an accumulated calf weight gain of 355.64 lbs on 13.04 acres in 198 days, at a cost of $114.23 per cow-calf pair. When calf accumulated weight was assumed to have a value of $0.70 per pound, the net returns after pasture costs were $134.72 per cow-calf pair and $10.33 per acre for all portions of the grazing season. Grazing for 6.5 months on the 4.0-month deferred strategy, a lactating cow and her calf used 2.01 acres per month, at a cost of $0.58 per day, or $17.31 per month. Each accumulated pound of calf weight cost $0.32 on the 4.0-month deferred strategy.

4.5-Month Twice-Over Rotation

The native range period of the 4.5-month twice-over rotation treatment was 137 days. Cow weight gain was 0.62 lbs per day and 9.44 lbs per acre; accumulated weight gain was 84.94 lbs. Calf weight gain was 2.21 lbs per day and 33.64 lbs per acre; accumulated weight gain was 302.77 lbs. Each cow-calf pair was allotted 9.00 acres, at a cost of $78.84. When calf accumulated weight was assumed to have a value of $0.70 per pound, the gross return was $211.94 per calf, and the net returns after pasture costs were $133.10 per cow-calf pair and $14.79 per acre on native range. The spring crested wheatgrass complementary pasture period was 31 days. Cow accumulated weight gain was 83.08 lbs. Calf accumulated weight was 67.58 lbs and cost $15.95 per calf. The fall Altai wildrye complementary pasture period was 30 days. Cow accumulated weight was 16.50 lbs. Calf accumulated weight was 52.77 lbs and cost $12.18 per calf. The combined pasture-forage types for the entire 4.5-month twice-over rotation strategy yielded an accumulated cow weight gain of 184.52 lbs and an accumulated calf weight gain of 423.12 lbs on 11.14 acres in 198 days, at a cost of $106.97 per cow-calf pair. When calf accumulated weight was assumed to have a value of $0.70 per pound, the net returns after pasture costs were $189.21 per cow-calf pair and $16.98 per acre for all portions of the grazing season. Grazing for 6.5 months on the 4.5-month twice-over rotation strategy, a lactating cow and her calf used 1.72 acres per month, at a cost of $0.54 per day, or $16.21 per month. Each accumulated pound of calf weight cost $0.25 on the 4.5-month twice-over rotation strategy.

The results from the study show that cows and calves do not gain weight at the same rate during the entire grazing season and that different grazing treatments cause differences in cow and calf weight performance. The cost per pound of accumulated calf weight was $0.64, $0.36, $0.32, and $0.25 on the 6.0-month seasonlong, 4.5-month seasonlong, 4.0-month deferred, and 4.5-month twice-over rotation strategies, respectively. The 4.5-month twice-over management strategy had the lowest cost per pound of accumulated calf weight, at 61%, 31%, and 22% lower than the cost per pound on the 6.0M SL, 4.5M SL, and 4.0M Def strategies, respectively. The twice-over rotation treatment is the most biologically effective grazing management strategy. Implementation of a biologically effective grazing management strategy reduces annual pasture costs, reduces cost per pound of accumulated calf weight, and improves net returns after pasture costs per cow-calf pair and per acre.

Discussion

The twice-over rotation grazing management system on native rangeland with complementary domesticated grass spring and fall pastures was developed specifically for the Northern Plains. The use of complementary domesticated grass spring and fall pastures extends the grazing season both early and late by exploiting the biological growth characteristics of the perennial grasses that grow well in the region.

The twice-over management strategy coordinates grazing on crested wheatgrass, native rangeland, and Altai wildrye pastures so that the nutritional quality of the various forage types and the nutritional requirements of the livestock match over the entire grazing season; this coordination of nutrient supply and demand improves individual animal performance.

The number of sets of tillers developed by native grasses each year determines the number of times each pasture in a rotation system can be grazed. Two sets of tillers can be developed annually by grasses in the Northern Plains when the grass plants are properly manipulated. This production of two sets of tillers permits two rotation grazing periods in each of three to six native range pastures of the twice-over rotation grazing management system. The twice-over rotation system on native rangeland is biologically effective because grazing periods are coordinated with grass growth stages and a small amount of leaf material is removed between the third-leaf stage and the flowering stage. This timed defoliation activates secondary tiller development from axillary buds, activates plant physiological mechanisms, and stimulates rhizosphere organism activity that increases nutrient flow and plant growth (Manske 1999): the result is increased plant basal cover, increased aboveground herbage biomass, and improved nutritional quality of herbage. The increases in herbage quantity and quality permit increased stocking rates, reduced acreage required to carry a cow-calf pair for the season, increased total accumulated weight gain, reduced cost per pound of accumulated calf weight, increased net return after pasture costs per cow-calf pair, and increased net return after pasture costs per acre (Manske et al. 1988, Manske 1994, Manske 1996).

The twice-over management strategy does not start grazing on any forage type until the grass plants have reached the third-leaf stage because grazing before grass is ready affects plant biological processes negatively and in turn reduces herbage biomass production (Manske 2000). Delaying grazing on native rangeland until grass plants have reached the third-leaf stage, in early June, requires the use of another forage type for earlier grazing. Some domesticated perennial cool-season grasses reach the third-leaf stage three to five weeks earlier than native cool-season grasses and are dependable as spring pastures from early May until early June. Crested wheatgrass is an excellent early season spring pasture forage. The start of the grazing season on domesticated grass pastures is restricted to very late April or early May, because no perennial grass in the Northern Plains reaches the third-leaf stage before late April.

Manipulation of secondary tiller growth of grasses on native rangeland can improve livestock performance for two to two and a half months, until late September or mid October, but the biology of native grass plants does not permit extending this improved performance longer. Nutritional quality of herbage on native rangeland grazed after mid October is below the requirements of lactating cows. Forages that meet the nutritional requirements of lactating cows after mid October include Altai and Russian wildryes. The wildryes are excellent fall pastures because they retain nutrient quality in the aboveground portions of the plant until about mid November, much later than other types of perennial grasses, which translocate aboveground cell components relatively early in the grazing season. No perennial grass in the Northern Plains retains sufficient nutritional quality to dependably meet the nutritional requirements of lactating cows later than mid November.

In addition to improving livestock performance, the enhanced performance of native grass plants on the twice-over rotation grazing management system strengthens ecosystem health. The increase in basal cover and herbage biomass reduces the number and size of bare soil areas and increases the quantity of residual vegetation. These changes in the grassland ecosystem produce conditions favorable to the limitation of grasshopper pest species populations (Manske and Onsager 1998, Onsager 2000, Belovsky et al. 2000). The increased

plant density, herbage production, and residual vegetation, and the stronger ecosystem health conditions improve the grassland habitat for prairie grouse, ducks, waterfowl, and ground nesting birds (Manske and Barker 1988, Manske et al. 1988).

The low cost per pound of accumulated calf weight on the twice-over rotation grazing management strategy reflects the combined biological advantages and disadvantages of the strategy and demonstrates that it is biologically effective. The beneficial effects of improved vegetation condition, livestock performance, wildlife habitat, and grasshopper population reduction show that the twice-over rotation grazing management strategy can be successfully implemented in the Northern Plains region.

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Tables and Graphs

Table 1. Calf performance on grazing management strategies in the Northern Plains.

		6.0M Seasonlong	4.5M Seasonlong	4.0M Deferred	4.5M Twice-over Rotation
Crested Wheatgrass					
Length of Period	(days)	0.0	46.0	76.0	31.0
Acres/Month	(ac)	-	1.82	1.67	0.75
Acres/Period	(ac)	-	2.73	4.16	0.75
Calf ADG	(lbs)	-	1.91	1.79	2.18
Calf Gain/Acre	(lbs)	-	32.18	32.70	90.11
Calf Gain/Period	(lbs)	-	87.86	136.04	67.58

Native Rangeland					
Length of Period	(days)	183.0	137.0	122.0	137.0
Acres/Month	(ac)	4.04	2.86	2.22	2.04
Acres/Period	(ac)	24.24	12.70	8.88	9.00
Calf ADG	(lbs)	1.80	2.09	1.80	2.21
Calf Gain/Acre	(lbs)	13.59	22.55	24.73	33.64
Calf Gain/Period	(lbs)	329.40	286.33	219.60	302.77
Altai Wildrye					
Length of Period	(days)	0.0	0.0	0.0	30.0
Acres/Month	(ac)	-	-	-	1.39
Acres/Period	(ac)	-	-	-	1.39
Calf ADG	(lbs)	-	-	-	1.73
Calf Gain/Acre	(lbs)	-	-	-	37.96
Calf Gain/Period	(lbs)	-	-	-	52.77
Entire Strategy					
Length of Season	(days)	183.0	183.0	198.0	198.0
Weaning Weight	(lbs)	540.30	556.59	538.04	605.52
Weight/Day of Age	(lbs)	2.21	2.43	2.20	2.48
Acres/Season	(ac)	24.24	15.43	13.04	11.14
Calf ADG	(lbs)	1.80	2.04	1.80	2.14
Calf Gain/Acre	(lbs)	13.59	24.25	27.27	37.98
Calf Gain/Season	(lbs)	329.40	374.19	355.64	423.12

Table 2. Cow performance on grazing management strategies in the Northern Plains.

	6.0M Seasonlong	**4.5M Seasonlong**	**4.0M Deferred**	**4.5M Twice-over Rotation**

Crested Wheatgrass					
Length of Period	(days)	0.0	46.0	76.0	31.0
Acres/Month	(ac)	-	1.82	1.67	0.75
Acres/Period	(ac)	-	2.73	4.16	0.75
Cow ADG	(lbs)	-	1.95	0.91	2.68
Cow Gain/Acre	(lbs)	-	32.86	16.63	110.77
Cow Gain/Period	(lbs)	-	89.70	69.16	83.08
Native Rangeland					
Length of Period	(days)	183.0	137.0	122.0	137.0
Acres/Month	(ac)	4.04	2.86	2.22	2.04
Acres/Period	(ac)	24.24	12.70	8.88	9.00
Cow ADG	(lbs)	0.12	0.34	0.32	0.62
Cow Gain/Acre	(lbs)	0.91	3.67	4.40	9.44
Cow Gain/Period	(lbs)	21.96	46.58	39.04	84.94
Altai Wildrye					
Length of Period	(days)	0.0	0.0	0.0	30.0
Acres/Month	(ac)	-	-	-	1.39
Acres/Period	(ac)	-	-	-	1.39
Cow ADG	(lbs)	-	-	-	0.55
Cow Gain/Acre	(lbs)	-	-	-	11.87
Cow Gain/Period	(lbs)	-	-	-	16.50
Entire Strategy					
Length of Season	(days)	183.0	183.0	198.0	198.0
Acres/Season	(ac)	24.24	15.43	13.04	11.14
Cow ADG	(lbs)	0.12	0.74	0.55	0.93
Cow Gain/Acre	(lbs)	0.91	8.83	8.30	16.56
Cow Gain/Season	(lbs)	21.96	136.28	108.20	184.52

Table 3. Costs and returns for grazing management strategies in the Northern Plains.

		6.0M Seasonlong	4.5M Seasonlong	4.0M Deferred	4.5M Twice-over Rotation
Crested Wheatgrass					
Pasture Costs @ $8.76/ac	$		23.92	36.44	15.95
Accumulated Calf Wt.	lbs		87.86	136.04	67.58
Weight Value @ $0.70/lb	$		61.50	95.23	47.31
Net Return/c-c pr	$		37.58	58.78	31.36
Net Return/acre	$		13.77	14.13	41.82
Cost/lb of Calf Gain	$		0.27	0.27	0.24
Native Rangeland					
Pasture Costs @ $8.76/ac	$	212.34	111.25	77.79	78.84
Accumulated Calf Wt.	lbs	329.40	286.33	219.60	302.77
Weight Value @ $0.70/lb	$	230.58	200.43	153.72	211.94
Net Return/c-c pr	$	18.24	89.18	75.93	133.10
Net Return/acre	$	0.75	7.02	8.55	14.79
Cost/lb of Calf Gain	$	0.64	0.39	0.35	0.26
Altai Wildrye					
Pasture Costs @ $8.76/ac	$				12.18
Accumulated Calf Wt.	lbs				52.77
Weight Value @ $0.70/lb	$				36.94
Net Return/c-c pr	$				24.76
Net Return/acre	$				17.81
Cost/lb of Calf Gain	$				0.23
Entire Strategy					
Pasture Costs @ $8.76/ac	$	212.34	135.17	114.23	106.97
Accumulated Calf Wt.	lbs	329.40	374.19	355.64	423.12

Weight Value @ $0.70/lb	$	230.58	261.93	248.95	296.18
Net Return/c-c pr	$	18.24	126.76	134.72	189.21
Net Return/acre	$	0.75	8.22	10.33	16.98
Cost/lb of Calf Gain	$	0.64	0.36	0.32	0.25

Table 4. Pasture and forage costs of pasture management strategies for range cows with calves during the lactation production period.

	Production Costs $/ac	Forage Dry Matter Costs $/ton	Crude Protein Costs $/lb	Land Area per month ac	Feed Costs per day $	Feed Costs per month $	Cost/lb Calf Gain $
Native Rangeland Mid Summer	8.76	48.26	0.25	2.52	0.72	22.08	
6.0 M Seasonlong							
Spring Pasture							
Native Rangeland	8.76			4.04	1.16	34.81	0.64
Fall Pasture							
Entire Strategy	8.76			4.04	1.16	34.81	0.64
4.5 M. Seasonlong							
Crested Wheatgrass	8.76			1.82	0.52	15.60	0.27
Native Rangeland	8.76			2.86	0.81	24.30	0.39
Fall Pasture							
Entire Strategy	8.76			2.57	0.74	22.16	0.36
4.0 M Deferred							
Crested Wheatgrass	8.76			1.67	0.48	14.40	0.27
Native Rangeland	8.76			2.22	0.64	19.20	0.35
Fall Pasture							
Entire Strategy	8.76			2.01	0.58	17.31	0.32
4.5 M Twice-over							

	Crested Wheatgrass	21.26			0.75	0.51	15.30	0.24
	Native Rangeland	8.76			2.04	0.58	17.40	0.26
	Altai Wildrye	8.76			1.39	0.40	12.00	0.23
	Entire Strategy	9.60			1.72	0.54	16.21	0.25

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