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ECONOMIC RETURNS AS AFFECTED BY GRAZING STRATEGIES

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ABSTRACT

A simulation study was conducted to evaluate costs and returns for five selected grazing management strategies from the birth of a calf to weaning. The strategies included drylot feeding, spring domesticated grass pastures, native range pastures, and a fall domesticated grass pasture. The objectives of the study were to determine if there were economic advantages and disadvantages for the different grazing strategies and to develop a general grazing strategy that has biological and economic advantages. Drylot feeding showed a positive economic return from mid March to early May. Crested wheatgrass pastures added weight to calves at a lower cost than drylot. Grazing crested wheatgrass spring pastures in May showed economic advantage over grazing native range early during the same period. Fertilized crested wheatgrass pastures showed an advantage in net return per acre over unfertilized crested wheatgrass pastures. Native range grazing management with multiple pastures and multiple grazing periods showed economic advantage over native range grazed as a single pasture with a single grazing period. Grazing an altai wildrye fall pasture showed positive economic return and lowest costs per pound of gain.

The type of grazing system or management strategy used in cow-calf production on native range and domesticated grass pastures is very important. Grazing systems affect the biology of the growth of vegetation and the performance of cow-calf pairs which are shown as changes in stocking rate, acres for cow-calf pair per grazing season, calf and cow average daily gain and gain per acre, and total calf and cow gain per grazing season. These values in turn affect costs of pasture per cow-calf pair which affects net return per cow-calf pair and net return per acre.

Most grazing management research is designed to evaluate biological differences in vegetation (herbage

production, species composition, plant density, stocking rate, etc.) and animal performance (average daily gain, gains per acre, milk production, etc.) between treatments. It is difficult to evaluate how the combination of biological advantages and disadvantages of the vegetation growth and livestock performance affect entire grazing strategies. This study attempts to evaluate five grazing strategies by analyzing the costs and returns for cow-calf production from calf birth to weaning. The objectives of this study are to determine if there are economic advantages and disadvantages with five selected grazing strategies and to develop a workable general grazing strategy that has biological and economic advantages.

METHODS AND MATERIALS

A simulation study to evaluate general costs and returns for mean cow-calf pair production from calf birth to weaning was conducted at the Dickinson Research Extension Center in southwestern North Dakota, U.S.A. The simulation strategies started at the date of birth of a calf. An average birth date of 16 March and the average birth weight of 95 pounds was used for all simulation strategies. The cow and calf pair were simulated to move sequentially through a series of forage types. All five strategies had a drylot feeding period and a summer native range grazing period, four strategies had a spring domesticated grass pasture period, and one strategy had a fall domesticated grass pasture period. All strategies ended at the weaning of the calf. The five strategies were named after the type of grazing system used on the native range portion of the strategy and are: 6.0 month seasonlong, 4.0 month deferred, 4.5 month seasonlong, 4.5 month short duration, and 4.5 month twice-over rotation.

The five management strategies were simulated for this study but each treatment has supporting data collected at the Dickinson Research Extension Center. The grazing dates, stocking rates, and calf average daily gain used in the five different simulated management strategies are means for cow-calf pairs from data collected during several years of grazing research. The mean cow and calf performance data used in this simulation study was collected primarily from 1982 to 1987 for the drylot, crested wheatgrass and altai wildrye portions of the five strategies, and the native range portion for four strategies. These data were taken from grazing system projects reported by Manske *et al.* 1984, Manske and Conlon 1986, Manske *et al.* 1988, Manske 1994a and unpublished data in the Dickinson Research Extension Center files. The mean cow and calf performance on the native range portion of the 4.5 month short duration strategy was taken from the data reported for 1982 to 1987 by Kirby, Conlon, and Krabbenhoft 1991. Two strategies were not simulated for the full 244 day season because research data was not available to

completely cover each of the simulated forage periods. Stocking rates were set to be full use of the grazable portion of the forage.

Commercial Hereford and Angus-Hereford cows with Charolais sired calves were used on this study. Individual cows with calves were allocated to treatments each spring on the basis of age of cow, sex and age of calf. Dollar values in this report are United States currency. Pasture rent values ($8.76 per acre) used were the means of 1993 and 1994 from the 15 counties in southwestern North Dakota (ND Ag Statistics 1993 and 1994). One treatment of crested wheatgrass was fertilized annually with 50 pounds of nitrogen per acre at an average cost of $12.50 per acre. The native range vegetation was the Wheatgrass-Needlegrass type (Barker and Whitman 1988) of the mixed grass prairie. The crested wheatgrass and altai wildrye pastures were seeded as monocultures but had developed a small assortment of other grass and forb species as minor components. Average annual precipitation was 15.3 in. (389 mm) with 75% falling as rain between April and September. Temperatures averaged 66^{o}F (19^{o}C) in summer with average daily maximums of 80^{o}F (27^{o}C). Winter average daily temperatures were 16^{o}F (-9^{o}C) with average daily minimums of 2^{o}F (-17^{o}C).

Five different management system strategies were evaluated for forage and pasture costs and compared to the gross and net returns of the accumulated live weight of the calf while grazing each forage type and for the total simulation season using three calf market values at weaning. This study was intended to be a comparison of feed and pasture costs and relative dollar value for the different calf weight production levels from the five management strategies. This study was not intended to be a complete economic analyses of the grazing treatments nor a study in market strategies. The five simulated management strategies are described below and in table 1 and figure 1.

The 6.0 month seasonlong (6.0 M SL) management strategy was started on 16 March in drylot and a balanced lactation ration was fed for 61 days. The grazing portion started on 16 May with one native range pasture grazed for 183 days at a stocking rate of 0.25 animal unit months (AUM's)/acre until 15 November when the calves were weaned at 244 days of age.

The 4.0 month deferred (4.0 M Def) management strategy was started on 16 March in drylot and a balanced lactation ration was fed for 46 days. The grazing portion started on 1 May with grazing on an unfertilized crested wheatgrass pasture for 76 days at a stocking rate of 0.60 AUM's/acre. The livestock were moved to one native

range pasture on 15 July and grazed for 122 days at a stocking rate of 0.45 AUM's/acre until 15 November when the calves were weaned at 244 days of age.

The 4.5 month seasonlong (4.5 M SL) management strategy was started on 16 March in drylot and a balanced lactation ration was fed for 46 days. The grazing portion started on 1 May with grazing on an unfertilized crested wheatgrass pasture for 46 days at a stocking rate of 0.55 AUM's/acre. The livestock were moved to one native range pasture on 15 June and grazed for 137 days at a stocking rate of 0.35 AUM's/acre until 30 October when the calves were weaned at 229 days of age.

The 4.5 month short duration (4.5 M SD) management strategy was started on 16 March in drylot and a balanced lactation ration was fed for 46 days. The grazing portion started on 1 May with grazing on an unfertilized crested wheatgrass pasture for 46 days at a stocking rate of 0.55 AUM's/acre. The livestock were moved to one of eight native range pastures on 15 June and rotated through the eight pastures on a 5 day graze, 35 day rest schedule for 137 days at a stocking rate of 0.47 AUM's/acre until 30 October when the calves were weaned at 229 days of age.

The 4.5 month twice-over rotation (4.5 M TOR) management strategy was started on 16 March in drylot and a balanced lactation ration was fed for 46 days. The grazing portions started on 1 May with grazing on fertilized (50 lbs N/acre on 1 April) crested wheatgrass pasture for 31 days at a stocking rate of 1.33 AUM's/acre. The livestock were moved to one of three native range pastures with each pasture grazed for two periods, one period of 15 days between 1 June and 15 July (third leaf stage to anthesis phenophase) followed by a second period of 30 days after 15 July and prior to mid October for 137 days at a stocking rate of 0.49 AUM's/acre. The first pasture grazed in the sequence was the last pasture grazed the previous year. The livestock were moved to an altai wildrye pasture on 15 October and grazed for 30 days at a stocking rate of 0.72 AUM's/acre until 15 November when the calves were weaned at 244 days of age.

RESULTS

The net returns per cow-calf pair and per acre (Tables 2, 3, 4, 5 and Fig. 5 and 6) are different for the five simulated management strategies. The gross and net returns were determined for three potential market values of $0.90, $0.80, and $0.70 per pound of calf accumulated live weight and are included in the tables but only the $0.70/lb

values will be discussed in this section. The birth weight of the calf has economic value at time of sale but only the accumulated weight gained was included in this discussion of costs and returns of the various forage periods of the respective strategies. The pasture costs were determined from the average rent value of $8.76 per acre for native range, crested wheatgrass, and altai wildrye pastures. Acreages for forage types (Fig. 1), and calf average daily gain (Fig. 2) were determined from previous grazing research projects for each of the five management strategies. Calf gain per acre (Fig. 2), calf accumulated weight gained (Fig. 3), feed and pasture costs (Fig. 4), and cost/day and cost/lb gain (Table 6 and Fig. 7) were determined during this study for the five management strategies.

The native range period (Table 4) of the 6.0 month seasonlong simulation strategy was 183 days with calf average daily gain of 1.80 lbs, gain per acre of 13.59 lbs and accumulated weight gain of 329.40 lbs. Each cow-calf pair was allotted 24.24 acres at a cost of $212.34. Assuming the calf accumulated weight sold at $0.70/lb, the gross return was $230.58 per calf and the net returns were $18.24 per cow-calf pair and $0.75 per acre on native range. The drylot portion (Table 2) of this strategy added an accumulated weight of 115.90 lbs to each calf at a cost of $48.80. The entire simulated 6.0 month seasonlong strategy (Table 5) had an accumulated weight gain of 445.30 lbs on 25.46 acres in 244 days at a cost of $261.14 per cow-calf pair. The net returns at $0.70/lb were $50.57 per cow-calf pair and $1.99 per acre.

The native range period (Table 4) of the 4.0 month deferred simulation strategy was 122 days with calf average daily gain of 1.80 lbs, gain per acre of 24.73 lbs, and accumulated weight gain of 219.60 lbs. Each cow-calf pair was allotted 8.88 acres at a cost of $77.79. Assuming the calf accumulated weight sold at $0.70/lb, the gross return was $153.72 per calf and the net returns were $75.93 per cow-calf pair and $8.55 per acre on native range. The drylot (Table 2) and spring domesticated grass pasture (Table 3) periods of this strategy added an accumulated weight of 87.40 and 136.04 pounds, respectively, to each calf at a cost of $36.80 and $36.45, respectively. The entire 4.0 month deferred strategy (Table 5) had an accumulated weight gain of 443.04 lbs on 13.96 acres in 244 days at a cost of $151.04 per cow-calf pair. The net returns at $0.70/lb were $159.09 per cow-calf pair and $11.40 per acre.

The native range period (Table 4) of the 4.5 month seasonlong simulation strategy was 137 days with calf average daily gain of 2.09 lbs, gain per acre of 22.55 lbs, and accumulated weight gain of 286.33 lbs. Each cow-calf pair was allotted 12.70 acres at a cost of $111.25. Assuming the calf accumulated weight sold at $0.70/lb, the gross return was $200.43 per calf and the net returns were $89.18 per cow-calf pair and $7.02 per acre on native range. The

drylot (Table 2) and spring domesticated grass pasture (Table 3) periods of this strategy added an accumulated weight of 87.40 and 87.86 pounds, respectively, to each calf at a cost of $36.80 and $23.91, respectively. The entire simulated 4.5 month seasonlong strategy (Table 5) had an accumulated weight of 461.59 pounds on 16.35 acres in 229 days at a cost of $171.96 per cow-calf pair. The net returns at $0.70/lb were $151.15 per cow-calf pair and $9.24 per acre.

The native range period (Table 4) of the 4.5 month short duration simulation strategy was 137 days with calf average daily gain of 2.13 lbs, gain per acre of 30.21 lbs, and accumulated weight gain of 291.81 lbs. Each cow-calf pair was allotted 9.66 acres at a cost of $84.62. Assuming the calf accumulated weight sold at $0.70/lb, the gross return was $204.27 per calf and the net returns were $119.65 per cow-calf pair and $12.39 per acre on native range. The drylot (Table 2) and spring domesticated grass pasture (Table 3) periods of this strategy added an accumulated weight of 87.40 and 87.86 pounds, respectively, to each calf at a cost of $36.80 and $23.91, respectively. The entire simulated 4.5 month short duration strategy (Table 5) had an accumulated weight of 467.07 pounds on 13.31 acres in 229 days at a cost of $145.33 per cow-calf pair. The net returns at $0.70/lb were $181.62 per cow-calf pair and $13.65 per acre.

The native range period (Table 4) of the 4.5 month twice-over rotation simulation strategy was 137 days with calf average daily gain of 2.21 lbs, gain per acre of 33.64 lbs, and accumulated weight gain of 302.77 lbs. Each cow-calf pair was allotted 9.00 acres at a cost of $78.84. Assuming the calf accumulated weight sold at $0.70/lb, the gross return was $211.94 per calf and the net returns were $133.10 per cow-calf pair and $14.79 per acre on native range. The drylot (Table 2), spring (Table 3), and fall (Table 3) domesticated grass pasture periods of this strategy added an accumulated weight of 87.40, 67.58, and 52.77 pounds, respectively, to each calf at a cost of $36.80, $15.95, and $12.18, respectively. The entire simulated 4.5 month twice-over rotation strategy (Table 5) had an accumulated weight of 510.52 lbs on 12.06 acres in 244 days at a cost of $143.77 per cow-calf pair. The net returns at $0.70/lb were $213.59 per cow-calf pair and $17.71 per acre.

Two factors that have considerable influence on the net returns per cow-calf pair and per acre are the number of acres required to carry a cow-calf pair and the calf gain per acre. These two factors are affected by stocking rate and calf average daily gain. The levels of stocking rate are affected by the quantity of herbage production. Stocking rates can be increased on any grazing system for the short-term but if the quantity of herbage production is not

manipulated to increase proportionally, the plant community will suffer negative effects on the long-term basis. Stocking rates are variable on any given parcel of land depending on the type of grazing management used and the resulting effects on plant growth. Calf average daily gain is affected by the nutritional quality of the available forage consumed by the calf (assuming quantity is not a limiting factor) and also by the forage consumed by the cow because of its effects on the lactation rate. Grazing management strategies that provide forages that meet the nutritional requirements of the livestock for longer periods of time should have greater average daily gains and gains per acre. Grazing management strategies that provide an adequate quantity of forage at the required nutritional quality for the entire grazing season have the greatest chance to have the highest net returns per cow-calf pair and per acre.

The drylot feeding period showed positive economic returns for all five grazing management strategies from mid March to early May (Table 2). Crested wheatgrass pastures accumulated weight on calves at a lower cost per pound than drylot (Table 6 and Fig. 7). Grazing crested wheatgrass spring pastures in May showed positive economic returns (Table 3) and an advantage over grazing native range pastures early during the same period (Table 6 and Fig. 7). Fertilization of crested wheatgrass with 50 lbs N/acre showed advantages in increased stocking rates, calf average daily gain and gain per acre, and a reduction in the acreage required to carry a cow-calf pair which greatly improved the net returns per acre over unfertilized crested wheatgrass pastures (Tables 3 and 6 and Fig. 6). Native range grazing management strategies that incorporated multiple pastures with multiple grazing periods had economic advantages in net returns per cow-calf pair (Fig. 5) and per acre (Fig. 6) over strategies with single native range pastures grazed for one period (Tables 4 and 6). Data collected at the Dickinson Research Extension Center shows that the three pasture, twice-over rotation system on native range grazed between 1 June and 15 October has a biological (Manske *et al.* 1988, Manske 1994a, Biondini and Manske 1995) and economic advantage (Tables 4 and 6) over the single pasture seasonlong treatments. The short duration treatment with eight pastures grazed three or more times each shows economic advantage (Tables 4 and 6) and a biological advantage in maintaining livestock performance at a higher stocking rate (Kirby, Conlon, and Krabbenhoft 1991) over the single pasture seasonlong treatments.

Grazing native range for 6.0 months on one pasture shows an economic disadvantage (Tables 4 and 6) because of the low stocking rate and calf gain per acre, and high costs for a pound of weight gain. Grazing native range from mid July to mid November as on the 4.0 month deferred strategy improved the stocking rate over other seasonlong

strategies but calf average daily gain was reduced compared to 4.5 month seasonlong (Table 4). Fall domesticated grass pastures provided an economic advantage in net return per acre (Tables 3 and 4) and had the lowest cost for a pound of weight gain (Table 6 and Fig. 7) compared to native range and unfertilized crested wheatgrass.

The 4.5 month twice-over rotation grazing strategy, with drylot, spring, native range, and fall pastures, from calf birth to weaning showed numerically higher values over the other strategies in calf weaning weight, calf weight per day of age, calf average daily gain, calf gain per acre, total calf accumulated weight gain per season, gross returns per calf, net returns per cow-calf pair, and net returns per acre (Table 5 and Fig. 1, 2, 3, 5, and 6) and lower numerical values in acreage required to carry a cow-calf pair per season, total feed and pasture costs, cost per day and cost per pound of gain (Tables 5 and 6 and Fig. 4).

DISCUSSION

Selection of a biologically and economically successful grazing management strategy utilizing native range and domesticated grass pastures must consider several factors that are inherent in the Northern Great Plains grassland ecosystem and can be separated into three major problems: 1) plant growth is limited by several factors, 2) ungrazed grasses are low in nutritional quality during the later portion of the grazing season, and 3) some grazing starting dates cause negative effects. Perennial grass growth is limited by both low and high temperatures, variable precipitation levels, and seasonal precipitation patterns. The ambient climatic conditions result in frequent periods with plants under water stress. During the 12 year period, 1983-1994, 43% of the growing season months from mid April through mid October had low precipitation conditions that caused water stress in perennial plants (Manske 1994c). The short period of May, June, and July is when nearly all of the growth in graminoid leaf and flower stalk height occurs (Goetz 1963, Manske 1994c). Grazing after July on native range that has not been previously manipulated is primarily on residual vegetation. Ungrazed grasses are low in nutritional quality during the later portion of the grazing season and the major graminoids drop below 9.6% crude protein levels around mid July (Whitman *et al.* 1951, Manske 1994c, Sedivec and Manske 1994). Grazing native range too early causes negative effects on plant growth. Starting seasonlong grazing treatments on native range before early June results in a loss of 45-60% of the potential peak herbage biomass (Campbell 1952, Rogler *et al.* 1962, Manske 1994c).

The identification of these three major problems inherent in the native range ecosystem and the interpretation of the

biological (Manske *et al.* 1988, Manske 1994a, Biondini and Manske 1995) and economic (this paper) evidence from grazing management research with perennial vegetation in western North Dakota suggests that a grazing strategy for cow-calf pairs from birth to weaning includes a drylot period after birth, a spring domesticated grass pasture period beginning in early May, a native range period from early June to mid October using a rotation system with multiple pastures and multiple grazing periods, and a fall domesticated grass pasture period from mid October to mid November.

A drylot period is needed for calves born before late April because at the present time a perennial grass forage species that is phenologically mature enough to withstand grazing pressure in March and April is not available. Under the conditions of this simulation study, the net returns per cow-calf pair and per acre were positive during the drylot period of the five management strategies (Table 2).

The purpose of a spring pasture is to provide forage during the period of May when grazing is detrimental to native range grass growth. Domesticated grass species that have very early phenological development can be used as a spring pasture. Crested wheatgrass reaches the third leaf stage around 20 April on the average eight out of ten years at Dickinson. Other cool season grass species could possibly be used as spring pastures also. Fertilization of the crested wheatgrass pastures improves the net returns per acre compared to unfertilized crested wheatgrass pastures (Table 3).

The cool season native range grass species generally reach their third leaf stage around 1 June in western North Dakota. Grazing ahead of that time reduces peak herbage production. Delaying the start of grazing until after mid July is positive for increasing stocking rate but is very negative for livestock performance as seen in the 4.0 month deferred strategy by the low calf average daily gain (Table 4).

Grassland plants have coevolved with herbivores for 20 million years (Manske 1994b) and have developed mechanisms to compensate for defoliation. Understanding these adaptive tolerance mechanisms and setting grazing periods to beneficially manipulate these mechanisms is the key to the development of useful grazing management systems. These mechanisms have been concisely described by Manske 1994a.

Defoliation with grazing between the third leaf stage and anthesis phenological stage has beneficial stimulation of

the two adaptive tolerance mechanisms and has been shown to have positive effects on the plant community, livestock performance, and wildlife habitat. Controlling defoliation by grazing with multiple pastures (3 to 6) and restricting access in each pasture to one period of grazing between the third leaf stage and anthesis phenophase and a second grazing period after anthesis and before winter senescence provides a grazing period for stimulation of the two adaptive tolerance mechanisms and a later period of grazing to harvest some of the increase in herbage production. The stimulation period has been found to be 1 June to 15 July in western North Dakota, which necessitates that, each of the three equal size pastures in the system be grazed for 15 days in sequence. The harvest period occurs during 15 July to 15 October with each of the pastures grazed a second time for 30 days in the same sequence. In successive years, the grazing sequence is rotated so that the first pasture grazed during the current year was the last pasture grazed the previous year.

The twice-over rotation grazing system has been able to manipulate the level of secondary tiller development and improve the nutritional quality of the forage available during the later portion of the grazing season. It has not, however, been able to extend this period later than mid October. A fall domesticated grass pasture is needed that can provide forage of adequate nutritional quality from mid October to mid November. Altai wildrye has provided that forage need at Dickinson, but other types of wildryes may be as good or better. A perennial forage type that can provide nutritional quality without supplementation that is adequate for maintenance of production by a lactating cow after mid November is currently not known. The calf average daily gain in the late portion of the grazing season was less than 2.00 lbs on altai wildrye but the net returns per acre were greater on the altai wildrye pastures than on the native range pastures between the period of mid October and mid November.

CONCLUSION

A grazing management strategy that is biologically and economically successful coordinates the grazing of various forage types with the phenological development and biological needs of the plants, as well as matching the forage types with the nutritional requirements of the livestock so that the livestock have adequate nutritional quality for the entire grazing season. Consideration should be given to match the size and type of livestock to the quality of forage available on each particular ranch operation. A grazing management strategy utilizing perennial forages that works biologically and economically has a drylot period from calf birth to early May, a spring domesticated grass pasture from early May to early June, a native range grazing system with three to six pastures grazed twice per year, once

during the stimulation period (third leaf to anthesis) and a second time during the harvest period (seed development to fall senescence), and a fall domesticated grass pasture from mid October to mid November. Economic returns received from cow-calf production on native range and domesticated grass pastures can be increased by implementing a grazing management strategy that beneficially affects the biology of the growth of vegetation and the performance of cow-calf pairs.

LITERATURE CITED

Barker, W.T. and W.C. Whitman. 1988. Vegetation of the Northern Great Plains. Rangelands 10:266-272.

Biondini, M.E. and L.L. L. Manske.1995. Grazing frequency and ecosystem processes in a northern mixed prairie, USA. Ecological Applications. (accepted)

Campbell, J.B. 1952. Farming range pastures. Journal of Range Management 5:252-258.

Goetz, H. 1963. Growth and development ofnative range plants in the mixed grass prairie of western North Dakota. M.S. Thesis, NDSU, Fargo, N.D. 165 p.

Kirby, D.R., T.J. Conlon, and K.D. Krabbenhoft. 1991. A short duration grazing experience in western North Dakota. Proceedings of North Dakota Cow/Calf Conference. Bismarck, North Dakota. p. 46-53.

Manske, L.L., J.L. Nelson, P.E. Nyren, D.G. Landblom, and T.J. Conlon. 1984. Complementary grazing system, 1978-1982. p. 37-50. *in* Proceedings North Dakota Chapter of the Society for Range Management, 1983. Dickinson, North Dakota.

Manske, L.L. and T.J. Conlon. 1986. Complementary rotation grazing system in western North Dakota. North Dakota Farm Research 44:6-10.

Manske, L.L., M.E. Biondini, D.R. Kirby, J.L. Nelson, D.G. Landblom, and P.J. Sjursen. 1988. Cow and Calf performance on seasonlong and twice-over rotation grazing treatments in western North Dakota. Proceedings of the North Dakota Cow-Calf Conference. Bismarck, North Dakota. p. 5-17.

Manske, L.L. 1994a. Ecological management of grasslands defoliation. p. 130-136. *in* Taha, F.K., Z. Abouguendia, and P.R. Horton, eds. Managing Canadian rangelands for sustainability and profitability. Grazing and Pasture Technology Program, Regina, Saskatchewan.

Manske, L.L. 1994b. History and land use practices in the Little Missouri Badlands and Western North Dakota. Proceedings - Leafy Spurge Strategic Planning Workshop. USDI National Park Service, Dickinson, North Dakota. p. 3-16.

Manske, L.L. 1994c. Problems to consider when implementing grazing management practices in the Northern Great Plains. NDSU Dickinson Research Extension Center. Range Management Report DREC 94-1005. Dickinson, North Dakota. 11 p.

North Dakota Agricultural Statistics Service. 1993. North Dakota Agricultural Statistics 1993. North Dakota State University and U.S. Department of Agriculture. Fargo, N.D. 112 p.

North Dakota Agricultural Statistics Service. 1994. North Dakota Agricultural Statistics 1994. North Dakota State University and U.S. Department of Agriculture. Fargo, N.D. 112 p.

Rogler, G.A., R.J. Lorenz, and H.M. Schaaf. 1962. Progress with grass. N.D. Agr. Exp. Sta. Bul. 439. 15 p.

Sedivec, K.K. and L.L. L. Manske. 1994. Nutritional quality of native range. Proceedings of North Dakota Cow/Calf Conference. Bismarck, North Dakota. p. 21-25.

Whitman, W.C., D.W. Bolin, E.W. Klosterman, H.J. Klostermann, K.D. Ford, L. Moomaw, D.G. Hoag, and M.L. Buchanan. 1951. Carotene, protein, and phosphorus in range and tame grasses of western North Dakota. N.D. Agr. Exp. Sta. Bul. 370. 55 p.

Table 1. Dates, forage type, and period length for five cow-calf production management strategies from calf birth to weaning.

	Grazing Management Strategy				

	Seasonlong 6.0 M	Deferred 4.0 M	Seasonlong 4.5 M	Short Duration 4.5 M	Rotation 4.5 M
CALF BIRTH DATE	16 Mar	16 Mar	16 Mar	16 Mar	16 Mar
DRYLOT					
Start Date	16 Mar	16 Mar	16 Mar	16 Mar	16 Mar
Number of Days	61	46	46	46	46
CRESTED WHEATGRASS					
Start Date	-	1 May	1 May	1 May	1 May
Number of Days	-	76	46	46	31
NATIVE RANGE					
Start Date	16 May	15 Jul	15 Jun	15 Jun	1 Jun
Number of Days	183	122	137	137	137
ALTAI WILDRYE					
Start Date	-	-	-	-	15 Oct
Number of Days	-	-	-	-	30
CALF WEANING DATE	15 Nov	15 Nov	30 Oct	30 Oct	15 Nov
NUMBER OF DAYS FOR TOTAL SEASON	244	244	229	229	244

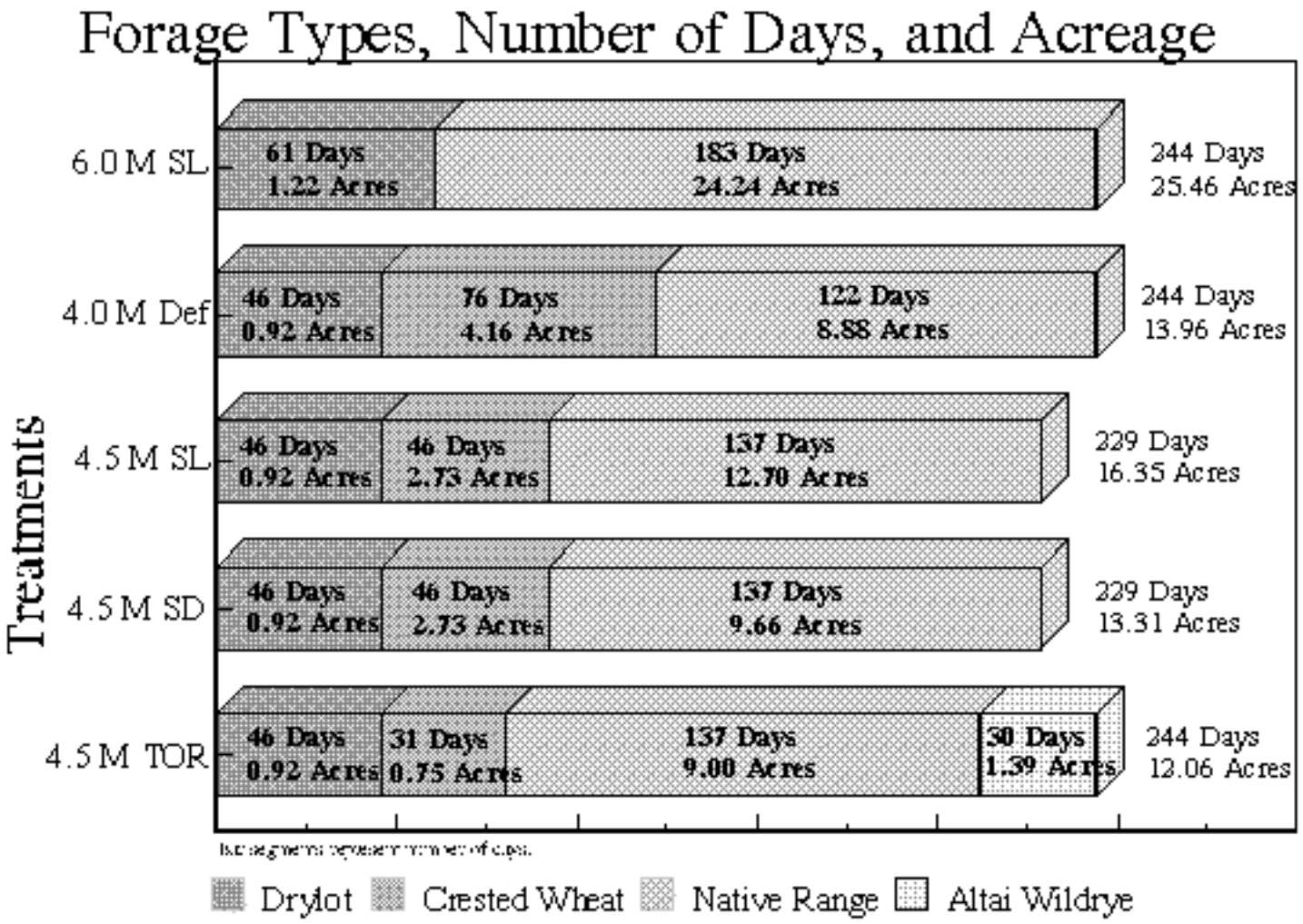

Fig. 1. Forage types, number of days, and acreage for five cow-calf production management stratedies from calf birth to weaning.

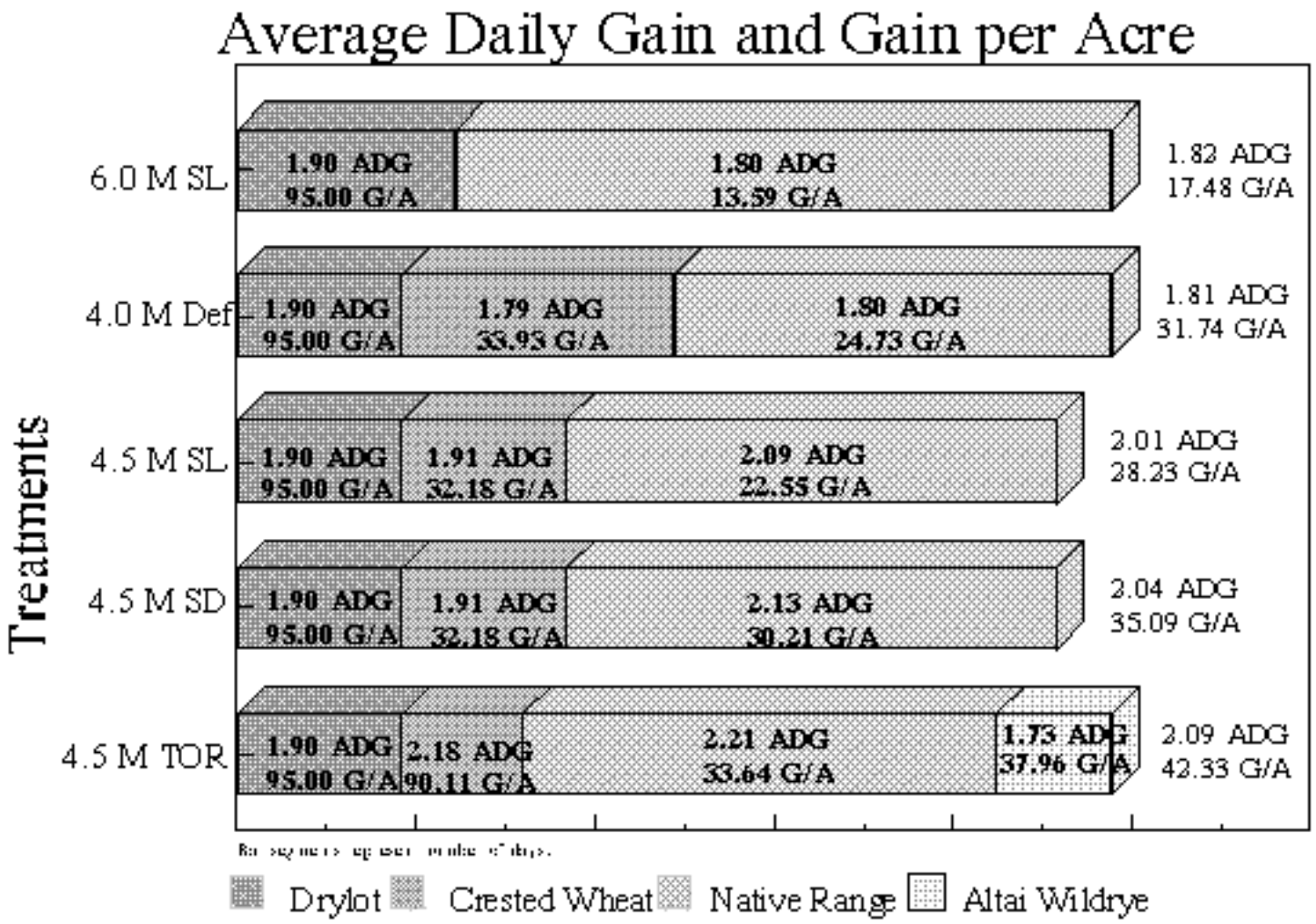

Fig. 2. Calf average daily gain and gain per acre for five cow-calf production management strategies from calf birth to weaning

Table 2. Projected general costs and returns for cow-calf production for drylot feeding on five management strategies in southwestern North Dakota.

	Grazing Management Strategy				

		Seasonlong 6.0 M	Deferred 4.0 M	Seasonlong 4.5 M	Short Duration 4.5 M	Rotation 4.5 M
LENGTH OF PERIOD	(days)	61.0	46.0	46.0	46.0	46.0
PRODUCTION						
Feed/Day	(lbs)	30.00	30.00	30.00	30.00	30.00
Feed/Period	(lbs)	1830.00	1380.00	1380.00	1380.00	1380.00
Acres/Period @1500 lbs/acre	(ac)	1.22	0.92	0.92	0.92	0.92
Calf ADG	(lbs)	1.90	1.90	1.90	1.90	1.90
Calf Gain/Acre	(lbs)	95.00	95.00	95.00	95.00	95.00
Calf Gain/Period	**(lbs)**	**115.90**	**87.40**	**87.40**	**87.40**	**87.40**
GROSS RETURNS Gross Return/C-C pr/Period						
@ **0.90/lb**	($)	104.31	78.66	78.66	78.66	78.66
@ **0.80/lb**	($)	92.72	69.92	69.92	69.92	69.92
@ **0.70/lb**	($)	81.13	61.18	61.18	61.18	61.18
COSTS						
Ration/C-C pr @ $50.00/ton	($)	45.75	34.50	34.50	34.50	34.50
Supplement @ $0.05/Day	($)	3.05	2.30	2.30	2.30	2.30
Total	**($)**	**48.80**	**36.80**	**36.80**	**36.80**	**36.80**

NET RETURNS Net Return/C-C pr/Period						
@ **0.90/lb**	($)	55.51	41.86	41.86	41.86	41.86
@ **0.80/lb**	($)	43.92	33.12	33.12	33.12	33.12
@ **0.70/lb**	($)	32.33	24.38	24.38	24.38	24.38
Net Return per Acre						
@ **0.90/lb**	($)	45.50	45.50	45.50	45.50	45.50
@ **0.80/lb**	($)	36.00	36.00	36.00	36.00	36.00
@ **0.70/lb**	($)	26.50	26.50	26.50	26.50	26.50

Table 3. Projected general costs and returns for cow-calf production for crested wheatgrass and altai wildrye pastures on five management strategies in southwestern North Dakota.

		Grazing Management Strategy					
		Crested Wheatgrass					**Altai Wildrye**
		Seasonlong 6.0M	Deferred **4.0M**	Seasonlong **4.5M**	**Short Duration 4.5M**	Rotation **4.5M**	Rotation **4.5M**
LENGTH OF PERIOD	(days)	0.0	76.0	46.0	46.0	31.0	30.0
PRODUCTION							
Acres/Month	(ac)	-	1.67	1.82	1.82	0.75	1.39

Acres/Period	(ac)	-	4.16	2.73	2.73	0.75	1.39
Calf ADG	(lbs)	-	1.79	1.91	1.91	2.18	1.73
Calf Gain/Acre	(lbs)	-	33.93	32.18	32.18	90.11	37.96
Calf Gain/Period	**(lbs)**	**-**	**136.04**	**87.86**	**87.86**	**67.58**	**52.77**
GROSS RETURNS Gross Return/C-C pr/Period							
@ 0.90/lb	($)	-	122.44	79.07	79.07	60.82	47.49
@ 0.80/lb	($)	-	108.83	70.29	70.29	54.06	42.22
@ 0.70/lb	($)	-	95.23	61.50	61.50	47.31	36.94
COSTS Pasture Rent							
C-C Pr, Period, @8.76/ac	($)	-	36.45	23.91	23.91	6.57	12.18
@ $12.50/ac Fert	($)	-	-	-	-	9.38	-
Total	**($)**	**-**	**36.45**	**23.91**	**23.91**	**15.95**	**12.18**
NET RETURNS Net Return/C-C pr/Period							
@ 0.90/lb	($)	-	85.99	55.16	55.16	44.87	35.31
@ 0.80/lb	($)	-	72.38	46.38	46.38	38.11	30.04
@0.70/lb	($)	-	58.78	37.59	37.59	31.36	24.76
Net Return per Acre							

@ 0.90/lb	($)	-	20.67	20.21	20.21	59.83	25.40
@ 0.80/lb	($)	-	17.40	16.99	16.99	50.82	21.61
@ 0.70/lb	($)	-	14.13	13.77	13.77	41.81	17.81

Table 4. Projected general costs and returns for cow-calf production for native range grazing systems on five management strategies in southwestern North Dakota.

		Grazing Management Strategy				
		Seasonlong 6.0 M	**Deferred 4.0 M**	**Seasonlong 4.5 M**	**Short Duration 4.5 M**	**Rotation 4.5 M**
LENGTH OF PERIOD	(days)	183.0	122.0	137.0	137.0	137.0
PRODUCTION						
Acres/Month	(ac)	4.04	2.22	2.86	2.15	2.04
Acres/Period	(ac)	24.24	8.88	12.70	9.66	9.00
Calf ADG	(lbs)	1.80	1.80	2.09	2.13	2.21
Calf Gain/Acre	(lbs)	13.59	24.73	22.55	30.21	33.64
Calf Gain/Period	**(lbs)**	**329.40**	**219.60**	**286.33**	**291.81**	**302.77**
GROSS RETURNS Gross Return/C-C pr/Period						
@ **0.90/lb**	($)	296.46	197.64	257.70	262.63	272.49
@ **0.80/lb**	($)	263.52	175.68	229.06	233.45	242.22

@ **0.70/lb**	($)	230.58	153.72	200.43	204.27	211.94
COSTS Pasture Rent						
C-C Pr, Period, @ 8.76/ac	**($)**	**212.34**	**77.79**	**111.25**	**84.62**	**78.84**
NET RETURNS Net Return/C-C pr/Period						
@ 0.90/lb	($)	84.12	119.85	146.45	178.01	193.65
@ 0.80/lb	($)	51.18	97.89	117.81	148.83	163.38
@ 0.70/lb	($)	18.24	75.93	89.18	119.65	133.10
Net Return per Acre						
@ 0.90/lb	($)	3.47	13.50	11.53	18.43	21.52
@ 0.80/lb	($)	2.11	11.02	9.28	15.41	18.15
@ 0.70/lb	($)	0.75	8.55	7.02	12.39	14.79

Table 5. Projected general costs and returns for cow-calf production from calf birth to weaning for the entire season on five management strategies in southwestern North Dakota.

		Grazing Management Strategy				
		Seasonlong 6.0 M	**Deferred 4.0 M**	**Seasonlong 4.5 M**	**Short Duration 4.5 M**	**Rotation 4.5 M**
LENGTH OF	(days)	244.0	244.0	229.0	229.0	244.0

SEASON						
PRODUCTION						
Weaning Weight	(lbs)	540.30	538.04	556.59	562.07	605.52
Weight/Day of Age	(lbs)	2.21	2.20	2.43	2.45	2.48
Acres/Season	(ac)	25.46	13.96	16.35	13.31	12.06
Calf ADG	(lbs)	1.82	1.81	2.01	2.04	2.09
Calf Gain/Acre	(lbs)	17.48	31.74	28.23	35.09	42.33
Calf Gain/Season	**(lbs)**	**445.30**	**443.04**	**461.59**	**467.07**	**510.52**
GROSS RETURNS Gross Return/C-C pr/Season						
@ 0.90/lb	($)	400.77	398.74	415.43	420.36	459.47
@ 0.80/lb	($)	356.24	354.43	369.27	373.66	408.42
@ 0.70/lb	($)	311.71	310.13	323.11	326.95	357.36
COSTS Pasture Rent and Feed						
C-C Pr, Season	**($)**	**261.14**	**151.04**	**171.96**	**145.33**	**143.77**
NET RETURNS Net Return/C-C pr/Season						
@ **0.90/lb**	($)	139.63	247.70	243.47	275.03	315.70
@ **0.80/lb**	($)	95.10	203.39	197.31	228.33	264.65
@ **0.70/lb**	($)	50.57	159.09	151.15	181.62	213.59
Net Return per Acre						
@ **0.90/lb**	($)	5.48	17.74	14.89	20.66	26.18

@ **0.80/lb**	($)	3.74	14.57	12.07	17.15	21.94
@ **0.70/lb**	($)	1.99	11.40	9.24	13.65	17.71

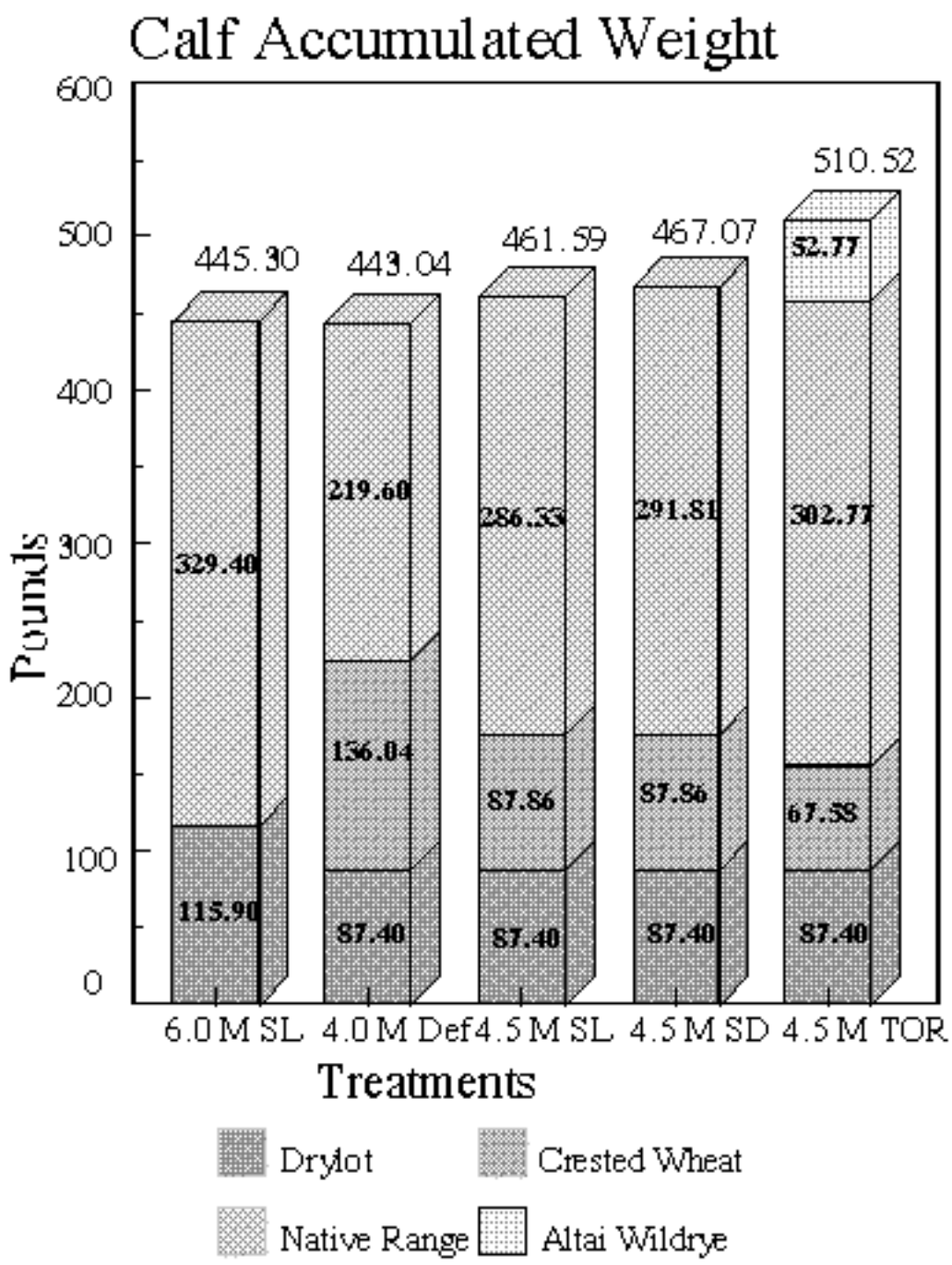

Fig. 3. Calf accumulated weight gain for five cow-calf production

management strategies from calf birth to weaning

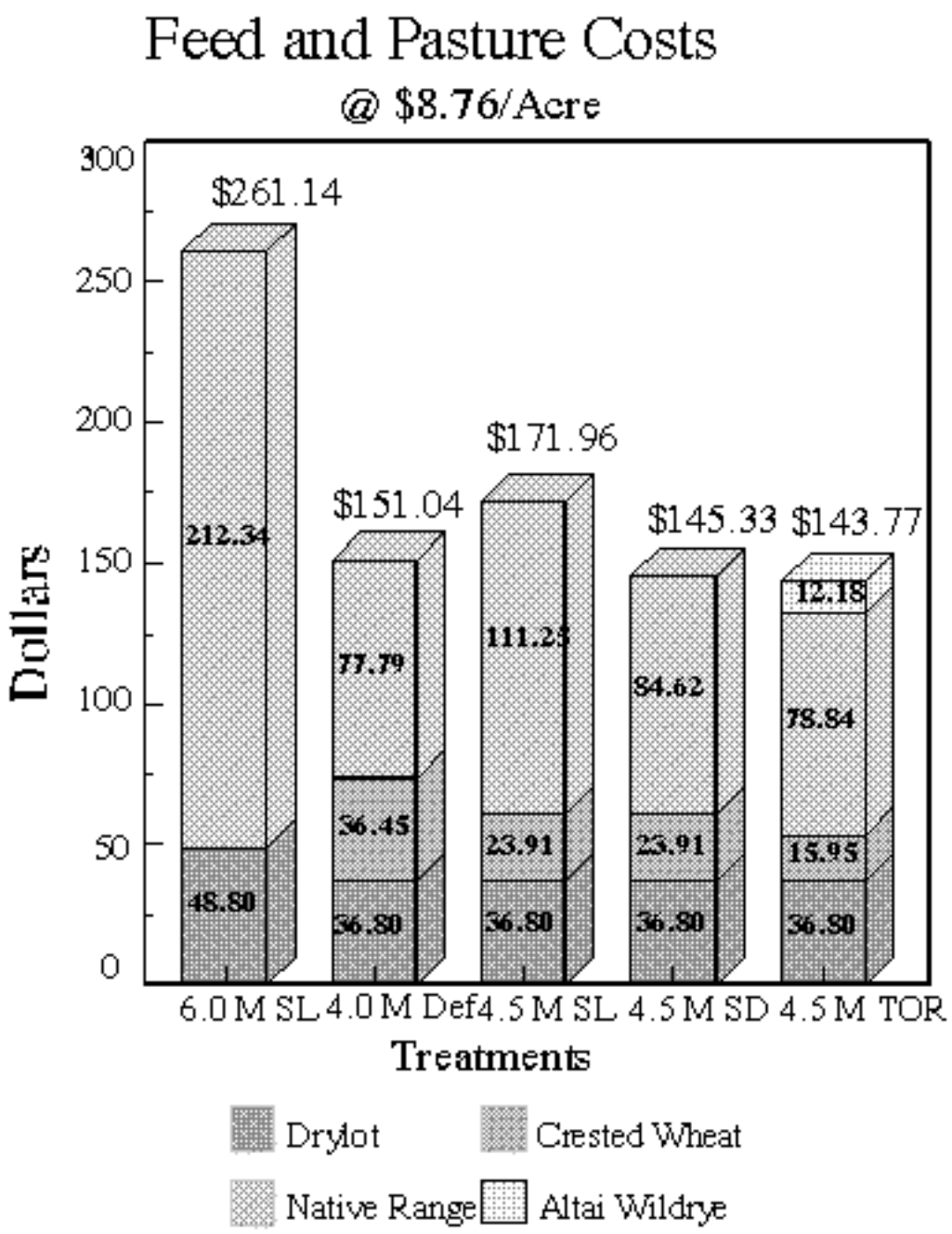

Fig. 4. Feed and pasture costs @ 8.76/acre for five cow-calf production management strategies from calf birth to weaning.

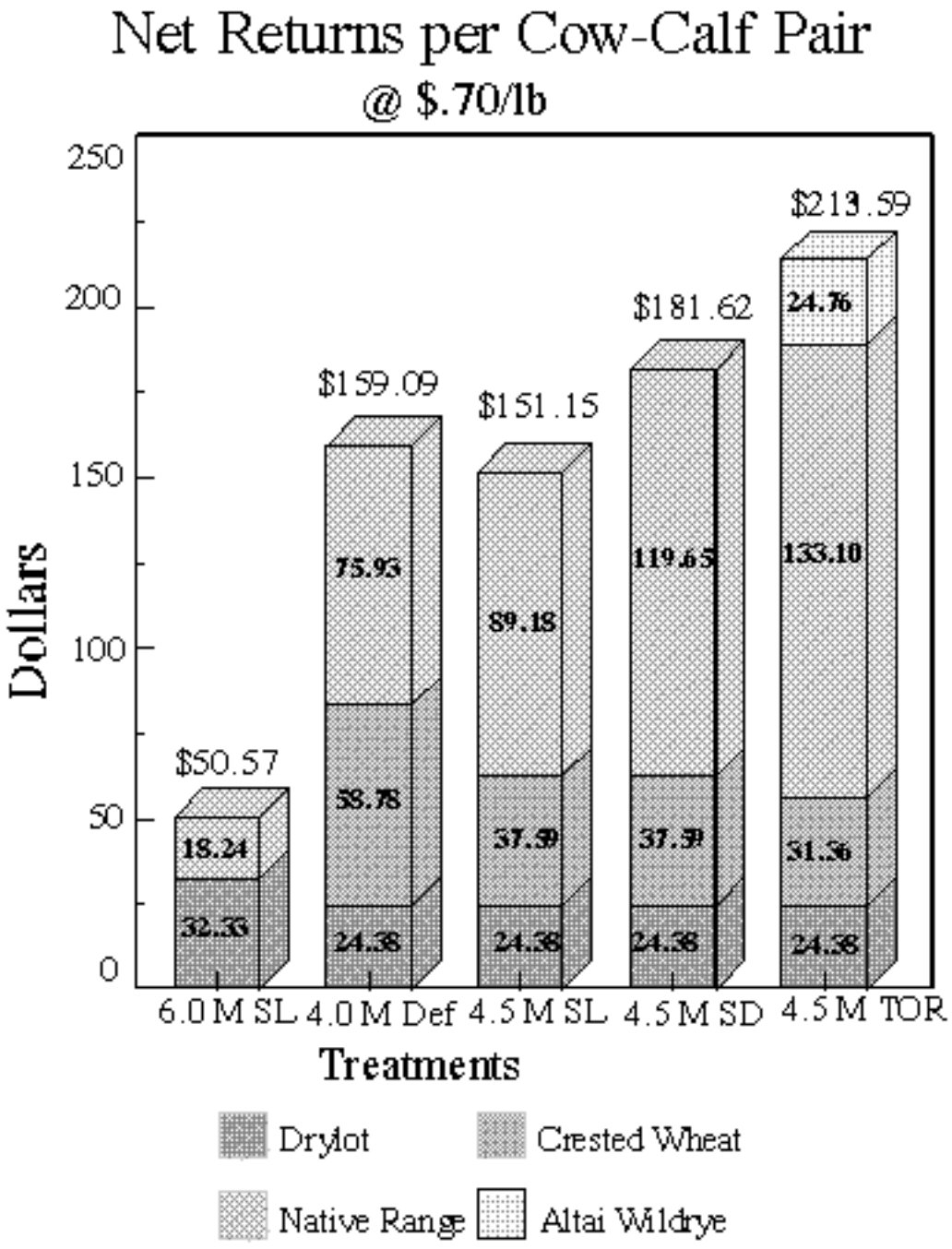

Fig. 5. Net returns per cow-calf pair @ $0.70/lb for five cow-calf production management strategies from calf birth to weaning.

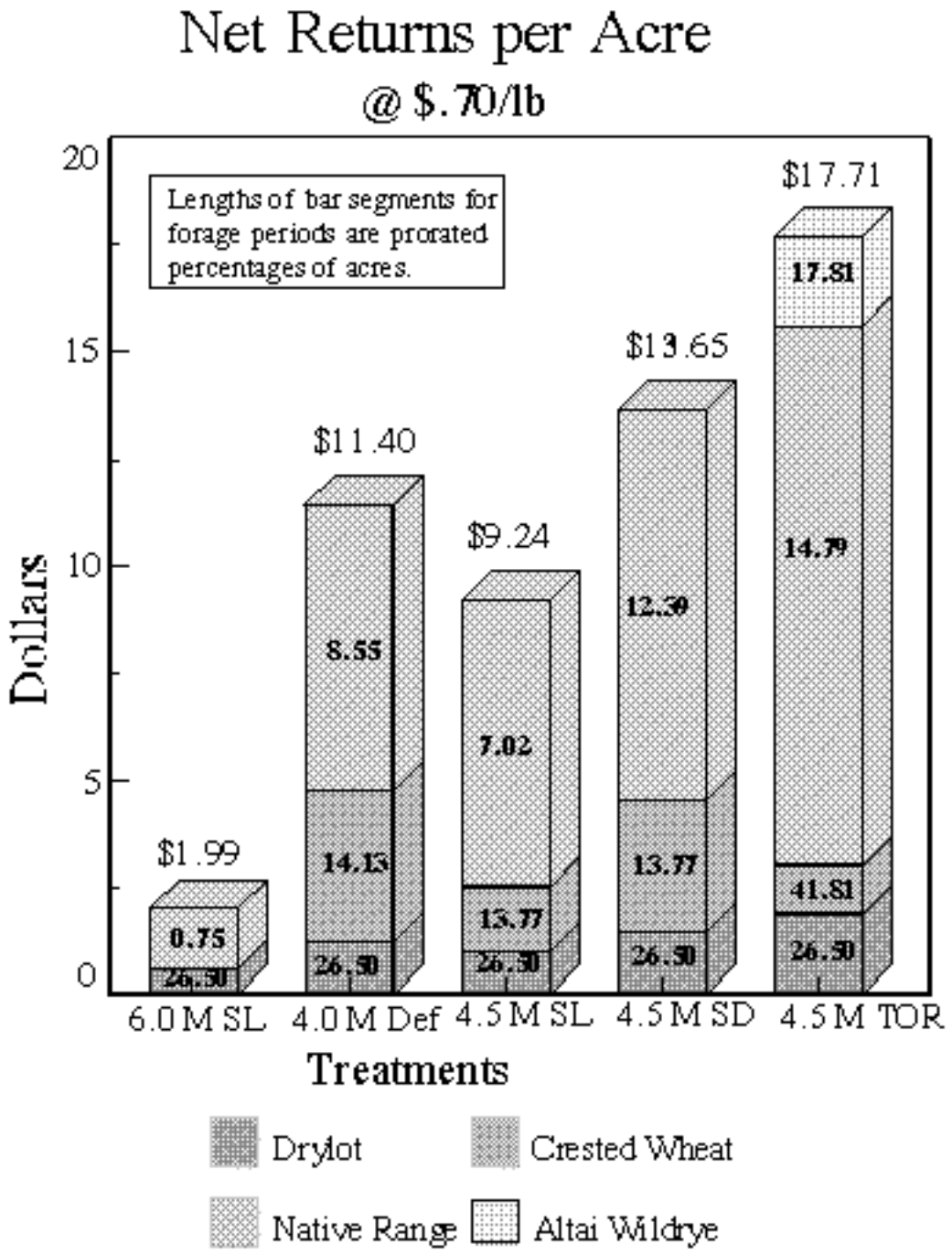

Fig. 6. Net returns per acre @ $0.70/lb for five cow-calf production

management strategies from calf bith to weaning.

Table 6. Cost per day and cost per pound gain at $8.76 per acre for five cow-calf production management strategies from calf birth to weaning.

		Grazing Management Strategy				
		Seasonlong 6.0 M	**Deferred 4.0 M**	**Seasonlong 4.5 M**	**Short Duration 4.5 M**	**Rotation 4.5 M**
DRYLOT						
Cost/Day	($)	0.80	0.80	0.80	0.80	0.80
Cost/lb Gain	($)	0.42	0.42	0.42	0.42	0.42
CRESTED WHEATGRASS						
Cost/Day	($)	-	0.48	0.52	0.52	0.51
Cost/lb Gain	($)	-	0.27	0.27	0.27	0.24
NATIVE RANGE						
Cost/Day	($)	1.16	0.64	0.81	0.62	0.58
Cost/lb Gain	($)	0.64	0.35	0.39	0.29	0.26
ALTAI WILDRYE						
Cost/Day	($)	-	-	-	-	0.40
Cost/lb Gain	($)	-	-	-	-	0.23
ENTIRE STRATEGY						
Cost/Day	($)	1.07	0.62	0.75	0.63	0.59

Cost/lb Gain	($)	0.59	0.34	0.37	0.31	0.28

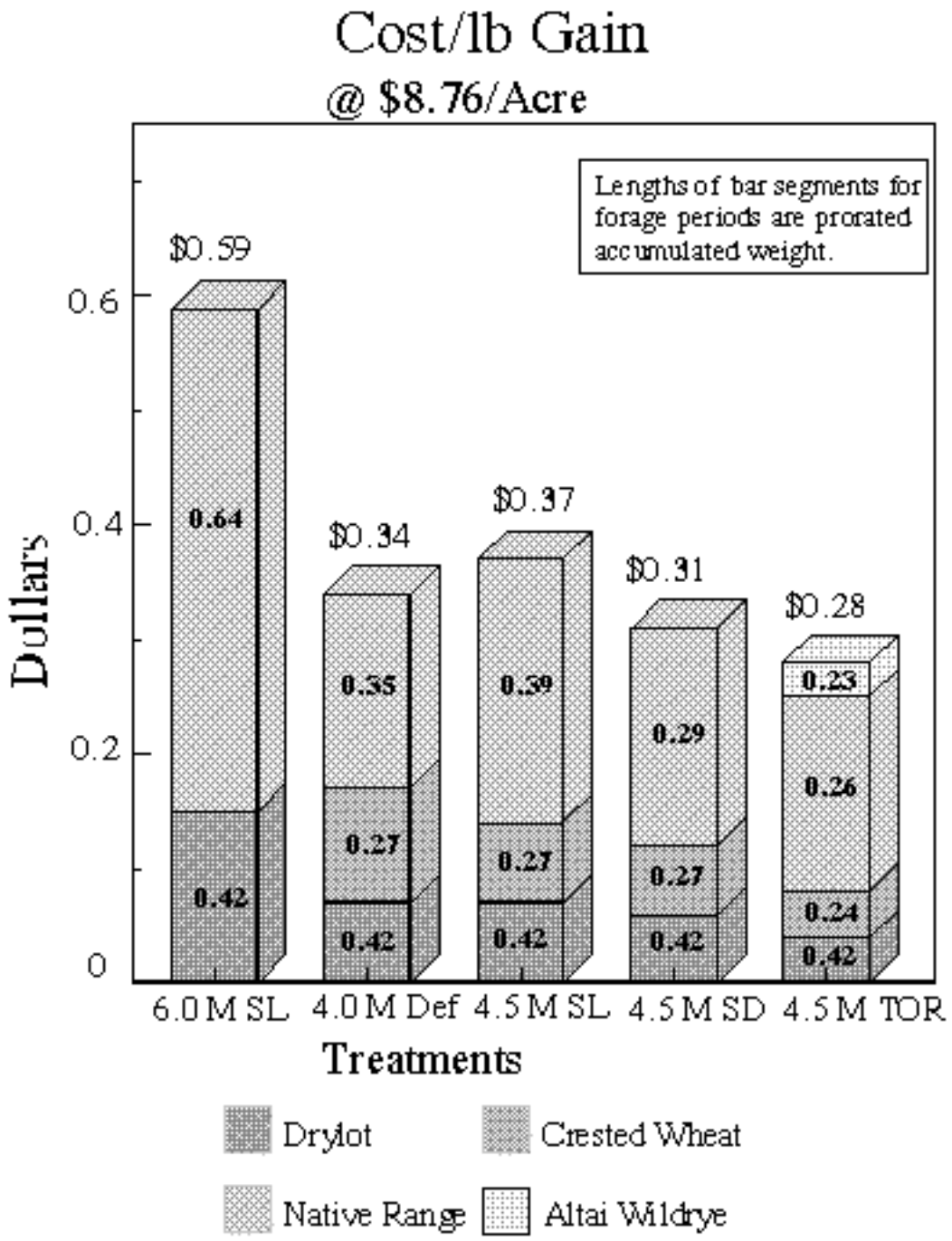

Fig. 7. Cost per pound gain @ $8.76/acre for five cow calf production

management strategies from calf birth to weaning.

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