The Modern Range Cow has Greater Nutrient Demand than the Old Style Range Cow

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The type of range cow roaming the grasslands of the Northern Plains has shifted from the old style, low performance cow to a fast growing, high performance cow with greater nutrient demand. The pasture and harvested forage management practices have been adjusted for the larger size cow, however, old style traditional forage management technologies with intentional periods of low quality forage continue to be used that minimize the modern cows advantage of greater production capabilities. Modern range cows have high production drain and do not produce at high performance levels when available forage nutrients are deficient resulting in calf weaning weights below their potential. Modern cows do not have the fat reserves that the old style cows produced and could draw on when forage quality was insufficient.

The greater size of modern range cows increases their nutrient demand throughout the production year, and their higher production levels increase the demand further. The increase in required nutrients of modern range cows is not simply proportional to the cows greater size.

A high performance 1200 lb range cow that has average milk production at 20 lb/d, and is 20% larger than an old style 1000 lb range cow that had milk production at 12 to 6 lb/d, requires 24% more energy and 33% more crude protein per year than the old style cow. The modern range cow with average milk requires 27% more energy and 41% more crude protein per day during the lactation production periods than the old style range cow (table 1).

A high performance 1200 lb range cow that has high milk production at 30 lb/d, and is 20% larger than an old style 1000 lb range cow that had milk production at 12 to 6 lb/d, requires 36% more energy and 55% more crude protein per year than the old style cow. The modern range cow with high milk requires 43% more energy and 72% more crude protein per day during the lactation production periods than the old style range cow (table 2).

The major increases in nutrient requirements occur during the lactation production periods. The modern range cow with average milk production at 20 lb/d requires 45% more crude protein during the early lactation period and requires 41% more crude protein during the spring, summer, and fall lactation periods than the old style range cow (table 1). The modern range cow with high milk production at 30 lb/d requires 79% more crude protein during the early lactation period and requires 72% more crude protein during the spring, summer, and fall lactation periods than the old style range cow (table 2).

The beef cow herd at Dickinson Research Extension Center was evaluated for the amount of weaned calf weight as a percentage of cow weight at weaning in 2007 (Ringwall 2008). These 5 to 9 year old modern cows had advanced genetic potential for fast growth, high performance, and high milk production at near 30 lb/d. The steer and heifer calves were about 7.5 months old (228 days) at weaning in mid November. The cows were separated into five weight categories from 1200 lbs to 1600 lbs with 100 lb increments (table 3).

Modern high performance cows should be expected to wean calf weight at greater than half the cows weight. However, the calf weight weaned by these very good beef cows was less than half the cows weight. As the cow weight increased, the percent calf weight weaned decreased from 49.7% for the 1200 lb cows to 33.7% for the 1600 cows (table 3). The cow crude protein requirements increase with increases in cow weight. The crude protein content of the available pasture forage managed by traditional old style practices decreases from early August to the end of the growing season in mid October. The crude protein content of less than 5% after mid October is tied to plant structural material and unavailable. The degree of deficiency in forage crude protein after early August increases with increases in cow weight and causes incrementally greater decreases in calf weaning weight for the calves of the incrementally larger cows.

Providing creep feed for the calves and supplemental crude protein for the cows attempts to treat the symptoms but does not solve this problem. The solution is two pronged: 1) lower mean cow weight to be in concordance with a herd of 1000 lb to 1200 lb cows, and 2) implement a biologically effective grazing management strategy that activates vegetative tiller production from axillary buds which increase the available forage quality during early August to mid October.

Modern range cows perform more efficiently and produce near potential rates when the forage nutrients provided meet the quantity of nutrients required during each production period. Biologically effective forage management strategies designed for high performance range cows (Manske 2012, 2014a, 2014b) are based on providing adequate nutrients that match the livestock nutrient requirements every day of each production period. Beef producers can select appropriate combinations of pasture types and harvested forage types and coordinate the livestock use of those forage types so that the herbage production curves and nutritional quality curves of the plants meet the dietary quantity and quality requirement curves of each cow production period. Matching the forage nutrient quality and quantity with livestock nutrient requirements is necessary for efficient beef production. Biologically effective forage management strategies improve cow performance, reduce cost per pound of captured crude protein, reduce acreage needed to carry a cow-calf pair, reduce forage feed costs per acre and per day, increase calf accumulated weight gain per acre, reduce cost per pound of calf weight gain, increase net return after pasture and harvested forage costs per cow-calf pair, and increase net return after forage feed costs per acre increasing the quantity of new wealth captured from the land natural resources.

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Table 1. Intake nutrient requirements (lb/d) and percent difference between modern 1200 lb range cow with average production and old style 1000 lb range cow.

Nutrient Requirements and Percent Difference		Cow Production Periods				
		Dry Gestation	Third Trimester	Early Lactation	Lactation Spring, Summer, Fall	12-month Season
Old Style 1000 lb range cow with milk production at 12 to 6 lb/d						
Dry Matter	lb/d	21.0	21.0	21.6	22.3	21.78
Energy (TDN)	lb/d	9.64	10.98	12.05	11.98	11.54
Crude Protein	lb/d	1.30	1.64	1.88	1.78	1.72
Modern 1200 lb range cow with average milk production at 20 lb/d						
Dry Matter	lb/d	24.0	24.0	27.0	27.0	26.0
Energy (TDN)	lb/d	11.02	12.62	15.85	15.23	14.29
Crude Protein	lb/d	1.49	1.87	2.73	2.51	2.29
Percent increase in nutrient requirements for average production 1200 lb cow						
Dry Matter	%	14.29	14.29	25.00	21.08	19.38
Energy (TDN)	%	14.32	14.94	31.54	27.13	23.83
Crude Protein	%	14.62	14.02	45.21	41.01	33.14

Data from NRC 1996.

Table 2. Intake nutrient requirements (lb/d) and percent difference between modern 1200 lb range cow with high production and old style 1000 lb range cow.

Nutrient Requirements and Percent Difference		Cow Production Periods				
		Dry Gestation	Third Trimester	Early Lactation	Lactation Spring, Summer, Fall	12-month Season
Old Style 1000 lb range cow with milk production at 12 to 6 lb/d						
Dry Matter	lb/d	21.0	21.0	21.6	22.3	21.78
Energy (TDN)	lb/d	9.64	10.98	12.05	11.98	11.54
Crude Protein	lb/d	1.30	1.64	1.88	1.78	1.72
Modern 1200 lb range cow with high milk production at 30 lb/d						
Dry Matter	lb/d	24.1	24.2	29.2	29.08	27.45
Energy (TDN)	lb/d	11.07	12.73	18.0	17.17	15.64
Crude Protein	lb/d	1.50	1.90	3.36	3.06	2.67
Percent increase in nutrient requirements for high production 1200 lb cow						
Dry Matter	%	14.76	15.24	35.19	30.40	26.03
Energy (TDN)	%	14.83	15.94	49.38	43.32	35.53
Crude Protein	%	15.38	15.85	78.72	71.91	55.23

Data from NRC 1996.

Table 3. Weaned calf weight as percentage of cow weight at weaning.

		Cow Weight Categories (lbs)				
		1200-1299	1300-1399	1400-1499	1500-1599	1600-1699
#Cow-Calf Pairs		37	39	38	33	22
Mean Cow Weight	lbs	1242	1357	1456	1549	1698
Mean Calf Weight	lbs	617	611	589	598	572
Mean Weight/D of Age	lb/d	2.71	2.68	2.58	2.62	2.51
Calf Wt % Cow Wt	%	50%	45%	41%	39%	34%

Data from Ringwall 2008.

Literature Cited

Manske, L.L., and S.A. Schneider. 2012. Biologically effective management of grazinglands. 3rd Edition. NDSU Dickinson Research Extension Center. Rangeland Research Outreach Program DREC 12-4015. Dickinson, ND.

Manske, L.L., and S.A. Schneider. 2014a. Evaluation and development of forage management strategies for range cows. 3rd Edition. NDSU Dickinson Research Extension Center. Rangeland Research Outreach Program DREC 14-4011c. Dickinson, ND.

Manske, L.L., and S.A. Schneider. 2014b. Increasing value captured from the land natural resources: An evaluation of pasture forage and harvested forage management strategies for each range cow production period. 3rd Edition. NDSU Dickinson Research Extension Center. Rangeland Research Outreach Program DREC 14-4010c. Dickinson, ND.

National Research Council (NRC). 1996. Nutrients requirements of beef cattle. 7th rev. ed. National Academy Press, Washington, DC.

Ringwall, K. 2008. With cow sizes, one can't forget production potential. BeefTalk 408. NDSU News Release. http://www.ag.ndsu.edu/news/columns/beeftalk/