Forage Plant Nutrients Produced on the Land Are the Primary Unit of Production in the Beef Industry

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The genetic make-up of the North American beef herd has been transformed over the past forty to fifty years, and we now have high-performance, fast-growing meat animals. However, the improved profit margins anticipated from this new type of livestock have not materialized. The fundamental cause of this problem is that traditional pasture-forage management practices are inefficient at capturing nutrients from the land. The beef production industry as a whole has not moved toward implementing an improved, efficient pasture-forage management system paradigm.

The basic components of the traditional pasture-forage management system have not changed in decades. Forage dry matter quantities are still used as the measure when producers make major pasture and harvested-forage management decisions. Pasture stocking rates are determined from estimates of herbage dry matter production. Harvested forages are cut at the time when the greatest dry matter weight can be captured, and hay is traded on the dry matter weight basis per bale or ton.

Forage dry matter does not have a real economic value because it is not incorporated into the beef weight produced. The dry matter is simply the carrier of the nutrients it contains. The nutrients, mainly crude protein and energy (TDN), are the valuable products produced by forage plants on the land.

The renewable forage nutrients are the primary unit of production in a beef operation, and they are the source of new wealth from agricultural use of grazingland and hayland resources of the Northern Plains. A biologically effective pasture-forage management system based on increasing production of nutrients per acre, improving the efficiency of capturing produced nutrients, and improving the conversion of nutrients into a saleable commodity like calf weight will improve profit margins by reducing costs per pound of nutrient, cow-calf pasture-forage costs, and the cost of accumulated calf weight.

A comparison of the traditional and the biologically effective pasture-forage management systems can be illustrated by a story of two gold bullion producers.

Gold bullion producer A and gold bullion producer B have the same type of mill equipment and the same size dump truck. Each mill has the capacity to process one truckload of gold-bearing rock per day. A local mine supplies the ore, which is priced by the ton of matrix rock.

Producer A places priority on managing for efficient capture of gold. He samples the ore coming from various locations at the mine and loads only ore with high gold concentrations into his dump truck for use at the mill. He hauls and stores extra loads of ore when the mine is extracting rock from areas that have a high gold concentration. He has these stored loads delivered to the mill when the mine is extracting rock from areas of low gold concentrations. This producer operates his mill at potential outputs all year, one half the year with high-quality ore delivered directly from the mine and the other half with high-quality ore hauled from storage.

Gold producer B uses traditional practices and tries to provide adequate quantities of matrix rock that meet mill input needs. He plays golf for $1.00 a hole to supplement his income, and he hauls ore from the mine at times that do not interfere with his golf schedule. Loading his truck with mine run ore during the entire year is more convenient, requires less time away from his golf games, and does not require the additional costs of labor and equipment needed to handle stored rock. However, producer B is able to operate his mill at potential outputs for only a quarter of the year; for the other three-quarters of the year, output from his mill is below potential.

The matrix rock that producer A selects and hauls to his mill has higher gold content during three-quarters of the year than the rock producer B hauls to his mill. The strategy of producer A permits him to capture greater quantities of gold from his mill each year than producer B captures. The cost per ton of matrix rock is the same for both producers, but because the gold concentration in his matrix rock is greater, producer A has a lower cost per pound for gold delivered to his mill. This reduction in cost for the input gold amounts to a far greater savings than the costs hauling some of the loads from storage add. Producer A's effective

management, which provides ore with a greater concentration of gold, results in improved mill operation efficiency and a lower cost per pound for the output gold produced. Producer A receives greater profits than producer B when both producers sell their entire annual production at the same time to the same distributor at the same rate per pound of gold. Producer B is a better-than-average golfer, but his expenses often exceed his winnings.

Managing for efficient capture of the greatest quantity of the primary unit of production, whether gold in matrix rock or nutrients in forage, is critical to improved profit margins. The cow-calf operation that bases management on efficient pasture-forage practices that produce and capture the greatest quantities of nutrients per acre could have 130 percent more saleable product per year than a similar operation run by traditional practices. Pasture and forage costs for the operation managed with efficient pasture-forage practices could be only 70 percent of the traditional operation's costs, and the profit of the operation managed with efficient practices could be 92 percent greater than that of the operation managed with traditional practices.

Biologically effective pasture-forage management systems have three characteristics that improve the efficiency of feeding beef cows. First, effective management systems increase forage nutrient production per acre by coordinating defoliation periods with plant growth stages so that the biological requirements of the plants are met. This timed defoliation promotes vegetative reproduction by tiller development from axillary buds, stimulates beneficial activity of rhizosphere organisms, and facilitates the functioning of ecosystem processes at higher levels. For native rangeland this stimulation period occurs between the third new leaf stage and the flowering stage (1 June to 15 July).

Second, effective management systems improve nutrient capture efficiency by using various forage types during the periods in which the amount of nutrient weight captured per acre is a high proportion of the nutrients produced. The optimum plant growth stage for harvest by grazing or haying is that at which the herbage production curve and the nutrient quality curve for a specific forage type cross. For perennial grasses, this period occurs at the flowering stage.

Third, effective management systems increase nutrient conversion efficiency by providing adequate nutrients throughout the cows' 12-month production cycle. High-performance livestock perform at greater efficiency when their nutritional demands are met in each production period. Periods with nutrient deficiency limit livestock production. Producers can match forage nutrient supply to livestock nutrient demand by selecting appropriate combinations of pasture and harvested-forage types and by timing livestock use of those forages so that herbage production curves and nutrient quality curves of plants match the dietary quality and quantity requirement curves of cow production periods.

A biologically effective pasture-forage management strategy for beef cows with calves born before mid April is to graze fertilized crested wheatgrass (50 lbs N/acre on the first week of April) from early May to early June; graze native rangeland managed by a 3- or 4-pasture twice-over rotation system from early June to mid October; graze Altai wildrye from mid October to mid November; graze spring-seeded winter cereal, like winter rye, from mid November to mid December; and feed early harvested annual cereal hay, like forage barley cut at the milk stage, from mid December to late April.

More information on biologically effective pasture-forage management systems is available on the Web at www.GrazingHandbook.com.

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