

Time of Harvest Is Critical in Minimizing Hay Cost

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Beef producers can reduce the cost of livestock feed from harvested forages by cutting plants at the optimum growth stage, says a North Dakota State University range scientist.

“Cutting forages at the growth stage when the greatest amount of nutrients can be captured per acre reduces the costs of nutrients and in turn the costs of livestock feed,” states Lee Manske, range scientist at NDSU’s Dickinson Research Extension Center. “Traditionally, domesticated perennial grass hays are cut late, after the seed heads have developed and plants have reached maximum height. Cutting domesticated grass hay at a mature plant stage yields about the year’s potential production of forage dry matter per acre at a moderately low cost per ton, but the low yield in weight of nutrients per acre causes high nutrient costs.”

Mature domesticated grass hay like crested wheatgrass and smooth brome grass is expensive livestock feed because the costs per pound of crude protein are high, at 28 cents. The land costs, production costs, equipment costs, and labor costs per acre are lower for domesticated grass hay cut late than for annual cereal hays like forage barley or oat forage and for annual legume hays like forage lentils or pea forage. However, during the cows’ third trimester production period mature domesticated grass forage has daily livestock feed costs of 85 cents per cow, which are considerably greater than the daily feed costs of 38 cents per cow for annual cereal forages and 44 cents per cow for annual legume forages.

Livestock feed costs are determined primarily by the cost per unit of weight of the nutrients contained in the forage, not the cost per unit of weight of dry matter, Manske says. The amounts of dry matter needed to meet the nutrient requirements of livestock are variable with the amount of nutrients contained in the forage. Forages with lower nutrient costs per unit of weight have lower feed costs per day. The nutrient cost per unit of weight is determined by the weight of the nutrients harvested per acre prorated against the land costs, production costs, equipment costs, and labor costs per acre.

The weight of nutrients harvested per acre is related to the percent nutrient content and the weight of the forage dry matter at the time of cutting. The percent crude protein content and dry matter weight of the forage first increase and then decrease as the growing season progresses and plants mature. These changes are reflected in the quantity curves for the two factors. The percent crude protein content and dry matter weight curves for a single forage type differ from each other throughout the growing season, and the curves of various forage types have different shapes.

The greatest percent crude protein occurs during early plant growth stages and then the quality level declines as the plants develop. The weight of the forage dry matter per acre increases during the early growth stages until plants reach their maximum height, and then the dry matter weight decreases as the plants dry during senescence, Manske explains. The rate of growth to peak dry matter weight is greater in grasses than legumes, and percent crude protein content declines at a greater rate in grasses than in legumes. The greatest amount of crude protein per acre is present not when the percent crude protein curve or dry matter weight per acre curve reaches its peak but at the plant growth stage when the curves for percent crude protein content and weight of forage dry matter cross.

The two curves cross at the flowering growth stage for grass plants, including perennial grasses and annual cereal grasses. The cost per pound of crude protein is lower for perennial grasses and annual cereal forages when plants are cut early, between the boot stage and the early milk stage. Cost per pound of crude protein for crested wheatgrass hay cut at the boot stage is 14 cents, half the cost per pound of crude protein for hay cut at a mature plant growth stage. Costs per pound of crude protein for forage barley and oat forage hay cut early, at the milk stage, are

11 cents and 13 cents. Costs per pound of crude protein for the respective annual forage types cut later, at the hard dough stage, are higher, at 15 cents and 17 cents.

The two curves for legumes cross at a later growth stage, when the plants are at full growth but before the leaves start drying from senescence. Costs per pound of crude protein are 13 cents for forage lentil and for pea forage hay cut once at a late full-growth stage. Costs per pound of crude protein are 17 cents and 15 cents, respectively, for the same legume forage types cut at earlier plant growth stages.

“This evaluation of harvested forages based on costs per unit of weight of the nutrients shows that not all harvested forages are expensive livestock feed,” Manske says. “Harvested forages cut at the growth stage that yields the greatest amount of nutrients per acre have lower costs per unit of weight of nutrients and provide lower-cost livestock feed.”