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The management of forage crops, especially hay, can be improved on many farms and ranches. Typically, if a choice is required between working on (1) a cash grain crop or a livestock enterprise versus (2) a hay crop, the hay crop loses. In many cases this makes sense. Labor should be allocated to the enterprise in which the greatest marginal gain can be secured.

However, opportunities in managing alfalfa hay are sometimes missed. In this newsletter, we explore possibilities for more economically harvesting and handling alfalfa up to the point of storage and feeding.

Timing at Harvest

Forage management goals directly affect decisions regarding when crops are harvested. Hay crops can be managed primarily for quality at harvest or for yield output and stand longevity. Managing for quality only can result in rapid deterioration of a plant stand. Plants "worn down" from early harvesting require more frequent stand replacement than those managed for maximum yield.

Thus, an economic trade-off exists. Can a producer gain more from producing a higher quality hay than from producing the maximum tonnage? The answer will depend upon the producer's hay needs. If the producer requires the hay for a dairy operation in which milk production is the ultimate goal, producing a quality hay may bring the greatest return. If a producer requires the hay for a range beef cow operation, a higher return may be obtained from concentrating on quantity of output. Forage for sale to others should be managed for the prospective buyer's needs.

Hay Storage Losses

The use of large round bales has been widely adopted by many producers. This method of harvesting decreases the amount of time and labor required to harvest hay. For example, normal baling rates with large round bales range from 10 to 16 t/hr compared to 6 to 10 t/hr for small bales. If handled properly, the feed value of large bales can be equal to that of small bales. Large bales, however, have their own special problems--most of which are associated with weathering and spoilage.

In considering the economic losses associated with the spoilage of large round bales, the hay bale weight associated with different depths of possible hay spoilage needs to be understood. For a 1,500 lb. bale six feet in diameter and five feet long, 11% of the bale (160 lbs.) is contained in the outside 2 inches. The corresponding figures for 4 inches are 21% (315 lbs.), for 6 inches 31% (460 lbs.), for 8 inches 40% (595 lbs.), and for 10 inches nearly half or 48% (720 lbs.). At $45/ton, a loss of even two inches from the outside of a round bale represents a loss of $3.71/bale. Dollar losses increase as more of the outside of the bale is spoiled ($7.09 with 4 inches spoiled, $10.46 with 6 inches, $13.50 with 8 inches, and $16.20 with 10 inches). Thus, the true cost per ton of usable hay in this example range from $49.95/ton with a 2 inch loss to $66.60/ton with spoilage of the outside 10 inches. Since greater percentages of total bale weight are contained in outside layers of smaller bales, the relative losses for small bales are even greater than in this example.

Economics of Shelters

Economic decisions regarding the inside storage of hay will depend upon the amount of deterioration (due to

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weathering) that you encounter, the price of hay, and the cost of storage structures. Shelters are economically feasible only if the value of the hay saved is greater than the annual ownership cost of the storage facility.

Let's assume that you are considering the construction of a pole shed to store your hay. If the cost per square foot for the shed was $3.50 and your annual ownership costs were 14%, the annual ownership cost per square foot would be $.49. It is estimated that small square bales require approximately 15 sq ft/ton, large round bales stacked 2 high need 30 sq ft/ton, and large round bales stacked 3 high require 20 sq ft/ton. Multiplying the annual ownership cost times the square footage required, the annual storage costs for small square bales would be $7.35/ton; for 2 high large round bales, $14.70/ton; and for 3 high large round bales $9.80/ton. If your expected storage losses per ton due to weathering exceeded the above annual ownership costs per ton, it would pay you to build the pole shed. Building hay storage would be even more feasible if your building cost per square foot or annual ownership costs were lower than those in this example.

Hay Feeding Losses

Wastage due to trampling when cattle are allowed free access to large package bales can be severe. A Purdue University study showed 12 to 45% more hay was required when large bales were fed on the ground without racks as compared to feeding hay in racks. Losses from feeding hay on the ground without racks ranged from 12% for a once-a-day feeding to 45% for once-in-4 day feeding (assuming 20 lbs./cow/day). This compares with a loss of 5% for rack feeding. The value associated with this loss ranges from $3.15 to $18.00/ton (at $45/ton), depending on feeding interval. Thus, using racks can be another possible way to lower livestock production costs.

Summary

South Dakota farmers and ranchers may be able to improve the quality of their alfalfa hay crop, and at the same time, increase their returns per ton or per acre. Many of the options available to improve hay quality do not require large new investments, only deliberate timing and a little common sense. If you are a producer, take a good look at your storage and handling methods. Also, evaluate your situation for the best time to harvest so that you can take maximum advantage of the trade-offs between improved forage quality and increased forage yield. Little adjustments could bring high pay-offs to your forage enterprise.

Further information on producing high quality forage may be obtained by contacting the author (SDSU Economics, Box 504A, Brookings, SD 57007; tel 605-688-4873), or Ed Twidwell, Extension Forage Specialist, Ag Hall, SDSU, Brookings, SD 57007; tel 605-688-4754), or from groups such as the South Dakota Forage and Grassland Council (Arie Bertsch, President, R.R. 1, Box 19, Freeman, SD 57029; tel 605-925-7082).