



Forage Management

Ed Rayburn, Forage Agronomist, WVU Extension Specialist

February 2006

Hay Production Costs Cut By Proper Use of Legumes or Nitrogen Fertilizer

Weather conditions cause hay production to vary from year to year. Market conditions and a producer's aversion to risk help the farmer to determine whether to use the optimum nitrogen (N) fertilization rate or to use legumes to fix N for hay production. We have good information on the effect of nitrogen and legume management on the average hay production and the variability in hay production caused by weather.

This information was used to produce budgets to evaluate the effect of year-to-year production variability on the break-even price. Production costs were based on costs of machinery and time that are typical of a small West Virginia beef cattle farm. Fertilizer prices were based on 2005 spring prices. For rates of N fertilizer greater than 50 pounds per acre per year, it was assumed that the N would be split-applied and that two or three hay cuts would be done per year. The cost of hay production is expressed as a break-even price - the value of all fertilizer, machinery, and labor (\$10/hour) but not the value of the land. This study did not consider the risk of rain damage.

The mean hay yield and the variation in hay yield are plotted in Fig. 1. Since most farmers admit that they are gamblers, I am presenting average values and also the odds of having higher or lower yields. The 15 percent level represents a one-in-six-year chance of yields being lower than indicated, and the 85 percent level represents a one-in-six-year chance of yields being higher than indicated. The space between the 15 percent and 85 percent probabilities represents what yields will be in two out of three years.

In this study, hay production increased as N-fertilization rate increased. There was little difference

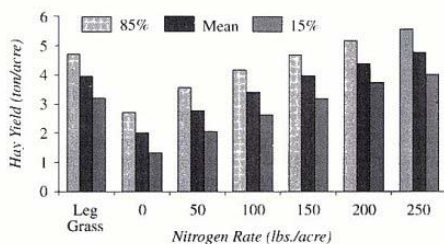


Fig. 1 The effect of nitrogen rate and legume combination on the mean and 15 percent and 85 percent probability levels of orchardgrass and alfalfa-orchardgrass hay yields.

in the 15 percent-85 percent probability yield spread for any of the forage systems evaluated.

Under N fertilization, the 0 N rate had the highest average cost (breakeven price of \$63/ton), and the 100 pounds of N/acre had the lowest cost (\$53/ton) (Fig. 2). The orchardgrass-legume hay management would have the lowest cost (\$44/ton). The largest 15 percent-85 percent yield spread in break-even price occurred for the 0 N rate. The smallest spread occurred for the orchardgrass-legume system. This spread indicates the risk in the management system.

At the rate of 100 pounds of N/acre (the N rate having the lowest break-even price for N-fertilized hays), the price of N has to increase to \$0.72/pound (1.9 times the 2005 price) before the break-even price of N-fertilized hay increases to \$63/ton (the break-even price of hay receiving no N fertilizer and having no legume).

With the currently high N price (\$0.38/pound), machinery and other variable costs have a greater influence on hay break-even price than does N-fertilizer price. From a business management perspective, it appears that maintaining legumes in hay stands to provide N is an important way to keep down the costs of hay production. When legume content in the stand is insufficient to maintain adequate N fixation, N fertilization of the grass hay stand will increase hay production and keep unit production costs of hay lower than using no N fertilizer, which results in low hay yields.

This research was done as part of the Pasture-Based Beef Systems for Appalachia, a multi-institutional collaboration among the U.S. Department of Agriculture's Agricultural Research Service, West Virginia University, Virginia Tech, and the University of Georgia.

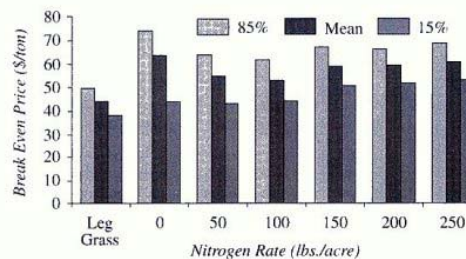


Fig. 2 The effect of nitrogen rate and alfalfa combination on the mean and 15 percent and 85 percent probability levels of orchardgrass hay break-even price.