SPECIAL REPORT

HARVEST MANAGEMENT ALTERS ECONOMIC RETURN COOL-SEASON GRASSES

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Cool-season grass use in Pennsylvania farming systems is increasing as farmers attempt to better manage and utilize nitrogen from manure. Harvest management recommendations for many cool-season grasses are generally based on research which monitored yield only. With forage quality being a major concern in balancing animal rations, livestock farmers are asking more about harvest management practices to manipulate forage quality and the economics of these practices.

The objectives of this study were to determine the effect of harvest frequency and number on forage yield and quality, and net economic return of cool-season forage grasses common to the northeastern United States.

Study Description

Established stands of orchardgrass, reed canarygrass, smooth bromegrass, and timothy at the Russell E. Larson Agric. Research Center near Rock Springs, PA were subjected to two (70-d interval), three (45-d interval), or four (35-d interval) harvests per year. Dry matter yield and forage quality were determined and economic evaluations of each treatment were made based on the value of the harvested forage and the differential costs associated with production.

Applied Questions

• Which harvest schedule produced the greatest DM yield/acre? In dry years, greatest DM yields for all species were obtained when 2 or 3 harvests/year were taken on a 70 or 45-d interval, respectively (Table 1). During the growing seasons with normal or above normal rainfall, greatest yields of smooth bromegrass and timothy were again achieved when harvested 2 or 3 times/year; however, yields or orchardgrass and reed canarygrass were greatest when harvested 3 or 4 times/year (Table 1).

• Which harvest schedule resulted in the highest quality forage? Regardless of rainfall during the growing season or grass species, forage quality improved and value of the forage increased from $49 to $81/ton as harvest interval decreased from 70 to 35 d, respectively.

• Which harvest treatment produced the greatest economic return/acre? In dry years, the number of harvests (harvest interval) made no difference in net economic return regardless of the grass species (Table 1). This response is logical because harvest schedules that produced the greatest yields also produced forage of the lowest quality, resulting in similar economic return for all harvest schedules.

In growing seasons when rainfall is normal or above normal, frequent harvests (35 or 45-d intervals) tended to result in the greatest net economic return per acre (Table 1). Frequent harvests also produced the highest quality forage but did not negatively impact forage yield as much as in dry years. An exception to this trend was for timothy where harvest frequency had no effect on economic return.

Recommendations

In the northeastern United States, cool-season grass harvest schedules must remain flexible and responsive to climatic conditions. In dry years, reduced yields associated with more frequent harvests of orchardgrass, reed canarygrass, smooth bromegrass and timothy were offset by improved forage quality so that net economic return per acre was unaffected. Therefore, under dry conditions, the level of forage quality required by the consuming animal should be used as guidelines for implementing a harvest schedule. Sufficient DM intake for high producing dairy animals would be impossible with the quality of forage obtained with 70-d harvest intervals. In years when rainfall is at or above normal, 35 to 45-d harvest intervals should be employed to maximize DM yield and forage quality.

Forage producers need to be able to plan a harvest strategy that will maximize net economic return without knowing what the growing season will be like. Consequently, producers who want high quality forage, should plan the first harvest as if four harvests will be taken on 35-d intervals. This means that in central Pennsylvania the first harvest should be taken about 20 May to ensure that a large portion of the grass forage for the season will be of high quality since a large portion of the total annual yield comes in the first harvest. The 35-d harvest interval could then be lengthened to 45d or more unless rainfall and grass growth are well above normal.

Table 1. The effect of number and frequency of harvests on the annual dry matter (DM) yield and net economic return from four perennial cool-season grasses under different environmental conditions.

Treatments		Dry Conditions†		Normal to wet conditions†	
Species	Harvest schedule	DM	Economic return‡	DM	Economic return‡
#/yr x interval	ton/acre	$/acre	ton/acre	$/acre	toon/acre
Orchardgrass	2 x 70 d	3.97§	88	5.35	159
	3 x 45 d	3 77	97	5.64	217
	3 x 35 d	3.04	97	----	--
	4 x 35 d	----	--	5.55	258
Reed canarygrass	2 x 70 d	3.78	96	5.48	197
	3 x 45 d	3.63	97	5.86	250
	3 x 35 d	2.87	108	----	--
	4 x 35 d	----	--	5.15	247
Smooth bromegrass	2 x 70 d	4.45	130	6.31	233
	3 x 45 d	3 89	117	6.19	283
	3 x 35 d	2.77	103	----	--
	4 x 35 d	----	--	4.89	252
Timothy	2 x 70 d	4.13	106	5.70	172
	3 x 45 d	3 70	88	5.25	194
	3 x 35 d	2.89	87	----	--
	4 x 35 d	----	--	4.54	172

†Dry and wet conditions averaged 70 and 135 percent, respectively, of normal (29.6 in. by 1 Oct). Reduced plant growth permitted only three harvests to be made from the four-harvest treatment in dry years.

‡Based on relative value of the harvested forage ($65/ton hay with a forage quality of 16% CP and 60% DDM) minus costs for harvesting ($28/harvest) and fertilization.

§All values are the mean from 2 years.