Tall Fescue: Forage and Seed Production Economics

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Introduction

Irrigated grass pastures are essential components of western U.S. agriculture, especially on cattle ranches of the intermountain region. Unfortunately, the yield and quality of these grasslands are relatively low compared to the national average because of current management practices (Jacobs *et al.*, 1993). Attempts have been made to increase forage yields of these pastures by fertilization and applying or controlling irrigations but these efforts have resulted in minimum success (Jacobs *et al.*, 1993). The price increase of fertilizer, energy, and fuel has made improvement of these natural grasslands more difficult and thus threatens the profitability and sustainability of current production systems.

Tall fescue (*Schedonorus arundinaceus* (Schreb.) Dumort.) is one of the most productive cool-season grasses in the U.S. It can grow on a wide range of soils, has high drought and winter hardiness, and can be used for pasture, hay, stockpiling, silage, soil conservation, and turf grass (Balasko, 1981). Also, it has prolific seed production ability. Therefore, tall fescue may have potential for forage and seed production in northwest Wyoming of U.S., perhaps other areas including neighboring states. The objectives of this project were to find out the suitability of tall fescues that are adaptable to the western mountain regions, specifically the Bighorn Basin, and generateinformation on growth, forage yield, and seed yield that could benefit growers in the Bighorn Basin and other areas of Wyoming and beyond.

Materials and Methods

The study was conducted at the Powell Research and Extension Center (PREC) and at the Stroh farm, Powell, under irrigated conditions. The experimental design was a factorial randomized complete block with four replications organized in a split-plot arrangement. The experiments included a forage yield trial that received three different nitrogen (N) treatments (0, 56, and 112 kg N ha^{-1}) and a seed yield trial that received three N treatments (0, 112, and 168 kg N ha^{-1}). There were three clipping treatments (no, early [early May], and late [late May to early June]) for seed yield trial. Forage yield and seed yield were measured by harvesting plots (Fig 1) every year for three years and an economic comparison was made on average forage and seed yields.

Fig 1 Powell Research and Extension Center: Forage harvesting using a Swift forage harvester

Forage yield and seed yield data was analyzed each year using standard GLM procedure of SAS. Block, year, and

interaction effects were considered at the time of analysis. Means were separated ($P \leq 0.05$) following F test. Finally, an economic comparison of seed and forage production with N rates under irrigation was made. Custom enterprise budgets were prepared to determine the expected net returns. Given the fact that production systems analyses are not common in the study area, custom rates were used for each location. Current fertilizer prices were used from Agricultural Prices, National Agricultural Statistics Service, USDA. For hay price, 2012 average market price for Wyoming was used (WAS, 2013). Current market price for tall fescue seeds was used to calculate seed production revenue.

Results and Discussion

Tall fescues used in the study responded well to N treatments (*e.g.,* Table 1). The highest forage and seed yields were associated with the highest N treatment. Clipping treatments influenced seed yield as well. The highest seed yields were associated with the highest N and no clipping treatments. The forage and seed yields obtained from this study are promising and similar to or greater than other work reported by other researchers (Rolston and Young III, 2009; Islam *et al.*, 2011). Economic comparisons showed that at least 56 kg N ha^{-1} was needed to make the forage production profitable under irrigation (Table 1). Seed productions from tall fescue were more profitable than forage production. At both locations, the maximum expected net returns ($809 ha^{-1} at PREC; $719 ha^{-1} at Stroh farm) were obtained from 168 kg N ha^{-1} with no clipping treatment (data not shown). Early clipping may be used in years when late freezing injury and/or limited forage availability are expected. Based on three years data and economic comparison, late clipping is not recommended as this decreased seed production significantly. The study generated useful information for producers in the region and beyond to use tall fescue both as forage and seed crops.

Table 1 Economic comparison of tall fescue managed for forage production under irrigation

Revenue ha^{-1}	**PREC**			**Stroh farm**		
	N treatment (kg ha^{-1})					
	0	56	112	0	56	112
Forage production (kg ha^{-1})	2143	5070	6603	1620	3971	5793
Revenue* ($)	202	479	624	153	375	548
Expenses ha^{-1} ($)						
Land preparation	$17	$17	$17	$17	$17	$17
Seed	$31	$31	$31	$31	$31	$31
Fertilizer N	$0	$36	$72	$0	$36	$72
Fertilizer phosphorus	$52	$52	$52	$52	$52	$52
Fertilizer potassium	$11	$11	$11	$11	$11	$11
Weed control	$34	$34	$34	$34	$34	$34
Planting	$13	$13	$13	$13	$13	$13
Corrugating	$11	$11	$11	$11	$11	$11
Seed harvesting	$0	$0	$0	$0	$0	$0
Forage harvesting	$34	$34	$34	$34	$34	$34
Misc. expenses and interest	$90	$90	$90	$90	$90	$90
Total expenses	$293	$329	$365	$293	$329	$365
Expected net return* ($ ha^{-1})	**-$90**	**$150**	**$259**	**-$139**	**$46**	**$183**

*For hay price (revenue), the 2012 average market price for Wyoming was used, *Custom enterprise budgets were prepared to determine the expected net returns.

Conclusion

The economics of forage and seed yield indicate that tall fescue may have potential to add revenue to producers' enterprises. However, further studies warrant determining the maximum N rates for maximum profits.

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