

## ECONOMICS

# Study reveals legume-fescue mixture economics

by Jon Biermacher / [jtbiernmacher@noble.org](mailto:jtbiernmacher@noble.org), Mohua Haque / [mhaque@noble.org](mailto:mhaque@noble.org) and Paul Beck, University of Arkansas Southwest



**Tall fescue** is a primary cool-season perennial forage used to grow light-weight stocker cattle in the southeastern Great Plains. Kentucky 31 (K31) is the

most common variety in the region, but is infected with a toxic endophyte (TE) that causes fescue toxicosis in beef cattle, which reduces animal performance and profitability. Novel endophyte (NE) varieties have been developed that maintain the group of toxins that protects the plant from most pests, but does not have the toxin that causes fescue toxicosis in beef cattle. Establishment of nontoxic legume crops (e.g., clover) into stands of K31 has been shown to dilute the effects of fescue toxicosis while supplying the plants with significant levels of nitrogen fertilizer. At this time, however, there is limited information about the economic potential of grazing novel versus toxic tall fescue that has been interseeded with nontoxic legumes. In response to this limited information, a collaborative study between the Noble Foundation and the University of Arkansas was conducted.

Data for average daily gain, grazing days and total gain per acre were

**Table 1. Grazing days, total gain, costs, revenue and net return by grazing system**

Measures of Animal and Economic Performance	Grazing system**					
	TexC	TexN	K31C	K31N	MaxC	MaxN
Grazing Days	139bc	151a	137c	151a	139bc	146ab
Total Gain (lbs/acre)	457c	538a	258d	279d	438c	499b
<b>Establishment Costs:</b>						
Seedbed Preparation (plow, disk, cultivate) (\$/acre)	38	38	38	38	38	38
Fertilizer (N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O) (\$/acre)	187	187	187	187	187	187
Pesticide application (\$/acre)	10	10	10	10	10	10
Tall Fescue Seed and Seed Establishment (\$/acre)	90	90	50	50	90	90
Fescue Establishment Costs (\$/acre)	324	324	284	284	324	324
Fescue Costs Amortized @ 7.5% (\$/acre)	47	47	28	28	47	47
Clover Establishment Costs (\$/acre)	18	-	18	-	18	-
Clover Cost Amortized @ 7.5% (\$/acre)	5	-	5	-	5	-
Total Annual Establishment Cost (\$/acre)	53	47	33	28	53	47
<b>Annual Production Costs:</b>						
Fertilizer (N, P <sub>2</sub> O <sub>5</sub> , K <sub>2</sub> O) (\$/acre)	35	118	35	118	35	118
Mineral (\$/acre)	26	32	26	32	26	31
Cattle Receiving (\$/acre)	121	139	121	139	121	140
Interest on Operating Capital (\$/acre)	31	40	31	40	31	39
Total Annual Production Costs (\$/acre)	214	328	214	328	214	328
Total Cost (\$/acre)	267c	376a	247d	356b	267c	375a
Gross Revenue (\$/acre)*	462c	545a	269d	293d	443c	497b
Net Return (\$/acre)	195a	169a	22c	-63d	176a	122b

\*Calculated assuming a value of gain of \$1.21 and \$0.88 per lb of gain for the fall and spring grazing periods, respectively.

\*\* Letters that vary between systems represent statistically significant differences at a 95% level of confidence.

collected in a grazing trial conducted over four years (2007 to 2011) at the University of Arkansas's Livestock and Research Station near Batesville, Ark. Two novel endophyte varieties (MaxQ and Texoma MaxQII) and one toxic endophyte variety (K31) were randomly assigned to 18, 2-acre paddocks. White clover was interseeded into one-half of each pasture, while the other half received 60 pounds of nitrogen (34-0-0) in the fall and again in February. Enterprise budgeting techniques were used to compute expected values for production costs,

gross revenue and net return for six tall fescue grazing systems, including 1) Texoma MaxQII with clover (TexC); 2) Texoma MaxQII with nitrogen (TexN); (3) K31 with clover (K31C); (4) K31 with nitrogen (K31N); (5) MaxQ with clover (MaxC); and (6) MaxQ with nitrogen (MaxN).

Grazing days, total gain (pounds per acre), production costs (dollars per acre), gross revenue (dollars per acre) and net return (dollars per acre) averaged over the four grazing seasons for each system are reported in Table 1. Results indicate that the ►

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K31C system realized an \$88 per acre advantage in net return compared to the conventional K31N system. However, neither of the toxic endophyte grazing systems (K31N or K31C) was as economical as the four NE systems (TexN, TexC, MaxN and MaxC) evaluated in the study. The TexC, TexN and MaxN systems realized \$195, \$169 and \$176 per acre net return, respectively, and were not found to

be statistically different. Sensitivity analysis revealed that the results between novel endophyte and toxic endophyte systems were not sensitive to the price of nitrogen, the price of clover or the life expectancy of tall fescue or clover stands. However, it was found that the profits between the TexN and TexC were equal for a price of nitrogen equal to 43 cents per pound. Farmers in this region

who are interested in establishing tall fescue for use in a stocker cattle grazing enterprise would be better off with a novel endophyte variety compared to toxic K31. Farmers who currently utilize K31 are encouraged to consider interseeding white clover into their pastures to help dilute the toxicity of this toxic variety of tall fescue and to help provide necessary nitrogen fertilizer to their pastures. ■