

## Reduce tall fescue toxicosis in *Festuca arundinacea* forage systems with legumes

J.C. Waller, A.E. Fisher, H.A. Fribourg and C.J. Richards

The University of Tennessee, 2505 River Drive, Knoxville, Tennessee, 37996-4574 USA, Email: jwaller@utk.edu

**Keywords:** *in vitro*, forage quality, *Neotyphodium coenophialum*, *Trifolium pratense*, *Trifolium repens*

**Introduction** Tall fescue (*Lolium arundinaceum* = *Festuca arundinacea*) is an important cool-season grass because of persistence and spring and autumn productivity. Most existing tall fescue pastures in Tennessee are Kentucky-31 (KY-31) and are infested with the endophytic fungus *Neotyphodium coenophialum* that causes tall fescue toxicosis. Symptoms in beef cattle include reduced rates of gain, poor conception rates, decreased dry matter intake, a long rough haircoat in summer, and very low serum prolactin. Earlier studies indicated that the performance of cattle grazing endophyte-free (EF) tall fescue is superior to that of cattle grazing endophyte-infected (EI) tall fescue (Fribourg *et al.*, 1995). However, EF tall fescue is not as persistent as EI. Addition of clovers to tall fescue pastures is a recommended practice. Our objective was to compare forage quality, *in vitro* dry matter disappearance, dry matter intake, and animal performance of EI and EF KY-31 pastures, and inclusion of legumes.

**Materials and methods** Experimental pastures were well established and located at the Blount Unit (35°49'N, 83°13'W) of the Knoxville Experiment Station. Forage treatments were EF KY-31 tall fescue, EI KY-31 tall fescue, EI Ky-31 with ladino white (*Trifolium repens*) and red clovers (*T. pratense*) (EI+Cl), and alternating groups of four 20-cm drill rows of EI and EF tall fescues (EI/EF). The strips of EI and EF in the same pasture evaluated a management strategy for improving EI pastures by adding EF areas to reduce the effects of the endophytes. Animal performance data were collected during spring and summer for two consecutive years. Masticate samples were obtained using ruminally cannulated steers (Olsen, 1991) from each pasture treatment for forage quality and *in vitro* digestibility estimates. Samples were placed on ice, transported to the laboratory, and frozen. Samples were air-dried (60°C forced air oven), ground to pass a 1-mm screen in a Wiley mill, and analyzed for crude protein (CP), neutral detergent fiber (NDF), and acid detergent fiber (ADF) via near-infrared technology (FOSS NIR Systems, Model 5000, Silver Spring, MD 20904). *In vitro* dry matter disappearance (IVDMD) was determined using modification of the Tilley and Terry (1963) two-stage *in vitro* technique. Weaned beef (*Bos taurus*) steers with an average initial weight of 329 kg grazed the pastures. Dry matter intakes (DMI) were determined using dosed chromic oxide fecal concentrations and IVDMD. Average daily gain (ADG) was determined by dividing the weight gained during the grazing season by the number of grazing days.

**Results** All experimental pastures contained excellent stands of forage and the EI+Cl contained about 25 to 35% clover each spring and decreased to 15 to 20% in summer.

**Table 1** Forage quality from masticate analyses, *in vitro* dry matter disappearance and animal performance of tall fescue pastures

Parameter	Forage Treatments <sup>1</sup>			
	EI	EF	EI/EF	EI+Cl
CP, % d.m.	18.45 <sup>a</sup>	18.04 <sup>a</sup>	17.52 <sup>a</sup>	24.11 <sup>b</sup>
NDF, % d.m.	68.16 <sup>a</sup>	68.66 <sup>a</sup>	68.49 <sup>a</sup>	49.89 <sup>b</sup>
ADF, % d.m.	37.74 <sup>a</sup>	38.28 <sup>a</sup>	38.35 <sup>a</sup>	31.13 <sup>b</sup>
IVDMD, % d.m.	58.16 <sup>a</sup>	58.42 <sup>a</sup>	59.84 <sup>a</sup>	65.12 <sup>b</sup>
DMI, g/d	4696 <sup>a</sup>	5654 <sup>b</sup>	6177 <sup>b</sup>	5520 <sup>b</sup>
ADG, g/d	436 <sup>a</sup>	717 <sup>b</sup>	576 <sup>c</sup>	553 <sup>c</sup>

<sup>1</sup>Parameters not sharing superscripts are significantly different at  $P < 0.05$

**Conclusions** Addition of clover to EI tall fescue increased forage intakes to that of EF or EI/EF fescue and also increased the quality and digestibility of diet consumed. This resulted in greater gains than those for steers grazing EI fescue without clover, but performance was reduced compared to that of steers grazing EF tall fescue.

### References

- Fribourg, H.A., J.C. Waller, J.H. Reynolds, M.A. Mueller & K.D. Gwinn (1995). Stand persistence of tall fescue cultivars free of or infested with *Acremonium coenophialum*. *Annales de Zootechnie*, 44 (Supp.), 124.
- Olsen, K.C. (1991). Diet sample collection by esophageal fistula and rumen evacuation techniques. *Journal of Range Management*, 44, 515.
- Tilley, J.M.A. & R.A. Terry (1963). A two-stage technique for the *in vitro* digestion of forage crops. *Journal of the British Grassland Society*, 18, 104-111.