The effects of exposure to endophyte-infected tall fescue seed on faecal and urine concentrations of ergovaline and lysergic acid in mature gelding horses

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Introduction Despite the good nutritive value of endophyte-infected tall fescue, consumption by livestock results in a decrease in both reproductive and growth performance due to ergot alkaloids produced by an endophytic fungus (Cross *et al*., 1995). Little research has investigated the metabolic fate of ergot alkaloids and/or their metabolites in grazing horses. Thus, the objectives of this experiment were: a) to determine concentrations of ergovaline (EV) and lysergic acid (LA) in the faeces and urine of geldings exposed to tall fescue seed over a time course experiment and b) to measure the effects of alkaloid-containing tall fescue on nutrient digestibility and serum clinical enzyme profiles.

Materials and methods Mature geldings (394.2 ± 7.1 kg; n = 10) of mixed breeding were randomly assigned to one of two treatments: 1) control diet with endophyte-free tall fescue seed (EF) or 2) a diet containing endophyte-infected (EI) tall fescue seed at 0.5 mg ergovaline/kg of total diet. Lysergic acid in the EI diet was 0.84 mg/kg diet and 0.0 mg/kg in the control diet. Three distinct phases were established: no exposure (Control phase - ContP; 14 d); short-term exposure (Acute phase - AcuteP; 4 d), and longer-term exposure to ergovaline (Sub-acute phase - SAP; 21 d). Ergovaline and LA were quantified in the urine and faeces. Blood and rectal temperatures were collected daily during each phase. Serum was analyzed for creatine kinase (CK), alkaline phosphatase (AP) and aspartate aminotransferase (SGOT).

Results Differences due to treatment were undetected for rectal temperature (P = 0.97). Serum AP and CK were similar between treatment groups (Table 1). Serum SGOT was greater for the EF treated group than those in the EI group during the AcuteP (P = 0.09; 402.6 vs 269.6 U/L). Within the EI treatment group, SGOT was greater during the SAP than the ContP (P = 0.03). Geldings consuming the EI diet had faecal ergovaline concentrations of 0.0, 0.3, and 0.4 mg/kg for the ContP, AcuteP, and SAF, respectively. Within the EI group, ergovaline concentrations differed between the phases (P < 0.01) with the greatest amount excreted during the SAP.

Table 1 Rectal temperature (RT), serum enzyme, and ergovaline data for geldings fed an endophyte-free (EF) and endophyte- infected diet (EI)

	Phase					
	Control		Acute		Subacute	
Treatment	EF	EI	EF	EI	EF	EI
RT, °C[a]	38.5	38.6	38.6	38.7[b]	38.4	38.3[c]
SGOT, U/L[a]	329.8	228.9	402.6[d]	269.6[b, e]	407.9	326.6[c]
CK, U/L	239.2	228.2	311.9	231.8	293.9	231.3
AP, U/L[a]	222.1	213.6	247.2	233.4	207.4	210.4

[a] Phase effect (P < 0.10)
[b, c] Within treatment, means differed (P < 0.03)
[d, e] Treatments differed between EF and EI groups (P = 0.09)

Conclusions Concentrations of 0.5 mg ergovaline per kg diet or less had little effect on serum AP, CK, and SGOT, or rectal temperature. A majority of the ergovaline consumed by geldings was excreted in the faeces. Because no signs of decreased animal performance were observed, results suggest geldings grazing endophyte-infected tall fescue containing less than 0.5 mg ergovaline/kg DM may not experience fescue toxicosis.

References

Cross, D.L., L.M. Redmond & J.R. Strickland (1995). Equine fescue toxicosis: signs and solutions. *Journal of Animal Science*, 73, 899-908.