Serum concentrations of ergovaline/ergot alkaloids in late-term pregnant mares grazing endophyte-infected tall fescue pastures: A preliminary report

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Ergot alkaloid toxicities such as tall fescue toxicosis from Neotyphodium coenophialum-endophyte-infected [E+] tall fescue pastures are important veterinary and economic problems. Tall fescue toxicosis apparently results from ingestion of vasoconstrictive ergot alkaloids produced by symbiotic fungal endophytes; ergovaline is generally considered the critical toxin. To date, ELISA and HPLC with UV/fluorescence detection have been the predominant means of ergot alkaloid determination. These techniques, however, lacked sufficient sensitivity and/or specificity, to detect serum concentrations of specific ergot alkaloids. Thus, the objective of this study was to employ highly sensitive analytical techniques that included the application of liquid-liquid extraction, HPLC and Electrospray(+) ionization mass spectrometry (ESI-MS) with multiple reaction monitoring (MRM), to detect specific ergot alkaloids in equine serum with a limit of detection estimated at 1 pg/mL. To this end, weekly blood samples were collected by venipuncture from late-term pregnant mares (>290 d) exposed to toxic endophyte-infected (>90% contaminated) tall fescue pastures. Serum samples were analysed from four mares that showed clinical signs of ergot alkaloid reproductive toxicity (i.e., agalactia, prolonged gestation, placental thickening, mare and neonatal mortality). We now report that serum concentrations of ergovaline in mares grazing E+ tall fescue pastures ranged from 0.7 to 3.8 pg/mL, and its 8-positon epimer ergovalinine, from 1.5 to 5.5 pg/mL. Conversely, concentrations of ergocryptine and its epimer, ergocryptinine, ranged from 1.2 to 6.8 pg/mL and 2.2 to 7.5 pg/mL, respectively. These very low serum concentrations of ergovaline were consistent with a relatively small daily dose (approximately 1 mg/d on E+ pastures), and with ergovaline being an exceptionally potent xenobiotic/toxin. However, it is likely that these serum samples also contained an apparent mixture of ergot-related compounds, each of which may contribute to the overall clinical fescue toxicosis syndrome, and the specific identification of which will require broadening the scope of this highly sensitive and specific analytical method.

Acknowledgments

This work was funded by KY and MS Agricultural Experiment Stations; USDA-ARS Forage-Animal Product, Research Unit.

Keywords: Equine; Fescue toxicosis; Endophyte-positive; Ergovaline; Ergovalinine

DOI: 10.1016/j.theriogenology.2008.05.028