



Prenatal and Postnatal Lamb Muscle Growth as Influenced by Ergot Alkaloid Exposure in Utero

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Objectives

Two experiments were conducted to determine the impact of ergot alkaloids fed during 2 stages of gestation (MID, d 35 to 85, or LATE, d 86 to 133/parturition) on prenatal (Experiment 1, Exp1) and postnatal (Experiment 2, Exp 2) lamb muscle growth.

Materials and Methods

Pregnant Suffolk ewes (Expt. 1, $n = 36$, BW 78.02 ± 9.53 kg; Expt. 2, $n = 60$, BW 83.13 ± 1.69 kg) were fed endophyte-infected tall fescue seed (E+; 1772 $\mu\text{g}/\text{hd}/\text{d}$ ergovaline+ergovalinine) or endophyte-free tall fescue seed (E-; 0 $\mu\text{g}/\text{hd}/\text{d}$ ergovaline+ergovalinine) during MID or LATE gestation, which created 4 dietary treatments of E+/E+, E+/E-, E-/E+, and E-/E-. Maternal and fetal necropsies were performed at d 133 of gestation. Semitendinosus (ST) muscle was removed from each fetus, immediately frozen in liquid nitrogen and stored at -80°C . Total cellular RNA was extracted using the *mirVana* miRNA Isolation Kit (Ambion, Austin, TX) and quality analysis of RNA performed using an Agilent 2100 Bioanalyzer, with a RIN threshold of 7.0. The tRNA from 3 fetuses per treatment from the ST was used for miRNA sequencing and data analysis (LC Sciences, Houston, TX). Data was analyzed as a randomized block design with a 2×2 factorial with fescue treatment (E+ or E-), stage of gestation (MID or LATE), and 2-way interaction in the model. In Expt. 2, Suffolk ewes were stratified by genotype (dopamine receptor 2 [DRD2] SNP; AA, AG, GG) and assigned to fescue treatments of E+ or E- fed during 2 stages of gestation, MID or LATE similar to Expt. 1, except that ewes were allowed to lamb

naturally. Data for Expt. 2 were analyzed as a $3 \times 2 \times 2$ factorial with ewe genotype, fescue treatment, time of gestation and all interactions in the model. Lamb weights were recorded at birth and weaning. At weaning, wethers ($n = 44$) were fed individually a high concentrate diet until they reached 59 kg or 185 d postweaning.

Results

Prenatal (d 133) lamb fetal weights were lower ($P < 0.05$) for ewes fed E+ fescue during LATE gestation (E-/E+ and E+/E+). Total and individual muscle mass were also lower in fetal lambs from ewes fed E+ fescue during LATE gestation. miRNA transcriptome were altered in the semitendinosus muscle of fetal lambs from ewes fed E+ fescue during LATE gestation. Exp. 2 lamb birth and weaning weight was lower ($P < 0.05$) for ewes fed E+ tall fescue seed during LATE gestation. At slaughter, wethers from GG ewes fed E+ had greater live weight than E-. Hot carcass weights, dressing percentage, and carcass traits did not differ due to fescue treatment. Biceps femoris muscle was lower on a percentage of hot carcass weight for wethers from ewes fed E+ fescue during LATE gestation. Carcass fat percentage, as measured by dual-energy X-ray absorptiometry at 24 h postmortem, did not differ ($P > 0.05$) by ewe genotype or fescue treatment.

Conclusion

Exposure to ergot alkaloids from E+ fescue during LATE gestation reduces prenatal and postnatal muscle growth in lambs, and alters prenatal muscle miRNA expression.