

Harnessing Alfalfa as a Functional Feed to Combat Fescue Toxicosis & Heat Stress in Cattle

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Alfalfa (*Medicago sativa* L.) is commonly used as a nutrient-dense forage in livestock production, but also contains polyphenolic compounds that can confer additional health and production benefits beyond meeting nutrient requirements. However, the bioactivity of alfalfa flavonoids and use of alfalfa as a functional feed have not yet been evaluated in ruminant livestock. Furthermore, no information is available regarding the concentrations of flavonoids in alfalfa varieties grown in the United States. Therefore, the goal of this research is to evaluate novel applications of alfalfa as a functional feed for mitigation of fescue toxicosis and heat stress in beef cattle and will address the following specific objectives: 1. Determine the efficacy of alfalfa isoflavones and flavones in alleviating fescue toxicosis at a supplementation level relevant to alfalfa supplementation in beef feeding systems; 2. Characterize isoflavones, flavones, flavonols and coumestans in alfalfa varieties adapted to the southeastern United States as well as influences of factors such as stage of maturity and seasonal/environmental impacts on concentrations of these flavonoids; and, 3. Evaluate the application of supplementing alfalfa as a functional feed for prevention of fescue toxicosis and heat stress in beef cattle. Preliminary research results indicate that flavonoid and coumestan concentrations in alfalfa cultivars grown in Central Kentucky vary by cultivar, year, and their interaction. Additionally, flavonoid supplementation either via purified isoflavones (biochanin A and formononetin), flavones (luteolin and apigenin), or whole alfalfa can be utilized to alter vascular hemodynamics including vasodilation resulting in blood flow rates above baseline, and consequently improved thermotolerance in sheep challenged with fescue toxicosis. Harnessing the phytochemical properties of alfalfa with innovative feeding strategies has the potential to benefit livestock and forage producers across the United States, notably the southeastern region where the compounding effects of fescue toxicosis and heat stress are of greatest concern.