

# UTILIZING LABORATORY AND FIELD STUDIES TO DETERMINE PHYSIOLOGICAL RESPONSES OF CATTLE TO MULTIPLE ENVIRONMENTAL STRESSORS

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## ABSTRACT

Heat stress and fescue toxicosis, resulting from intake of endophyte-infected fescue, have significant impacts on physiological processes in cattle. To study this impact, we used numerous physiological measures of thermal status to compare responses of cattle to chamber “stress tests” and “naturally occurring” field conditions. The objective of the present studies was to determine if exposure to the summer environment would result in adaptation of cattle to heat stress and/or fescue toxicosis (e.g., lower core temperature, respiration rate, and sweat rate). During field exposures, Angus steers were placed on either endophyte-infected (E+) or uninfected (E-) fescue pastures. During the controlled heat challenges, steers were assigned to diets of either 0 or 40 $\mu$ g ergovaline/kg/d to maintain the fescue toxicosis state. Results showed little evidence that repeated exposure to the endophytic toxins gives animals a tolerance to the endophytic toxins. Feed intake, sweat rate and skin temperature were reduced in E+ animals regardless of previous exposure suggesting a lack of adaptation. Similarly, E+ animals showed an increase in rectal temperature above E- animals during each chamber exposure. Surprisingly, ruminal temperature showed no differences between groups suggesting it is a poor indicator of fescue toxicosis. Shoulder and rump sweat rates did show signs of acclimation to heat stress being reduced between the start to the end of summer. Sweat also showed a decrease after several days in the heat. This reduction occurred even though rectal temperature and respiration rate were still elevated, suggesting that reduction of sweat rate, and possibly water loss, is more important than reduction of body temperature during heat stress.