

Public Abstract

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Title:Utilizing laboratory and field studies to determine physiologically adaptive responses of cattle to multiple environmental stressors

Heat stress studies are often conducted using short-term, controlled laboratory exposures or long-term field exposures. Each approach has limitations and provides only a partial understanding of complex interactions between simultaneous environmental stressors. Heat stress and fescue toxicosis, resulting from intake of endophyte-infected fescue, have significant impacts on physiological processes with multiplicative interaction. It has been suggested that heat acclimation and repeated exposure to the endophytic toxins would improve the performance of cattle on tall fescue. We used numerous physiological measures of thermal status to compare responses of cattle in chamber "stress tests" and "naturally occurring" field conditions. Controlled heat challenges were conducted (Brody Environmental Center; University of Missouri) separated by summer field exposures during which Angus steers consumed either endophyte-infected (E+) or uninfected fescue (E-). Results showed little evidence that repeated exposure to the endophytic toxins gives animals a tolerance to the endophytic toxins. Feed intake, rectal temperature, sweat rate and skin temperature responded similarly for E+ animals regardless of previous exposure suggesting a lack of adaptation. Sweat rate however, did show signs of adaptation in the E- animals being reduced between the start to the end of summer. Sweat rate 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.