Management of Cattle Exposed to Adverse Environmental Conditions

Terry L. Mader, MS, PhD[a,*], Dee Griffin, DVM, MS[a,b]

KEYWORDS

• Environmental stress • Animal welfare • Livestock management

KEY POINTS

- Domestic livestock that are traditionally managed outdoors are particularly vulnerable not only to extreme environmental conditions but also to rapid changes in these conditions.
- Management and facility alternatives need to be considered to help these animals cope with adverse conditions.
- Manipulation of dietary ingredients, energy density, and intake may also be beneficial for livestock challenged by environmental conditions.
- Under hot conditions, high-volume water-holding devices and water availability is of upmost importance.
- Under cold conditions, maintaining facilities that prevent animals from getting wet/muddy is of upmost importance.

INTRODUCTION

Ruminants have the ability to generate a substantial amount of heat through fermentation of feedstuffs. In particular, high-producing animals fed high-energy diets generate large amounts of metabolic heat, which is usually transferred from the body to the environment using normal physiologic processes. Failure to transfer this heat in the summer results in an accumulation of heat within the body and predisposes the animal to heat stress.[1,2] This stress can cause animal discomfort or even death in the summer, whereas preservation of body heat results in an opposite effect in the winter. Regardless of season, under extreme environmental conditions, management of livestock discomfort and potential for deaths must be a higher priority than performance losses. Animal discomfort and related heat flux management can be achieved

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[a] University of Nebraska-Lincoln, Lincoln, NE 68028, USA; [b] Great Plains Veterinary Educational Center, Clay Center, NE 68933, USA
* Corresponding author. 9301 Valaretta Drive, Gretna, NE 68028, USA.
E-mail address: tmader1@unl.edu

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through behavioral changes initiated by the animal or facilities and/or feed management changes initiated by the caretaker.[3–5]

The primary objective of any environmental mitigation strategy is to aid the animal in the winter to keep the body temperature (BT) elevated throughout the day and in the summer to reduce the peak BT during the day and/or help the animal drive the BT down at night (Fig. 1). Studies, reported herein, were conducted under harsh environmental conditions, either in laboratory or natural environments, in an effort to better understand animal responses to those conditions and develop mitigation strategies for those conditions.

GENERAL GUIDELINES

Pen Layout

Proper feedlot pen layout and design are crucial for minimizing the effects of adverse climates. Mounds need to be built into feedlot pens, especially in the northern plains and western Corn Belt of the United States to minimize mud problems during wet periods and enhance airflow during hot periods. In the southern plains, mounds are not as crucial to have in feedlot pens; nevertheless, to enhance drainage and minimize buildup of mud and other residue, a slope of 3% to 4% away from the bunks is recommended. Also, proper design and strategic use of windbreaks is warranted.[6] Wind barriers or other structures should not be placed near (~30 m from pen) cattle in the summer in order to maximize airflow in the pen and around the animal.

Stocking Density for Mud and Dust Control

Even though mud tends to be a winter/spring problem and dust a summer/fall problem, both can be problematic year-round in some areas of the country. The degree to which

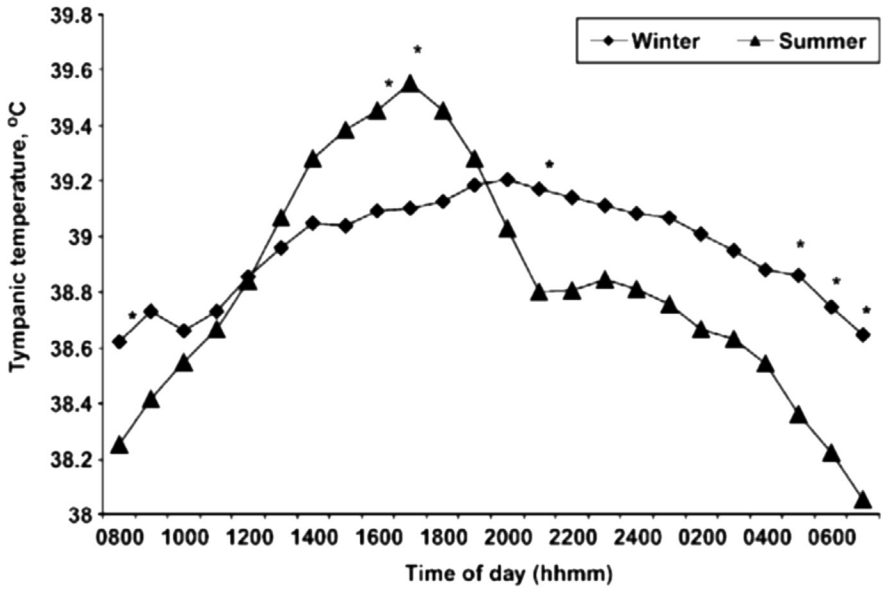

Fig. 1. Effects of season on tympanic temperature over a 24-hour period in feedlot heifers. Asterisks indicate that means within an hour differ by season ($P<.05$; SE = 0.10). Each point represents the mean of 12 pens of cattle. (*Data from* Mader TL, Kreikemeier WM. Effects of growth-promoting agents and season on blood metabolites and body temperature in heifers. J Anim Sci 2006;84:1030–7.)

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