

TECHNICAL MEMORANDUM

TO: Mr. Trevor Joyal, Manitoba Hydro
FROM: Gabor Mezei, M.D., Ph.D.
William H. Bailey, Ph.D.
DATE: February 19, 2015
SUBJECT: Noise, Heat, and Cattle

The scientific literature is quite extensive on the effects of heat stress on various aspects of cattle wellbeing and physiological responses of cattle to heat. Without attempting to provide a comprehensive review of the literature, some recent research results in this area are highlighted.

While cattle are able to maintain their body temperatures within a tight range over a wide extent of environmental conditions and ambient temperatures, heat stress has been identified as a major contributor to poor animal welfare and mortality among cattle during long distance transportation of live animals (Caulfield et al., 2014; Philips et al., 2013).

Increasing heat load may result in several responses in cattle, including more time spent standing. Recent cattle management trials conducted in three states in the United States (Arizona, California, and Minnesota) demonstrated that cows would respond to mild to moderate heat stress that results in increased core body temperatures by spending more time standing (Allen et al., 2015). These results suggest that standing contributes to the physiological process of cooling.

Heat stress was also shown to reduce milk secretion in dairy cows (Silanikove et al., 2009) and influence hormone levels (Bova et al., 2014). Maternal heat stress in cows may reduce mammary growth and subsequent lactation, and may also have a carryover effect on the postnatal growth of offspring, potentially from compromised immunity suffered due to parturition heat stress (Tao et al., 2013).

A cursory search of the literature did not identify studies specifically examining noise on cattle wellbeing or physiologic changes, but noise exposure has been identified as a potential stressor for cattle during handling and transportation (Grandin, 1998; Phillips et al., 2013).

Transmission Lines are not a Source of Harmful Noise and Heat to Cattle

The sound from the conductors of high-voltage transmission lines is very weak and not concentrated at specific frequencies that would aid detection. Transmission lines of Manitoba

Hydro are designed to meet applicable provincial and local noise guidelines and ordinances, and any audible noise from the transmission lines will be below the specified noise limits in fair weather. In foul weather, noise levels from alternating current transmission lines may increase; however, other weather components, such as wind and rain, will likely mask any noise increases that may be the result of foul weather. In addition, audible noise from transmission lines quickly diminishes with distance from the lines. Thus, audible noise from transmission lines is not a source of disturbance for cattle. This is confirmed by observations that transmission lines do not have any long-term effect on the grazing or movement patterns of cattle, or even wild deer and elk (Goodwin, 1975; Rogers et al., 1982).

Some of the energy transmitted via electric current flowing through transmission line conductors is lost due to electrical resistance of the conductors and is transferred into heat energy. This may result in heating of the conductors. This resulting heat, however, only affects ambient air temperature within a few centimeters of the conductors, and will have no effect on the air temperature at or near ground level, several meters from the conductors, where farm animals may be present. Thus, heat from transmission lines is not anticipated to affect ambient air temperature for farm animals even directly under the transmission lines.

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