COOPERATIVE EXTENSION SERVICE
SDSU

Extension Extra

ExEx 2018
August 1995
Animal Science

COLLEGE OF AGRICULTURE & BIOLOGICAL SCIENCES / SOUTH DAKOTA STATE UNIVERSITY / USDA

Effects of High Heat and Humidity on Reproduction in Cattle

by Bill Epperson, Extension veterinarian,
and Doug Zalesky, Extension beef specialist

High temperatures and humidity in the summer can result in behavioral and physical changes in cattle that affect breeding and reproductive success. These changes are commonly referred to as "heat stress" and include:

- Increased respiration rate.
- Increased rectal temperature.
- Increased water consumption.
- Decreased feed intake.
- Decreased weight gain.
- Decreased activity.

Advanced heat stress is characterized by incoordination, collapse, and death.

In addition to these outward signs, changes within the reproductive organs of bulls and cows occur that may result in decreased fertility. The threshold environmental temperature at which fertility changes may occur has been poorly defined. Temperature effects on fertility depend on the duration and magnitude of heat stress. High environmental temperatures that persist for weeks may be especially detrimental to reproductive efficiency. Cool nights will help decrease the heat stress and may offset the effects of high daytime temperatures.

Other important factors that help alleviate heat stress include:

- Adequate ventilation—either mechanical or natural.
- Shade and water.
- Appropriate use of water/water misters to increase heat loss through evaporation.

Effects of Heat Stress on Bulls

Signs of heat stress have been observed in bulls maintained in 90 F environments. Environmental temperatures of 100 F can be dangerous and may produce advanced signs of heat stress.

An abundance of experimental data indicate heat stress can damage semen quality. Changes after thermal stress can be observed on a semen evaluation en c! include alterations in the shape of the sperm cell head and tailpiece.

Applying external insulation to the bull's scrotum can raise the scrotal skin temperature 1-4 F. This experimental technique mimics an acute heat stress condition. Insulation of the scrotum of yearling bulls for 24-72 hours has resulted in a decrease in normal sperm. This decrease begins 1-2 weeks after the heat stress event. When the heat stress is alleviated, semen quality continues to decline for an additional 1-4 weeks.

Depending on the duration of heat stress, semen quality returns to pre-stress levels approximately 4-8 weeks after the heat stress event. Experiments where animals were exposed to hot conditions for longer periods of time (88 F - 95 F for 8 weeks) yielded similar results, with recovery occurring within 8 weeks after heat stress subsided.

The practical outcome of heat stress on bulls is not well defined. Changes in semen quality may decrease fertility, especially if the bull is only marginally fertile before heat stress. Experiments have shown that bulls differ 1n their apparent susceptibility to heat stress. Individual bulls may

produce very acceptable semen in the face of heat stress, while others are more severely affected.

If heat stress occurs and 1 - 2 weeks later a bull is expected to breed a large number of cows, as in a synchronized breeding program, a decrease in pregnancy rates could occur. However, under most conditions, with a normal bull, it would be unlikely that acute heat stress alone would radically compromise herd fertility. Data is lacking to allow an accurate assessment of fertility in the face of heat stress under the variety of management conditions encountered in the field.

It is commonly thought that heat stress is present only when animals are exhibiting the typical physical signs. It is important to recognize that effects of heat stress on semen quality are not immediate. but become evident after the heat stress event and may be present for a significant period of time.

Heat stress effects on bulls may be minimized with good breeding management. These practices include:

- Using proper bull:cow ratios—for yearlings not greater than 1:20, for mature bulls, not greater than 1:40.
- Providing shade and ventilation (fans or wind).
- Using highly fertile bulls.
- Providing adequate, good quality water and minerals
- Minimizing other stressors (flies, foot rot, etc.)
- Maintaining bulls in good, but not excessive, body condition. Obese animals are more susceptible to heat stress.
- Rotating bulls between pastures if in a multiple pasture situation. This may allow bulls more resistant to heat stress to compensate for the lowered fertility of a bull susceptible to heat stress.

Effects of Heat Stress on Reproduction in Cows

Environmental temperatures greater than 86ºF may alter hormone patterns in cows. A shorter duration of estrus and less intensive signs of estrus may result.

Heat stress at and immediately after the time of breeding(7-10 days) may result in a lower conception rate. This is particularly true if there has been no or little adaptation to the high temperature. This change appears to stem from an increased rate of early embryonic death, not from a failure of the egg to be fertilized.

With early embryonic death due to heat stress, the cow returns to estrus in 21 days. The developing embryo was lost before the maternal recognition of pregnancy, so the cow continues uninterrupted through her estrous cycle. The decreased fertility appears to be much more of a problem in lactating dairy cows, but some depression of fertility may be noted in heifers as well.

While most concern regarding heat stress is traditionally directed at the bull. it is important to realize that the reproductive efficiency of cows may be affected by heat stress.

This is particularly true in regard to the time near breeding and may be a significant consideration when employing a synchronization program.

In a synchronization program, timing the initial estrus to avoid hot weather and/or implementing management practices to decrease the impact of heat stress, as outlined previously, may be appropriate.

This publication and others can be accessed electronically from the SDSU College of Agriculture & Biological Sciences publications page, which is at http://agbiopubs.sdstate.edu/articles/ExEx2018.pdf

COOPERATIVE EXTENSION SERVICE SDSU

Issued in furtherance of Cooperative Extension work, Acts of May 8 and June 30, 1914, in cooperation with the USDA. Larry Tidemann, Director of Extension, Associate Dean, College of Agriculture & Biological Sciences, South Dakota State University, Brookings. SDSU is an Affirmative Action/Equal Opportunity Employer (Male/Female) and offers all benefits, services, and educational and employment opportunities without regard for ancestry, age, race, citizenship, color, creed, religion, gender, disability, national origin, sexual preference, or Vietnam Era veteran status.

ExEx 2018 - PDF by CES. August 1995; updated April 2002.