DCRC

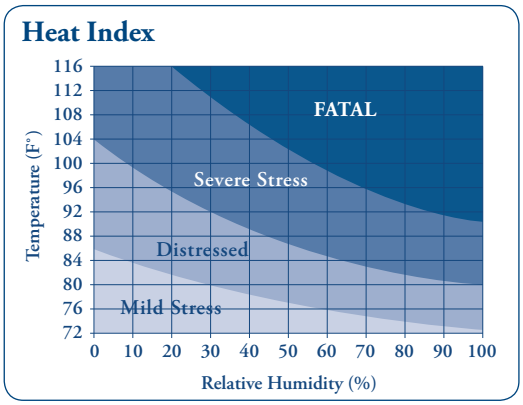
DAIRY CATTLE REPRODUCTION COUNCIL

# Managing Reproductive Performance During Times of Heat Stress

The tell-tale signs are there: fewer cows showing signs of estrus, inconsistent heats, more cows open after insemination. Heat stress is starting to take a toll on your herd's reproductive performance. Heat stress can have long-term effects on conception and pregnancy rates, lower milk production and increase health problems, resulting in lowered profitability.

## An Uphill Battle

For parts of the country commonly associated with mild weather, summer months can mean fighting the same battles herds in the southern portion of the country struggle with year 'round. The temperature-humidity index (THI) takes into account the combined effects of air temperature and humidity. Cattle will show signs of heat stress at a THI of 72; with summer THI readings creeping to these levels and beyond, dealing with heat stress is a common battle, regardless of location.




Alongside things typically associated with heat stress, like less milk and component production and dry matter intake, heat stress can negatively influence:

- **Estrous detection.** Both duration and intensity of estrus are negatively effected by heat stress. Cows attempting to reduce body heat production limit their physical activity, translating to fewer physical signs of estrus, which makes heat detection more difficult.
- **Fertility.** Pregnancy rate is reduced by decreased fertility resulting from impeded development of mature follicles. Premature follicles emerge around 40 days prior to ovulation, making oocytes susceptible to heat-related damage, which can compromise quality almost immediately.
- **Follicle maturity.** Heat stress during the estrous cycle causes earlier emergence of the dominant follicle in the second wave, more estrous cycles with three rather than two waves, and cycle extension in addition to negative changes in ovarian and follicular function.
- **Embryonic development.** Embryonic development, especially through day 40, is vulnerable to heat stress. Elevating the cow's internal temperature results in a reduction in the number of embryos that continue to develop.[1] As the cow tries to thermo-regulate, her system will redistribute blood flow away from her core. This aids in dissipating heat, but reduces blood flow supporting fetal development and supplying the uterine body.

## How to Fight the Heat

Producers can mitigate many negative effects of summer heat with proper cow comfort, nutrition and reproductive management. Combating the symptoms of heat stress requires focus on improving detection of estrus and managing heat-stress-related embryonic mortality.[2] Here are recommendations for improving performance and reproduction during summer heat:

- **Keep cows comfortable.** Shade, water availability, air movement and sprinklers are key to cooling cows. By providing shade alone, cows have lower rectal temperature and respiration rates and can

produce more milk. Shade does not influence air temperature, requiring producers in humid areas to provide additional methods of heat abatement. Several research studies have shown the combination of good ventilation, spray and fans to be most effective in free stall barns and along the feed bunk.

The holding pen is where cows experience the most heat stress, making sprinklers and fans especially worthwhile and effective.[3] To ensure highest milk quality, properly working sprinklers should wet the cow on her top and sides, leaving the udder dry. Dry cow and heifer housing also should be monitored as fetal development, milk production and fertility can be adversely affected by heat stress.

- **Focus on nutrition.** Properly balanced rations provide adequate energy to reduce problems of herd health and reproduction associated with decreased DMI during heat stress. Feed ingredients given to buffer the rumen have been effective in lowering the incidence of acidosis, which is commonly seen during hot weather. Increasing ration energy density with additional grain or fat sources has been shown to be advantageous during summer months as well.

Preliminary research has shown fungal cultures can reduce body temperature and respiration rate, and beta-carotene has been successful in increasing fertility and pregnancy rate in cows calving during the summer.

- **Heat detection aids.** Summer weather makes a convincing argument to utilize detection aids, including HeatWatch®, tail chalk, tail patches and pedometers. Timed A.I. (TAI) is particularly useful to bypass the often nonexistent signs of estrus. There are several studies that have explored the use of additional hormones to make TAI more effective. For example, an injection of GnRH agonist or hCG (human chorionic gonadotrophin) on day five of the estrous cycle may reduce pregnancy loss during heat stress by stimulating ovulation and the formation of a CL. Additionally, their use results in increased plasma progesterone.[4]

- **Embryo Transfer.** Several studies have demonstrated the effectiveness of embryo transfer (ET) to bypass embryo loss due to reduced oocyte maturation, fertilization and early embryonic death caused by exposure to heat stress.[5] Current research suggests fresh embryos are considerably more effective than frozen embryos or embryos flushed from heat-stressed cattle. The latter is lower due to fewer oocytes, lower fertilization rates and reduced embryo quality.[6] The high costs associated with ET and difficulty procuring quality, fresh embryos in a timely manner make it another area meriting continued research.

Room for improvement exists in managing reproduction during heat stress. Research shows promising alternatives to make a reproductive program even more successful in hot weather. It has been proven that with adequate, consistent cow cooling many reproductive issues can be diminished. Others can be managed and their negative impact reduced using heat detection aids, dietary supplements, embryo transfer, timed artificial insemination, or any combination thereof.

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