Improving Cow Preganancy During Heat

Improving Cow Pregnancy Success During Summer's Heat

By Pete Hansen Professor of Dairy Science,University of Florida

Heat Stress: Not Just for Southerners

Look at the lactating dairy cow as a factory that takes in fuel (feedstuffs) and burns it to produce milk. Not all the energy in feed is transformed into milk - much is converted to heat. To maintain a normal body temperature, the cow must lose that heat to the environment. The more milk she produces, the more heat she has to lose. High humidity and intense solar radiation compound the heat loss problem. When the cow can no longer regulate her body temperature, feed intake declines, milk yield reduces and reproduction is compromised.

Due to increased milk yields, heat stress is no longer a problem only in the south. With air temperatures as low as 80 F causing elevated body temperature in high producing cows, cows throughout most of the U.S. and Canada suffer effects of heat stress sufficient to cause reduced milk yield and reproduction.

Reduction in Detection of Estrus, Fertility

Just like humans, a heat-stressed cow minimizes physical activity. Thus, symptoms of estrus become less pronounced. Production of estrogen, the hormone that causes estrus behavior, can also be reduced by heat stress. In a Florida study, the estimated percent of estrous periods missed by herdsmen increased from about 40 percent in cool months to as high as 75-80 percent during hot months.

Even if estrus is detected, it is not likely a cow with elevated body temperature due to heat stress will get pregnant following insemination. The cow undergoes physiological changes in response to heat stress leading to damage of the egg and, following fertilization, the embryo.

The magnitude of reduction in fertility caused by heat stress can be severe. In south Florida, summer conception rates less than 10 percent are common.

Is Heat Stress Affecting Your Operation?

Analysis of herd records for seasonal variation in fertility will indicate whether heat stress is a problem. Another way to assess the degree of heat stress is to measure rectal temperature in selected cows - the higher the body temperature, the greater the reduction in fertility that can be expected. The cow's normal body temperature is about 101.3 F. An increase in body temperature of about 0.9 F has been estimated to cause a decline in conception rate of 12.8 percent. One can consider a cow with a rectal temperature of 102.2 F or higher in the afternoon is likely to be heat stressed (if she does not have mastitis or is otherwise sick).

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Cooling Cows

One way to minimize effects of heat stress is to provide housing that alleviates heat stress. This can be expensive. The degree to which housing should be modified to reduce heat stress will depend upon geographical location and extent of heat stress. Search the Internet for details on specific housing systems.

The simplest structures for providing cooling are shade structures. These can be inexpensive structures based on use of shade cloth or more permanent structures. By itself, shade is not very effective at preventing elevated body temperature in lactating cows if heat stress is moderate or severe. A common and fairly effective system for cooling cows is freestall or loose housing with sprinklers and fans. In tunnel ventilation barns, air is pulled through a low-ridged barn via a bank of exhaust fans at one end. A tunnel ventilation barn has a low roof and enclosed sides. Including foggers or misters can promote evaporative cooling as air moves through the barn. The tunnel barn is an expensive facility, with little documented evidence of effectiveness. Available information, based on producer experience and

some experimental studies, provides optimism tunnel ventilation can be an effective method to keep cows cool.

Heat-stressed cows willingly immerse themselves in water, so cooling ponds are sometimes used to allow cows to exhibit this behavior. Cooling ponds rapidly drop a cow's body temperature. These artificially constructed ponds are often built with constant movement of fresh water into the pond. There is little evidence the incidence of mastitis increases for cows in ponds, but be aware bacterial counts in the water can be high and the potential for problems exists.

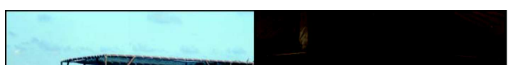
Management Strategies to Improve Reproduction

Cooling by itself is not sufficient to prevent effects of heat stress on reproduction. Even in well-managed herds with extensive cooling systems, reproductive function can suffer in

the summer. Incorporating estrus detection aids in an estrus detection program can improve reproductive performance driving heat stress. In a Floridastudy, the percentage of cows detected in estrus after estrous synchronization using prostaglandin was 26 percent based on visual detection only versus 43 percent based on visual detection combined with tail chalk.

Timed artificial insemination (A.I.) programs such as Ovsynch® can completely eliminate effects of heat stress on estrus detection because cows are inseminated at a fixed time regardless of estrus. In a Floridaherd with a voluntary wait period of 70 days, the percentage of cows pregnant by 90 days postpartum was 16.6 percent for cows in which first insemination was via timed A.I. using Ovsynch versus 9.8 percent for cows inseminated at visual estrus detection only. Benefits of timed A.I. programs during heat stress accrue because more cows are bred - timed A.I. does not reverse the effects of heat stress on conception rate. If fertility following timed A.I. is very low because of heat stress, benefits of timed A.I. might not be realized.

Unfortunately, there are no specific treatments to improve fertility of cows bred by A.I. Heat stress results in the formation of a defective egg whose damage cannot be reversed. Even if the egg escapes heat stress and gets fertilized, the embryo is susceptible to damage caused by elevated body temperature until day 3 to 5 of pregnancy.

With embryo transfer, 

effects of heat
stress on the egg are avoided because the embryos transferred are those derived from eggs with sufficient quality to give rise to transferable embryos. Embryos can also be produced during cool months of the year, when the egg is not susceptible to heat damage, and frozen for transfer in the summer. Effects of heat stress on the embryo are avoided because embryos are transferred at day 7 or 8 of pregnancy. Results from two experiments demonstrating improved pregnancy rates in heat-stressed cows using embryo transfer are shown in Figure 2.

The main limitation to embryo transfer is cost. Embryos produced by superovulation can be expensive. Those produced by in vitro fertilization are less expensive. One limitation to in vitro produced embryos is they do not survive freezing well. Thus, increases in pregnancy rate as compared to A.I. require that embryos be transferred fresh (compare the last two bars in Figure 2).

Author Bio: Pete Hanson is a professor of reproductive and environmental physiology in the Department of Animal Sciences, University of Florida. A graduate of the University of Illinois and the University of Florida, he has been at Florida since 1984. His research focuses on methods to alleviate heat stress effects on dairy cattle and enhancement of embryo transfer techniques.