Managing Reproduction during Times of Heat Stress

The negative effects of heat stress on dairy cows are multifaceted and have been studied for several years. This article highlights some of the reproductive challenges facing cows during heat stress, reducing a dairy’s profit. Several solutions to minimize the negative impact of heat stress are also reviewed.

Challenges

Various studies (Jordan, 2003; Rensis, 2003; West, 2004) have shown heat stress challenges the reproductive performance of dairy cows through a variety of altered physiologic means, including:

- Altered follicular development
- Lowered estrus activity
- Impaired embryonic development

The first reproductive challenge facing the heat stressed cow is altered follicular development. Heat stressed cows decrease feed intake causing less frequent pulses of the luteinizing hormone (LH) resulting in longer follicular waves. This lengthening of the follicular wave leads to the selection and ovulation of multiple, smaller dominant follicles (Sartori, 2002). Follicles are responsible for producing estrogen, a hormone that causes cows to show signs of heat. Smaller follicles will produce less estrogen than larger ones; therefore, resulting in less estrus activity. Estrus activity is also lowered due to the cows’ reduced motor activity, a means of trying to decrease her endogenous heat output. Thus, the occurrence of silent ovulations or “silent heat” increases, which will ultimately reduce heat detection efficiency even in well-performing heat detection programs. The high uterine temperature of the heat stressed cow can impair embryonic development, resulting in poor embryo implantation and increased embryo mortality (Jordan, 2003 and West, 2004). Figure 1 illustrates the challenges heat stress poses for dairy cows.

So when does heat stress affect your dairy cows? Well, it not only depends on the temperature but also the humidity of the surroundings, this is known as the temperature humidity index or THI. Heat stress occurs when the THI exceeds 72°F (22.2°C), which is when the cow’s body is unable to cool itself adequately. Use the chart in Figure 2 to see if heat stress could be challenging your cows. Some common signs of heat stress include increased body temperature (>102.6°F (39.2°C)) and panting (>80 breaths/minute). Reduced physical activity, feed intake (>10-15%) and milk yield (>10-20%) are also effects of heat stress (West, 2004).

### Solutions

To help reduce the negative reproductive effects of heat stress on a dairy, follow the three recommendations discussed below.

1. **Implement aggressive breeding programs**

   As cows do not display heats as much as they do in cool temperatures, a good heat detection program like ABS Global Reproductive Management System®, should be in place so professional technicians can assist in finding cows with marginal heats. Another way to help submission rates is the use of timed breeding protocols. Timed breeding programs will ensure cows showing no signs of heat don’t continuously get skipped when breeding. There are several, well-researched timed breeding programs to pick from, so work with your veterinarian to implement one that works best for your dairy. One mistake some producers make is to discontinue A.I. breeding and use bulls because they believe A.I. performance declines in the summer. This is a big mistake because natural service bulls’ fertility suffers just as much or more than cow fertility so now heat stress affects both sides of the reproductive process. Heat stress does not affect the fertility of frozen semen when handled and administered properly.

2. **Implement a cow cooling program**

   Cooling is one of the most effective ways to manage heat stress.
and minimize economic losses on your dairy. Sprinkling or soaking with water, along with supplemental airflow has been shown to reduce respiration rates by 17.6-40.6%, improve dry matter intake by 7-9% and increase milk yield by 8.6-15.8% (Bucklin, 1991 and West, 2004). This is also known as evaporative cooling. Many producers will try soaking or sprinkling cows without having fans for supplemental air flow. This is not recommended. With increased levels of water vapor in the air, water alone raises relative humidity. Consequently, THI will rise because nothing will dissipate the humid air around the cow. Fans in combination with water provide the best cow cooling as demonstrated in several studies (Brouk, 2005; Brouk, 2003; West, 2004).

Below are some considerations discussed by Brouk and others regarding cooling systems for dairies.

1. Consider the location temperature. Use evaporative cooling if temperatures remain above 100°F (~38°C) for a long time during the day or week to reduce environmental temperature.

2. Consider the relative humidity. If your area has a high relative humidity, larger droplets of water with fans are needed to effectively cool cows. If your area has a low relative humidity, a fog or misting system would effectively cool your cows.

3. Increase soaking frequency at the feedline as temperature increases.

4. Key areas to keep cool when determining where to place your fans and soakers are at the feed bunk to entice eating, holding area and fresh cow pen. The holding pen needs cooling because cows may spend anywhere from 2 to 6 hours in it (Harner, 2000) and their close proximity to other cows will contribute to higher core temperatures thereby increasing heat stress. Cooling fresh cow pens are also important because these cows are under high amounts of stress already.

### References


### Feed high quality feedstuffs/rations

Early lactation cows exposed to heat stress may go even further into negative energy balance because they aren’t consuming as much feed as needed. Consequently, they are more likely to have lower reproductive performance due to altered follicle development and lower estrus activity. Feeding high quality forages and balanced rations will decrease some of the effects of heat stress.

Heat stress will challenge dairy cattle reproductive performance by altering follicular dynamics, lowering the display of estrus and changing the uterine environment leading to increased embryo mortality. Implementing aggressive breeding programs, cow cooling strategies and top notch feeding programs can help minimize some of the negative effects of heat stress and keep your dairy operating as profitable as possible in these challenging times.

### Temperature Soaking Frequency

- **75-82°F (~23.9-27.8°C)** Once every 15 mins.
- **83-87°F (~28.3-30.5°C)** Once every 10 mins.
- **>87°F (30.5°C)** Once every 5 mins.