

Managing Heat Stress in Young Calves

As summer temperatures creep up between 80° and 90°F (27° - 32°C) and above, heat stress can negatively impact calf health and performance. Heat stress causes increased respiration rates, increased body temperature, rapid dehydration and reduced immune system function. In addition, the calf's maintenance energy requirement is elevated — similar to the effects of cold stress. In cold weather, calves burn more energy to keep themselves warm, while in hot weather they utilize more nutrients keeping themselves cool. Both calf growth and health can be negatively affected if heat stress is not managed.

Efforts should be made to identify and avoid heat stress in calves. If you see increased respiratory rates, open-mouthed breathing, decreased appetite, and reluctance to move your calves may be suffering from heat stress. This summer, consider the following tips to assure proper calf health and growth is maintained.

ENVIRONMENT

Reduce sun exposure — Use barns and hutches that do not allow sunlight to contact the calf. Eighty percent shade cloth is recommended on greenhouse barns and translucent hutches. A study conducted in Pennsylvania (Lammers et al., 1996) showed daytime air temperatures inside translucent hutches were 3.6°-5.4°F (2-3°C) higher than outside air. The study also noted higher calf body temperatures, higher respiration rates, higher water intake, and lower feed intake in translucent hutches when compared to opaque hutches.

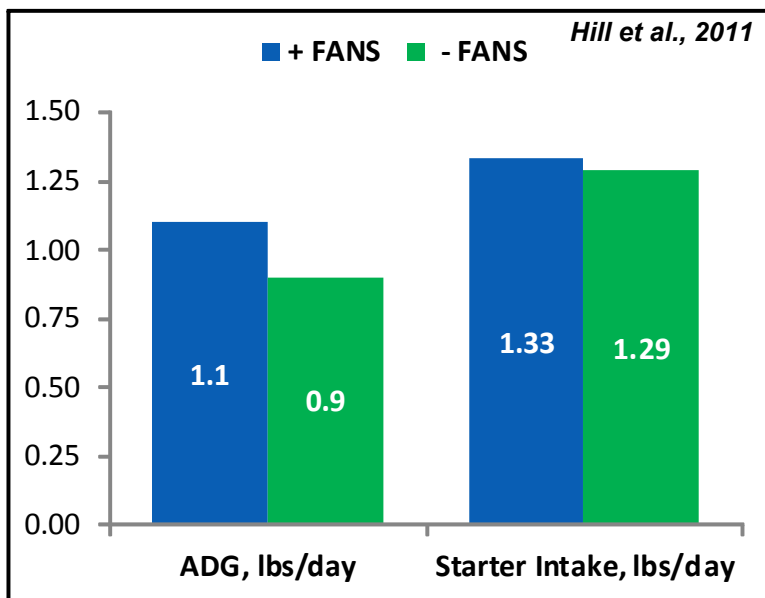
Improve air flow — Naturally ventilated buildings should have all vents completely opened including ridge and eave vents, as well as sidewall curtains. Hutches should also have vents/doors open, and the back end may be elevated using wooden or concrete blocks to improve ventilation. Hutches should also have enough space in between them to provide for adequate air flow.

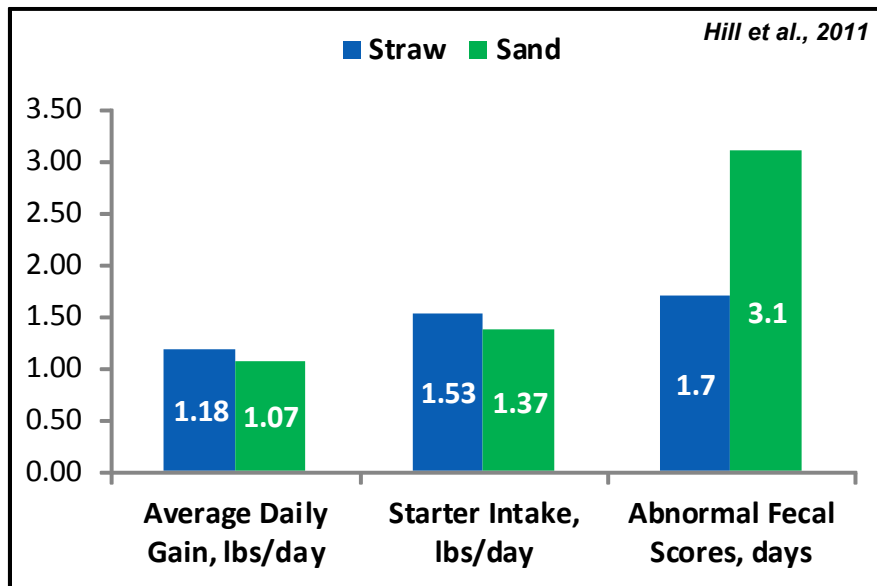
Hill et al. (2011) reported on the effects of the use of fans on pre-weaned calf growth and health. Calves were individually housed in pens with hog panel dividers within a naturally ventilated nursery barn. The study took place during May-September in Ohio, and temperature averaged 72°F with a range of 48° to 97°F. Half the calves were cooled with fans from 8 AM until 5 PM daily, while the other half of the calves were allowed natural ventilation.

Calves that were cooled with fans during the daytime had greater average daily gain (ADG, $P = 0.04$; see figure at right). **Total bodyweight gain during d 0-42 was 8.7 lbs greater for calves cooled with fans.** Interestingly, milk replacer intake was identical and starter intake was similar ($P = 0.78$; see figure at right) between groups, which suggests that calves cooled with fans had lower maintenance energy requirements. In other words, calves cooled with fans directed more energy toward growth rather than toward keeping themselves cool.

This study (Hill et al., 2011) also provided information on the impact of housing type on airborne bacteria concentrations:

- Naturally ventilated nursery barns had lower concentrations of airborne bacteria than did hutches.
- Elevating the rear of the hutch by 4 cm (1.58 inches) significantly reduced airborne bacteria concentrations.
 - Airborne bacteria counts: Non-elevated hutches = 326,400 CFU/m³; Elevated hutches = 88,474 CFU/m³





Bedding — The ideal bedding for calves during hot weather is debatable. Inorganic sources such as sand or wood shavings offer advantages over organic sources such as straw — sand and shavings do not insulate the calf as much and may reduce the fly population.

However, Hill et al. (2011) reported that calves raised in a naturally ventilated nursery barn and bedded with straw had greater ADG ($P = 0.02$), greater starter intake ($P = 0.04$), and reduced days with abnormal fecal scores ($P = 0.07$) compared with calves bedded with sand (see figure at left).

The nursery barn used in this study had pens that drained extremely well, which may explain why straw out-performed sand in this experiment. If the pens or

hutches are on concrete or a hard dirt surface, sand or wood shavings may be a better choice than straw. No matter the season, the key is to keep the calves clean and dry. Choose the bedding material that best fits the housing and labor situation.

DIET AND MANAGEMENT

Free choice water — Constant access to free choice, fresh water is essential for summertime calf rearing. Calves exposed to heat stress can consume 3-6 gallons (11.4-22.8 liters) of water per day. If calves are running out of water between feedings, a third water feeding may be necessary to prevent dehydration and assure proper health.

Calf starter — Freshness of calf starter needs to be closely monitored during hot weather to avoid mold growth or excessive fines. If possible, there should be a solid partition or enough space between the water and grain bucket to prevent carryover of water to the grain bucket.

Stresses — Perform stressful events in the early morning. Examples of stressful events include moving, grouping, vaccinating, dehorning, and castrating. Evening temperatures seem cool, but animal body temperature lags behind ambient temperature by 4-6 hours; therefore, morning is the best time to conduct potentially stressful activities.

Dehydration Level:

If a calf becomes dehydrated, be sure to know how to recognize clinical signs of dehydration. There are three key areas to evaluate when looking at calves that may be dehydrated from heat stress.

Eyes — The eyes should not be sunken into their sockets. They should be bright and fully placed in the calf's head. Eyes become sunken when a calf approaches 4% dehydration. This means a calf that weighs 100 lb. (45 kg) would be short at least 4 lbs (1.8 kg) or about 2 quarts (1.8 liters) of water. This level of dehydration usually requires electrolyte therapy to restore hydration status in the calf.

Skin Tent or Pinch Test — It is possible to grab a fold of skin on the calf's neck and squeeze it together. Once this "pinch" of skin is let go, it should go back to normal skin in 2 seconds or less. If the skin stays in a pinched or tented position for greater than 2 seconds, the calf is most likely at least 4% dehydrated and needs to be on electrolyte therapy.

Behavior — By combining the above two tests with the calf's behavior, it is possible to get a really good assessment of the calf's dehydration status. If a calf is sluggish, slow to eat or respond to feeding time, it may be dehydrated. Combine the prior two tests with calf behavior to assess how dehydrated a calf may be and how aggressive to be when treating dehydration.

References:

- Hill, T. M., H. G. Bateman II, J. M. Aldrich, and R. L. Schlotterbeck. 2011. Comparisons of housing, bedding, and cooling options for dairy calves. *J. Dairy Sci.* 94:2138.
- Lammers, B.P., J.W. Van Koot, A.J. Heinrichs and R.E. Graves. 1996. The effect of plywood and polyethylene calf hutches on heat stress. *Applied Engineering in Agriculture* 12(6): 741.