Heifer Management Blueprints

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Heat Stress in Heifers

Introduction

While no heifer-specific research has been done in regards to heat stress, the effect heat stress has on lactating animals is well documented. The effects of heat stress on lactating dairy cows suggest there are effects in heifers as well. A main concern of dairy producers and heifer growers in regards to heat stress has been the potential for a drop in average daily gain. With heat stress relevantly confined to short periods of time in the Midwest, heat stress may not have a direct concerning effect on growth, but other biological changes such as colostrom quality, calf size, conception rates, and lessened immunity caused by heat stress are of a concern in dairy heifers.

When does heat stress occur?

"It's not the heat, it's the humidity," heard many times, and this saying reigns true in dairy animals. Table 1 shows the temperature and humidity necessary to create a temperature-humidity index of 72 which is defined to be a critical point in dairy cows. Indexes higher than 72 may create problems associated with heat stress in lactating dairy cows. When a lactating dairy cow experiences heat stress, the stress will be apparent through a reduction in milk production as compared to heifers which have no easily recognizable change in animal performance due to heat stress. Heat stress may be measured by either rectal temperature or respiration rates. If the rectal temperature is above 103^{o}F or if respiration rates are greater than 80 breaths per minute on a significant number of animals, heat stress is occurring. Another consideration is the surface area to body mass ratio. In winter, producers must be cautious of cold temperatures and protect calves from the elements, the opposite is true in summer. Smaller animals are able to cool themselves more efficiently than large animals. Lactating cows also eat more and create more metabolic heat which also must be dissipated during the hot summer months.

Colostrum Quality

Calves born in the summer months may have less vigor and stamina. This could be due to numerous factors, but quality of colostrom being fed to the calf could be a reason. During summer, IgG concentrations in colostrom have been observed to drop by as much as 20%. Lower colostrom IgG concentrations leaves calves with less ability to fight diseases such as scours. If scours seem to be more prevalent during summer months this may be due to the effects of reduced effectiveness of passive transfer.

Reproduction

Another observation associated with heat stress and heifers is calves born during the hot months of summer may be slightly smaller. While calves have been proven to be smaller when born in warmer climates, the causes are unknown. It has been demonstrated that calf size is increased when cows are cooled during the dry period. Another well recognized observation has been the lower conception rates generally experienced in summer as well as higher incidences of early embryonic death. Higher uterine temperatures likely reduce embryo survival rates from the onset of estrus until about one day post-insemination. This implies cooling animals for only a short period of time amount insemination may result in improving conception rate.

Is it economical to cool heifers?

As with many issues that arise in the dairy industry, each case must be assessed separately. Before

taking any action, a producer should assess severity and effects heat stress may have on the heifers of their operation. Questions to ask can include how long does heat stress exist each year, what is the cost of installing heat stress modifications, and what is the anticipated return on investment. To date, the economic effects of heat stress on dairy heifers is difficult to quantify. This paper only highlights the possible areas to consider in such an assessment. Decreasing the heat stress in dry cows has been demonstrated to increase calf size and improve colostrom quality. As a result, pre-calving heifers should probably not be exposed to serious heat stress. As precaution, heifers should not be housed without access to shade, housed in poorly ventilated barns, or be severely overcrowded during summer months. Supplemental cooling using a combination of sprinklers and fans would reduce heat stress in heifers, but factors to aid determination of return on investment are largely unknown.

Table 1. Combinations of temperature and humidity that yield temperature-humidity indexes of 72.

Temperature °F	Relative Humidity %
72	100
74	80
76	60
80	35
84	15

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