UF-Gainesville Beef Cattle News Corner

Hot or not: understanding what makes a thermotolerant heifer

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Over the last few years, our research group has been collecting a multitude of traits in an attempt to describe thermotolerance in beef cattle. When we first started, our goal was to identify animals that respond differently to heat stress conditions. In order to carefully measure the internal body temperature of cattle, we placed iButton thermometers into blank (progesterone free) CIDRs (**Figure 1**) and inserted them into heifers. The CIDRs with the thermometers were able to measure the heifers' internal body temperature every 15 minutes for five days while the heifers were out on pasture, undisturbed. We started by using heifers from the multibreed herd at UF which ranged from purebred Brahman to purebred Angus with various crosses in between. We also used HOBO™ data loggers to record the outside temperature and humidity on the pastures where the heifers were kept, every 15 minutes. These were used to calculate the temperature-humidity index (THI), an indicator of heat stress. Conditions were considered to be high heat stress when the THI was 84 or higher for at least one hour. All of the internal body temperature measurements collected under high heat stress conditions were averaged together and compared across breeds. Cattle with even 25% percent Brahman were significantly cooler than purebred Angus (**Figure 2**).

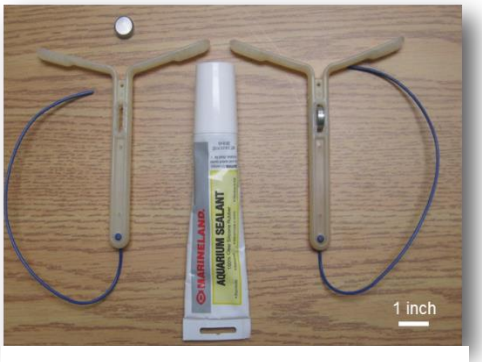

Figure 1. iButton thermometers and blank CIDRs

When we looked at the actual difference in body temperature, we were a little bit surprised that purebred Brahman cattle only stayed about 1°F cooler than the purebred Angus cattle. This difference seemed quite small until we also take into account what the cattle were doing under these high heat stress conditions.

Cattle were fitted with GPS collars that tracked their movement (**Figure 3**). The GPS data showed that purebred Brahman cattle spent most of the day out grazing in the pasture even under high heat stress conditions while the purebred Angus cattle spent most of the day laying in the shade (**Figure 4**).

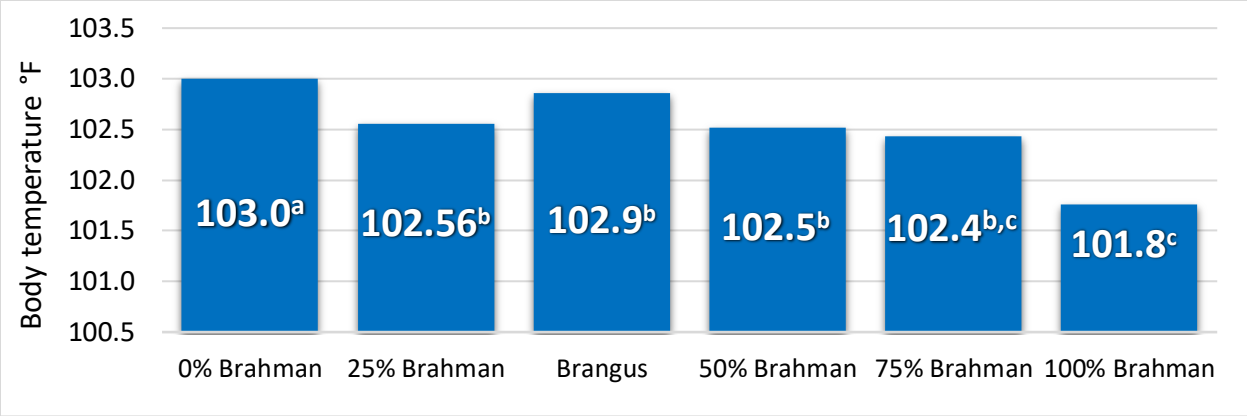

Figure 2. Relationship between breed composition and body temperature under heat stress. [a]Breed groups with differing letter superscript are significantly different. Remaining breed composition is Angus. Adapted from Sarlo Davila et al., 2019.

Figure 3. Brahman heifer with GPS collar

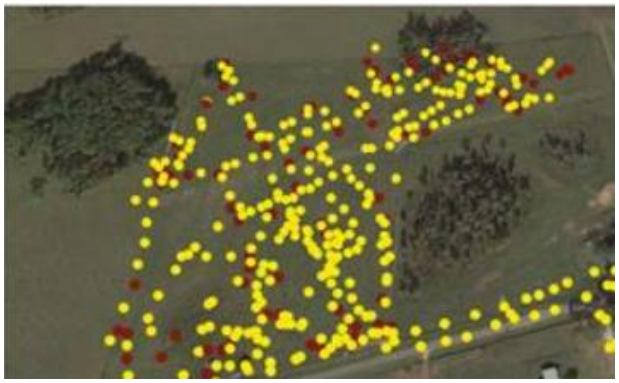

Figure 4. Heifers on pasture with GPS coordinates. Yellow represents moving cattle and red represent stationary cattle.

The percentage of Brahman breed influence was also proportional to the amount of time spent grazing. Heifers that were a greater percentage Brahman spent more time grazing than heifers with a lower Brahman percentage. While the 1°F difference between Angus and Brahman may not have seemed all that significant at first, the GPS data shows that Brahman cattle not only stay cooler but stay cooler while also grazing in the sun. It is important to keep this big picture in mind as we work to identify the genes that enable cattle to stay cooler under these conditions.