



# Cool Genes for **HOT** Climates

by Becky Mills

Heat and humidity are a way of life for Alex Johns. The Natural Resource Director for the Seminole Tribe, Johns manages over 10,000 cows near Okeechobee, Fla., right on the line between the subtropical and tropical climate zones. A typical summer day generally means temperatures in the mid 90s with 80 percent humidity.

“Heat stress is a huge concern for us,” he says. “We breed in January, February and March, at a cooler time, but cows start aborting when it gets hot.”

As a result, he was all in when Raluca Mateescu, University of Florida

animal scientist, asked if he and his crew would help in a study to identify the genes that control thermotolerance.

Mateescu and Johns started in the summer of 2017 by running 800 head of the Seminole Tribe’s potential replacement heifers through the chute. They inserted a CIDR, the Controlled Internal Drug Releasing device you’ve seen or used for heat synchronization, in each heifer’s vagina. Instead of releasing progesterone, though, this CIDR contained a tiny thermometer that recorded the heifer’s temperature every five minutes for five days. At the same time, they set up weather stations

to record the environmental temperature and humidity.

They also took skin biopsies so they could study the skin properties, including how many and how big the sweat glands are, and how deep they are in the skin. In addition, they took a hair coat score, with 1 being slick and 5 being a long, thick coat. They did temperament scores and took DNA samples on each heifer. Since these were replacement heifers, they also got typical production scores like weights and Body Condition Scores (BCS). The heifers also went through a Timed AI (artificial insemination) protocol, so they got reproduction data, too.

They repeated the process in 2018 with a fresh batch of heifers and will finish up this summer with the current crop.

With 40 percent of U.S. beef production taking place in either tropical or subtropical environments, Mateescu believes heat stress is too important a topic to just do one study. So, she’s doing another thermotolerance study at the University of Florida’s beef cattle farm in Gainesville.

“It is unique because we’re working with animals that range from 100 percent Brahman to 100 percent Angus,” she notes. That study involved 200 head for the last three years.

Here’s what Mateescu and her co-workers have found so far: “The coat score is very important. We’ve found animals with shorter and slicker hair maintain a lower body temperature.”

She says most of the Seminole Tribe’s Brangus heifers score a 1 or a 2, and don’t really shed, but she says, “It still has a huge impact on maintaining temperature.”

That goes along with Johns’ observations. “We’ve noticed differences in thriftiness in animals with different hair coats,” he reports.

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Halfway across the country, University of Missouri animal scientist Jared Decker is also helping cattle producers fight the heat stress battle. When he and his family bought a farm in Missouri in 2013, he got a real-world lesson in cattle adaptability, or the lack of.

His mother, who ranches in New Mexico, sent five of her Herefords to his place. "I learned firsthand about the challenges with heat stress and fescue," he reports. Only one of the females is still in his herd.

As a result, Decker requested and received funding for a three-year genetic adaptation project aimed at finding out which cattle are more suited for specific environments. In the study, which started in 2016, he uses tools at hand, EPDs and genomically-enhanced EPDs, but says, "Instead of analyzing cattle across the United States, we analyse them within regions. The National Cattle Evaluation EPDs work well, but we think we can do better."

Decker and his co-workers divided the country into nine regions based on temperature, elevation and precipitation. "We look at birth weight, weaning weight and yearling weight in each region. When we compare region-specific EPDs for the Southeast to other regions, we get lots of re-ranking. A bull that might have a lower weaning weight EPD nationally might have a higher weaning weight EPD in the Southeast and vice versa, although some bulls do stay the same," says Decker.

He adds, "The bull you might pick with National Cattle Evaluation EPDs might not be the bull you'd pick with

EPDs specifically for the Southeast. The main thing we're trying to do is find the bulls that will produce daughters that work better in each region."

As part of the local adaptation project, Decker is doing a hair shedding study. "When cows shed their winter coats, they have more heat tolerance and are much more productive. They wean a heavier calf and breed back sooner."

In May or June, participating cattle producers go through their cows and rate them from 1-5, a score of 1 being a cow that has completely shed her winter coat and is slick, and 5 being a cow that still has her winter coat. The breeders are turning in the ratings as well as a DNA sample on each animal.

"If we look at the Red Angus and Simmental data in the hair shedding study, we get the same answer. For every one-point increase in the score, we get a 12-lb. decrease in weaning weight. The calves from cows with a 5 score were 48 lbs. lighter than calves from cows with a 1 score."

In addition to Red Angus and Simmental, Decker and his team are also analyzing data from Angus, Hereford, Brangus, Charolais, Gelbvieh, Shorthorn, Maine-Anjou, Simbrah and crossbred cattle.

Like the local adaptation project, Decker says the analyzed data from the hair shedding project will be turned over to the breed associations and they can use it or not. If they use it, he says, "It is all about matching the cow's genetics to the stressors of her environment." ☛

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The good news is you can try this at home. Mateescu says, "It is very easy to do a coat score."

She also reports, "Temperament affects body temperature. The calmer cows maintain a lower temperature." More good news – temperament is another trait you can check at home.

She also has news from the skin biopsies at the university and from the Seminole heifers. "There is a big difference in the sweat glands of cattle.

The Brahmans have huge sweat glands that are closer to the skin's surface compared to pure Angus cattle. There is also variation in the Brangus. We should be able to select for larger sweat glands, which give the animals better ability to dissipate heat."

In the fall, Mateescu and her crew will start analyzing the DNA of the heifers. Her ultimate goal is for you to be able to do a simple commercial DNA test you may already be doing on your replacement heifers, and find out which ones can handle the heat. ☛