Beef Cattle Climate Adaptability

How can genomics help?

*by **Mayzie Purviance,** Angus Media intern*

It is predicted that by 2100, the average temperature in the United States will be raised by 2°-6° C (3.6°-10.8° F), and the number of days with a temperature above 32° C (90° F) is expected to increase, shared Raluca Mateescu, a quantitative geneticist for the University of Florida. In other words, our cattle are going to undergo an increase in heat stress.

During a June 1 breakout session on advancements in efficiency and adaptability at the 2017 Beef Improvement Federation (BIF) Research Symposium and Convention in Athens, Ga., Mateescu shared insights on how genomics might assist beef cattle in adapting to climate.

When an animal experiences heat stress, its ambient temperature is raised and productive functions are compromised. These negative effects can contribute to issues in production through feed intake and redistribution of blood flow, and elevated body temperature, which can affect specific organ systems.

If the chances of being affected by heat stress within the next 85 years are going to increase, how will our livestock cope? Mateescu offered an answer: "Genetic improvement is one of the few feasible strategies for adequate and sustainable production of beef protein in an increasingly hot world."

Mateescu has conducted extensive research to back up her statement. She spoke of the mechanisms of heat stress adaptation, such as thermoregulation. She also stated that in order to tolerate heat stress, we will have to regulate internal heat production and heat exchange.

Mateescu proposed crossbreeding Brahman and Angus genetics in order to increase thermotolerance. The figures shown in the accompanying PowerPoint (available in the Newsroom at *www.bifconference.com)* show the results of Mateescu's research. The figures indicate that although the Brangus herd did not have a heat tolerance as low as the Brahman, it had a significantly better heat tolerance than the purebred Angus.

Field Testing $B in Purebred Cattle

In field trial, high-$B group outperforms low-$B group in every metric.

*by **Troy Smith,** field editor*

"There are skeptics out there. Not everyone is convinced, but EPDs (expected progeny differences) and selection indices work," stated Tom Brink. "We can, at will, create high-value cattle."

Brink was referring to the power of modern genetic selection tools when he addressed attendees at the Beef Improvement Federation (BIF) Research Symposium and Convention hosted May 31-June 3 in Athens, Ga. The CEO of the Red Angus Association of America (RAAA) and founder of Top Dollar Angus Inc. spoke during the convention's Advancements in End Product Improvement breakout session, saying broad use of the Angus beef dollar value index ($B) has resulted in production of better-feeding cattle, with better carcass merit, that generate more net profit to be shared across industry segments.

Brink discussed a field study conducted as "proof of concept" research. It compared high-$B Angus genetics to low-$B Angus in a typical production setting, while minimizing, as much as possible, environmental influences on the two genetic groups. He explained how the 43 purebred animals raised and harvested for this study were the result of embryo transfer. Both sides of their pedigrees were known and genetically quantified via American Angus Association EPDs and dollar value indexes ($Values). Fed together, at the same Kansas feedyard, the two $B groups were treated with a standard implant protocol and harvested in three drafts, targeting 0.50 inches in average backfat.

"The high-$Beef cattle out-performed low-$Beef animals in every metric evaluated," reported Brink.

There was a pedigree average $B difference of $93.69 between the two groups ($141.12 vs. $47.40), which represented the expected difference in progeny of the research cattle. Since the study evaluated the animals themselves (not their progeny), the expected value difference between the high-$B and low-$B groups was twice their pedigree average $B difference, or $187.38 per head.

Brink called this dollar amount a reasonable prediction for how the cattle would perform. However, the study documented a real value difference of $215.47 per head, favoring the high-$B group.

"This shows that the predictive power of $B works extremely well in a real-world setting, and even is a little conservative," stated Brink. "The take-home message? Use the tools. They work."

for ways to derive genetic predictions tailored to specific production environments."

Ultimately, Decker said, he would like to see developed genomic-enhanced expected progeny difference (GE-EPD) values and selection indices that would predict a given animal's adaptability to one of nine regions within the United States. He said he expects animals would rank differently in each region for their predicted ability to perform and reproduce.

At the very least, he said, tools are needed to predict adaptability to three most-challenging regions — the Gulf Coast, the Fescue Belt and the high-elevation area of the West.

Decker also noted the launch of a cattle hair-shedding study, the goal of which is to create a genomic prediction — a GE-EPD — for the ability to shed winter hair in warm weather.