Fertility in the Future

Understanding and predicting fertility in bulls is helping achieve reproductive efficiency.

by Megan Silveira, assistant editor

In the discussion of fertility, the cow often takes precedent. Francisco Peñagaricano, assistant professor of quantitative genomics at the University of Wisconsin, said the bull rather than the cow should be at the forefront of these conversations.

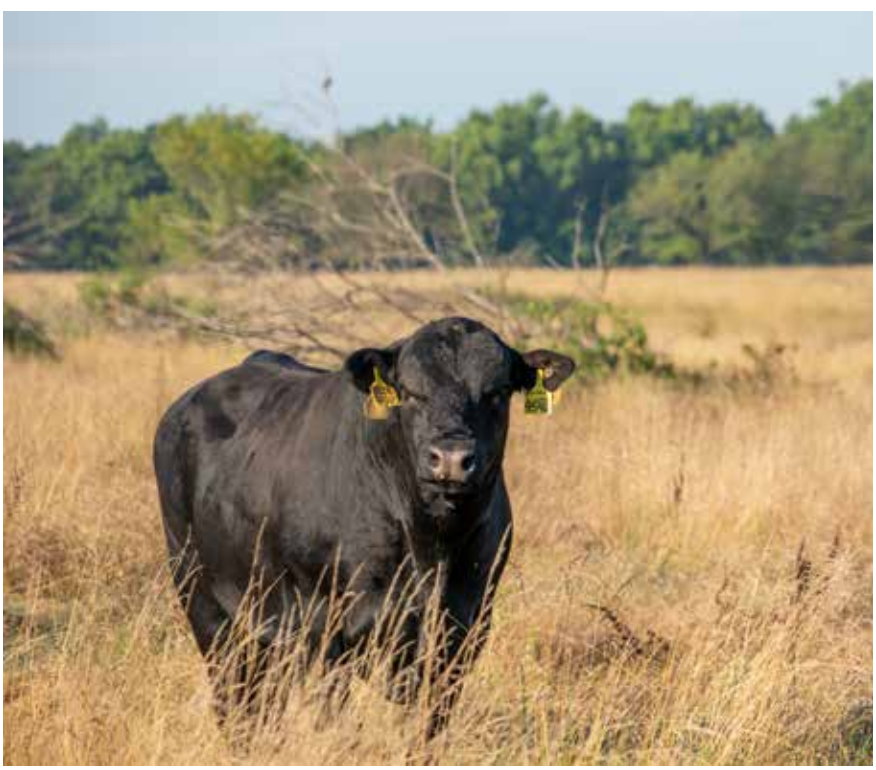
"A single bull will have a larger impact than a single cow on genomics," he said during his presentation, "Genomic Discussion and Prediction of Bull Fertility," at the 2021 Beef Improvement Federation (BIF) Research Symposium & Convention hosted June 22-25 in Des Moines, Iowa.

Peñagaricano reminded producers a cow typically can only produce one calf each breeding season, whereas a bull can sire numerous calves.

A vast majority of beef producers share the goal of improving reproductive efficiency, so, Peñagaricano said, it's important for members of the beef industry to understand fertility in bulls.

With past research on data of dairy bulls, Peñagaricano said genetic factors do explain part of the variation in bull fertility.

However, he explained, genes with the ability to influence fertility do so with miniscule effects. Often, it's novel regions, genes or variants in genetic data that Peñagaricano finds have large nonadditive effects on the next generation of livestock. For this reason, pathways, rather than single genes, are often the primary targets of selection for fertility.



Homozygous bulls are also often seen to possess lower genetic diversity, he said, warning producers that homozygosity might be an important risk factor for bull fertility.

With all this in mind, Peñagaricano said the next question producers have is, "Can fertility in a bull actually be predicted?" His answer: Yes.

"Genomic prediction works," he said. "It is outstanding. There is no discussion."

In fact, genomic prediction is so strong that for smaller breeds of cattle, Peñagaricano said, it will even be able to be used to produce across-country evaluations.

Peñagaricano described genomic prediction as a black-box tool, and said it has great potential to be applied to the subject of fertility. With Peñagaricano's research focusing on dairy bulls, he encouraged future research and evaluation to focus on calves from beef-on-dairy crosses to help researchers continue to better understand the fertility of beef bulls.

As technology continues to advance and producers push the industry forward, Peñagaricano said research on both genomics and bull fertility will continue to be at the forefront of producers' minds.

Eventually, the focus of the fertility conversation might start to naturally shift to center on the bulls rather than just the cows.

Applying Precision Technologies

Panelists share experiences in using smart feeder, individual animal monitoring and virtual fencing technologies.

by Troy Smith, field editor

New precision technologies were a topic of discussion during the 2021 Beef Improvement Federation Research Symposium & Convention hosted June 22-25 in Des Moines, Iowa. Three speakers shared their experience with application of three different technologies designed to aid collection of data contributing to genetic selection, monitor animal behavior and manage cattle placement during grazing.

Iowa State University Extension Specialist Patrick Wall explained the use of "smart feeder" technology for research. For his team's cow-calf studies, the feeder has been used to collect creep feed intake of individual calves. According to Wall, the solar-powered smart feeder reads each calf's electronic identification (eID) tag and allocates an assigned amount of feed. The feeder also records the amount actually consumed and tracks the number and timing of each individual's visits.

Wall explained how the study involved pairs on pasture or in drylot, with each calf assigned one of three treatments. According to its assignment, each calf visiting the feeder received either 1) no creep feed, 2) up to 2 pounds (lb.) per day, or 3) up to 15 lb. per day.

"There was a lot of variability as to when and how much calves ate, and some calves never went to the feeder," Wall said, reporting even for healthy calves with the same or similar weaning weight, intake of creep feed had varied from 0 lb. to 15 lb. per day.

Wall said intake studies were designed to collect and compare creep-feed intake data from calves whose dams have low vs. high expected progeny difference (EPD) values for milk. He believes such studies will help breed associations improve the usefulness of EPDs for genetic selection.

Bruning, Neb., cattleman Reiss Bruning talked about his family's application of an individual-animal monitoring system utilizing electronic ear tags and associated computer programs.

Such systems track and record animal behaviors — including movement, eating and rumination — to reveal activity trends and alert managers to changes. According to Bruning, their monitoring system aids management of artificial insemination (AI) programs.

"We use it for heat detection mostly, so we can simultaneously synchronize and breed multiple groups," Bruning said, noting how the monitoring system has saved time devoted to heat detection and reduced the number of false heats detected when using visual heat detection patches alone.

"The system also allows us to monitor postpartum anestrus by showing us when cows return to cycle, and we can monitor the onset of puberty in replacement heifers," Bruning added.

Virtual fencing technology was addressed by Cody Jorgensen, whose family runs cattle, farming and hunting enterprises near Ideal, S.D.

Jorgensen explained how individual animals wear electronic collars that emit an audio signal when the animals come near predetermined virtual boundaries. If any animal continues to approach a boundary, its collar delivers a mild shock similar to that delivered by a traditional electric fence.

Jorgensen described how cattle are trained by first exposing them to virtual boundaries established along existing physical fences. Then, virtual fences are used when cattle graze fields planted to forage crops or cover crops, and areas where building and maintaining physical fences is difficult. He said virtual fences are easily moved for rotational or strip-grazing. Virtual fencing is also used to keep cattle out of food plots planted for pheasants.

Jorgensen reported problems with first-generation collars used, but the improved version offered better fit and retention. He noted using collars on 2-year-old bulls was most challenging. Some bulls ignore the warning and the shock, but response is better when animals are trained at a young age.

"We like the concept, and the technology continues to get better," Jorgensen said. "I think this could be a game-changer." AJ

Editor's note: Find more coverage of the 2021 BIF Symposium in the Newsroom and on the Awards page at www.bifconference.com.

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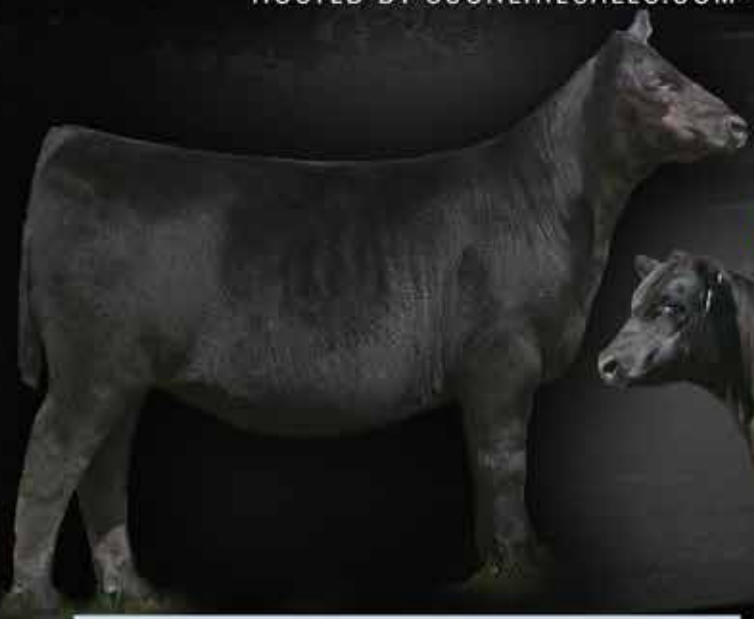

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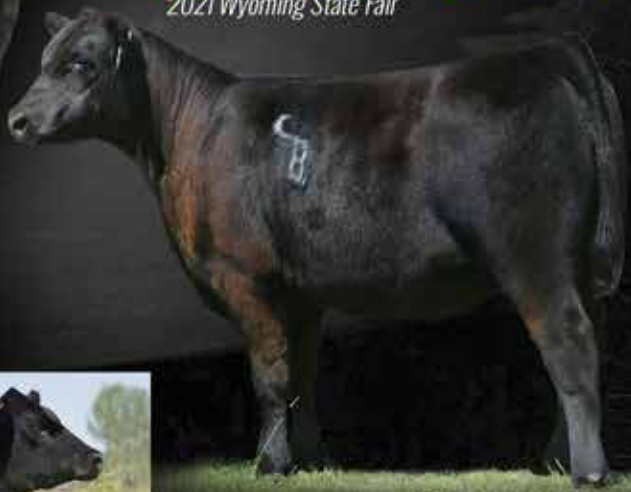

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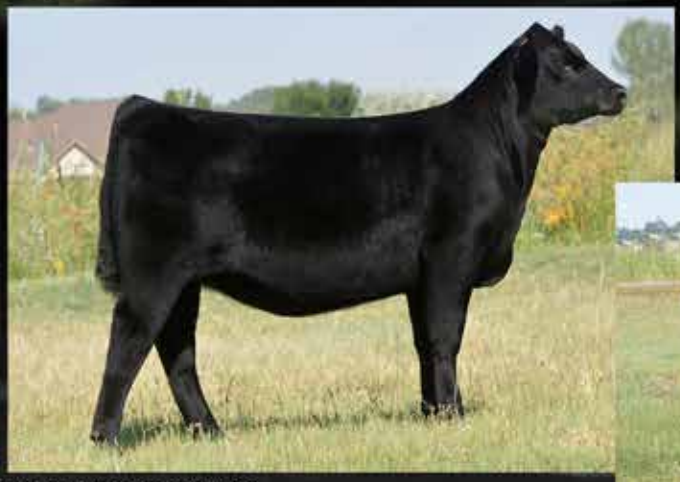

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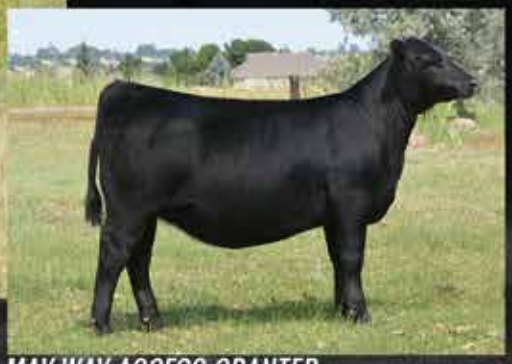

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