AVOIDING THE STORM

Proactive animal health means a genetic approach.

by Miranda Reiman, Certified Angus Beef LLC

The beef community is getting ready to rip off the Band-Aid®.

Antibiotics are effective tools in managing animal health; but they've also been a patch, serving until the advent of genetic tools to solve challenges in the long term.

"We've had increasing scrutiny around the use of antibiotics, so we need to be ready," said Brad Hine, research scientist for Australia's Commonwealth Scientific and Industrial Research Organisation (CSIRO). "Our ability to use antibiotics in our food-producing animals is, in the next few years, going to be rapidly reduced. A really good strategy is to try to breed animals that have improved disease resistance."

In other words, create cattle that don't get sick. What may sound like a far-off wish is quickly becoming reality.

At the 2019 Angus Convention in Reno, Nev., last fall, Hine shared insight into current work his team is doing with the Australian Angus Association. He also talked of upcoming collaboration with Angus Genetics Inc. (AGI).

"As we continue to refine genetic selection, we realize that genetics contribute to animal health in ways we probably don't fully understand today," said Mark McCully, CEO of the American Angus Association. "As we start identifying genetic lines of cattle that are less likely to get sick, that has ramifications across the entire industry."

It matters at every point in the production chain and affects economics, animal welfare and consumer perception.

"It's easy to make the assumption that the most productive animal is the animal with the best immune system," Hine said. "Obviously, the healthiest animal grew the fastest."

But that's just not true, he said; and in some instances, disease resistance is negatively correlated with production. For example, high-milking Holstein cows are often more at risk for mastitis, he noted.

"The research tells us, if we select for productivity alone, we increase susceptibility to disease," Hine said. "It's really important for producers to rethink that."

Australians have used a strategy developed for the Canadian dairy industry and applied it to Angus cattle.

This broad-based approach is a new twist compared to historical health work, where cattle have been bred for brucellosis resistance while sheep were bred to ward off internal parasites.

"We've been very cautious not to tailor this to any specific disease, because we might know one disease, but there's another one right around the corner," Hine said.

Different types of pathogens are dealt with in different ways: there's a cellular response for viruses that live inside the cells and antibodies that fight those outside the cells.

"There are two different arms in the immune system," he said. "And the risk you run if you select animals that are very good at one arm of the immune system is that sometimes those animals are not as good at handling pathogens that require the opposite arm." They test for both.

Hine's team vaccinated cattle just before weaning them into the yard, and then took blood tests to measure their response at the most stressful point.

"It's about breeding animals with a really strong immune system so they can handle whatever challenges they face," he said. "It is not necessarily the animals that can respond when they are happy and healthy in the paddy that we are trying to identify. It is those animals that can respond to a disease challenge when they are under some stress, and are able to cope with that situation and return to being productive."

The early work shows the variability is "enormous," Hine said, and the heritability appears to be moderate. Correlations to other traits were weak but followed as expected: temperament was favorable, production traits like growth were negative.

> "There are obvious benefits for producers, economically, from breeding for improved immune competence; but I think the biggest benefit is maintaining consumer confidence in our beef."
> — Australian researcher Brad Hine

He said that's good news, because it means health can become a priority in selection without compromising other goals.

Following indexed animals through the feedlot was a chance to see if the research worked in a real-world scenario.

For every animal that scored high for immunity, there was a $3.50 animal-health cost. Those in the low group accrued $103, Hine said, noting those are conservative estimates that don't account for labor.

"If we can identify low-immune-competent animals and get them out of the system, there is a huge economic benefit for us as an industry," he said.

The poorer immunity group accounted for only 11% of the total population, but represented 35% of the health line items.

"As tools are developed, I think the adoption

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rate will be pretty significant in terms of both pace and scale," McCully said. "A slight change in the improvement of animal health has huge economic ramification across the industry."

The technology is "in its infancy," he said, but the long-term goal would be the creation of genetic tools, both for Angus breeders and their commercial customers, such as genomic tests for replacement heifers or to prescreen cattle bound for the feedyard.

"I could definitely see this as a way of being better able to characterize risk," McCully said. "You could modify your management to the risk level."

Today, cattle often receive metaphylaxis — or whole herd treatment — upon processing into the feedyard. But studies show for every 100 that get preventative antibiotics, only 20 actually needed them, said John Richeson, West Texas A&M animal scientist. He spoke about innovations in health during the 2019 Feeding Quality Forum.

So, how do cattlemen identify that bottom fifth?

Researchers are developing everything from rapid blood tests to behavior-monitoring instruments, but they still need fine-tuning.

"We need it to be, ideally, at the speed of commerce so we don't slow down processing," Richeson said. The challenge is, how can we target accurately, quickly, and those sorts of things — there could be a huge cost savings to the producer."

Most of the work is focused on cattle chuteside at the feedyard.

With a genetic test for improved immunity in commercial cattle, that information could be communicated with the yard upon arrival, McCully said. Feedyard protocols could differ based on this information, and eventually, market signals should follow.

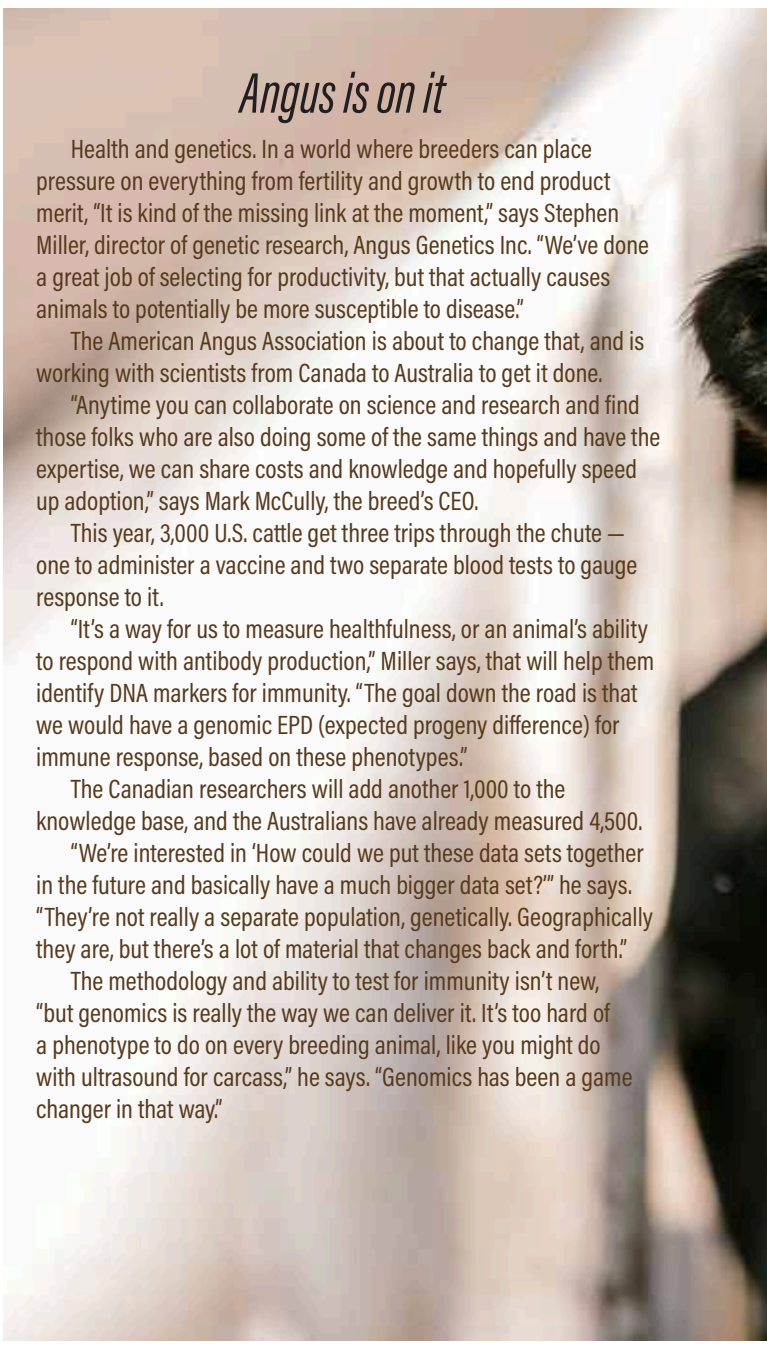
"If I'm a feeder, I'm still going to want those cattle vaccinated — it doesn't change anything about good calf management we do today," McCully said. "But if I can look at a set of cattle that has all of that, plus the genetics that give them the likelihood of staying healthier, that becomes an economic signal back to the producer to make more of those cattle."

Programs like AngusLink℠ could potentially convey information through the chain.

"I really do see immune competence as just one part of the puzzle when we start to think about the resilience of the animal," Hine said.

Cattlemen still need a focus on management and environments that control pathogens, giving cattle less exposure in the first place.

"We can breed the animals that are the most



Angus is on it

Health and genetics. In a world where breeders can place pressure on everything from fertility and growth to end product merit, "It is kind of the missing link at the moment," says Stephen Miller, director of genetic research, Angus Genetics Inc. "We've done a great job of selecting for productivity, but that actually causes animals to potentially be more susceptible to disease."

The American Angus Association is about to change that, and is working with scientists from Canada to Australia to get it done.

"Anytime you can collaborate on science and research and find those folks who are also doing some of the same things and have the expertise, we can share costs and knowledge and hopefully speed up adoption," says Mark McCully, the breed's CEO.

This year, 3,000 U.S. cattle get three trips through the chute — one to administer a vaccine and two separate blood tests to gauge response to it.

"It's a way for us to measure healthfulness, or an animal's ability to respond with antibody production," Miller says, that will help them identify DNA markers for immunity. "The goal down the road is that we would have a genomic EPD (expected progeny difference) for immune response, based on these phenotypes."

The Canadian researchers will add another 1,000 to the knowledge base, and the Australians have already measured 4,500.

"We're interested in 'How could we put these data sets together in the future and basically have a much bigger data set?'" he says. "They're not really a separate population, genetically. Geographically they are, but there's a lot of material that changes back and forth."

The methodology and ability to test for immunity isn't new, "but genomics is really the way we can deliver it. It's too hard of a phenotype to do on every breeding animal, like you might do with ultrasound for carcass," he says. "Genomics has been a game changer in that way."

disease resistant, but if we put them in a really bad, high-disease environment, then they will eventually succumb," Hine said.

Even with improved tools, cattle will still get sick, although hopefully less often. That allows for less antibiotics in the system.

"We need to be proactive rather than reactive. We need to be thinking about strategies now that put us in a good place in the future. Because certainly our ability to treat disease is going to be reduced as regulations come through," Hine said. "The perfect storm is brewing. So as an industry, how can we avoid that storm?" AJ