Angus Talk

Visiting with AGI's Stephen Miller

Host Doug Medlock visited with Stephen Miller, director of genetic research for Angus Genetics Inc. (AGI), about advancements in selection capabilities and research that are leading the way to unlocking the role genetics play in how an animal performs and ultimately produces a valued end product for the consumer. Here are some outtakes from their conversation.

Q: **Tell us a little bit about yourself.**

A: My interest stems back to the family's interest in agriculture. I grew up on a farm. My dad was involved in agriculture and went to the University of Guelph in Canada for agriculture. He became involved in the Canadian Department of Agriculture in meat grading and inspections.

Farming and the meat industry — it was just a part of my growing up. I started as a youngster at 5 years old. I was given a rabbit and started rabbit breeding, and everyone knows how rabbits breed. From there I moved on to goats and then cattle. …

I went on to the University of Guelph and got involved in a research course with a mentor of mine there, Jim Wilton, who I later replaced on faculty at the University of Guelph. Once I got involved in crunching the numbers behind animal breeding research, that's really what piqued my interest. As part of my doctorate I spent a year toward that research in Australia, working on beef cattle breeding. Then later I moved on to a post-doc and then eventually 14 years on faculty at the University of Guelph in animal breeding research.

Q: **You've spent close to 20 years working on high-level genetic evaluations and related technology. Why is now such an exciting time for cattle producers?**

A: If somebody asked me when I first started, would we be where we are now, I wouldn't have believed it in terms of the technology now. With genomics, it's not just interesting science, but it's actually having a huge impact on breeders. I've heard it termed a disruptive technology, and I think that's correct, but it really is exciting to see the tools being implemented and applied on the farm.

Q: **What do you plan to do as genetic research director on the AGI team?**

A: As a Canadian, I'd say I'm going to make a hockey stick. If you look at the genetic trend line for Angus, essentially the genetic values get better and better every year, and it's kind of a linear increase over time. If we do a better job of implementing some new tools, we can essentially make that straight line into a hockey stick and increase that rate of genetic change at the end. That's essentially what I hope to do through development of better tools for breeders so they can increase their rate of genetic progress.

Q: **What are some of the big projects going on now at AGI?**

A: One of the biggest projects is what we call the single-step genetic evaluation. That's a new way to use the genomic information in calculating the EPDs (expected progeny differences). Another underlying project I think is going have a big impact is the structured sire evaluation. Right now there are roughly 1,800 cows bred to Angus bulls for the project. The idea is to follow those progeny through and collect all the data. Collecting new information like that is going to be a big part of making better tools for breeders.

Q: **What do these mean for Angus breeders?**

A: Two things. More current information and better information. Angus breeders think about *Certified Angus Beef*® (CAB®) and the position Angus has in the marketplace with quality. That's been done through genetic progress, but we have to keep those tools current, and current information about carcass value is going to be what drives that.

Q: **How do you see evaluation capabilities evolving in the next few years?**

A: Essentially, what I see happening are better ways that we can use the genomic information. If you can imagine bird hunting or duck hunting, you use a shotgun. Essentially, the way we use the genomic information now is a lot like using a shotgun. We have the scatter pattern across the genome, and we try and relate that scatter pattern to traits.

What we're going to move toward I call more like rifle shooting. Instead of using just a shotgun approach with the genome, we're going to get down to and pinpoint mutations on the genome that are affecting the traits, and we're going to incorporate that information into EPDs. It will change the way we might genotype the animals, but it will also change the statistical methodology that we use behind the scenes.

Q: **How can breeders help to facilitate AGI endeavors and the development of these selection tools?**

A: We can't do anything without data. I think there was a pop song on the radio a couple of years ago, *All about that bass*, and here it's all about the database. I think breeders have to be humming that tune; it's all about the database. The quality data phenotypes and genotypes they collect on farm will drive our tools in the future.

Q: **How does research factor into the work of AGI?**

A: I look at research like an investment. A farmer might break up a field and replant his hay crop. You can continue using the same tools year after year with no reinvestment, but eventually you'll be out of business. Research has to be ongoing to continue to put the best tools in front of our breeders so they can stay ahead.

Q: **What research projects are ongoing right now?**

A: The single-step that we mentioned. There's a couple others that are just wrapping up — research done at the University of Georgia related to cattle that are more resistant to heat stress, and another project related to hair shedding. Both are related to adaptability traits in cattle.

Q: **How will knowing more about heat stress or hair shedding ultimately influence a breeder's profitability?**

A: We know that heat stress does basically reduce productivity. Cattle aren't going to grow as fast when they're under heat stress.

▶ "Instead of using just a shotgun approach with the genome, we're going to get down to and pinpoint mutations on the genome that are affecting the traits, and we're going to incorporate that information into EPDs. It will change the way we might genotype the animals, but it will also change the statistical methodology that we use behind the scenes," says Stephen Miller, director of genetic research for Angus Genetics Inc. (AGI).

We know there is a heritability to that component. If we can breed cattle that are more adaptable to those climates we can basically push Angus genetics into more markets, but also not only improve the profitability for the farmers because their cattle are more productive.

I think a suite of traits that farmers and breeders increasingly have more and more interest in is essentially what we might call welfare/well-being traits. Cattle that are more adapted basically have better welfare, and that's a good thing. If breeders are proactive about increasing the animal's welfare, I think it's just good for everybody.

Q: How do you see research benefiting the cattle industry?

A: Making better cows I see as an ongoing endeavor. I think as long as people are in the cattle breeding business, there's always going to be the opportunity to make them better. As we put tools in front of the breeders related to things like productivity, profitability traits, welfare traits — if we can get those tools that are more accurate earlier, they're going to make more progress and continue to make better cattle faster.

Q: What is single step?

A: Single step is basically a statistical approach where we combine the genomic information with the animal's performance and pedigree information in essentially one step. The whole calculation happens at once, and all that information is incorporated to estimate the animal's EPD.

Q: How does that differ from how AGI has traditionally generated the weekly evaluation?

A: With the two-step approach we have now, the first step is we want to come up with an estimate of the animal's genetic merit based on the genomic information or based on the DNA and it's genotype. The second step is essentially the EPD calculations that have been happening for the last 20 years in cattle breeding, where we consider the animals' phenotypes, the measurements the breeders take on farm and the pedigree. Then we take the traditional EPD and combine it with the genomic information and provide an EPD that basically combines both sources of information. That's a two-step process.

Q: How will this change benefit Angus breeders?

A: The downside right now of a two-step process is that step where we have to do the training or the calibration, where we take all the genotypes we have and all the phenotypes on those animals and we come up with a prediction of generic merit based on the genomics. Those predictions are used until we do another calibration. As time moves on, more genotypes come in to the Association. Then we basically recalibrate that. Every time we recalibrate, EPDs start to change, so people see a bit of a blip in the EPD trend lines on certain bulls, which is never desirable.

With single step it's seamless. Every run every time, every week for example, when we do the single-step run, all the genotypes and all the phenotypes are used and appropriately weighted so we don't have that potential up and down in values on bulls.

Q: When does AGI plan to adopt this method?

A: We're on track to deliver something to breeders in 2016. There are prototype values coming out now that people are poring over and looking at how they look compared to what's given to breeders now. There are plans to reveal some more at the Convention in early November as to just when this is going to go live.

Q: Will there be any changes in what's provided in the evaluation?

A: At the base level, no. It will be the same traits with one exception. Breeders will get their EPDs with genomic information incorporated and accuracies on all the traits. The one thing they won't get is a percentile based just on genomic information (see "By The Numbers," page 92).

Q: Tell us about the tenderness EPD.

A: That is the one new trait that we'll roll out the same time as single step. Tenderness is basically beef tenderness, and to get a beef tenderness score you actually have to take a steak and cook it and measure the tenderness of that meat. There's a database of about 2,000 animals, Angus-influenced animals, with tenderness and genotypes that will roll into that single-step evaluation and provide a tenderness evaluation back to breeders that hasn't been available until now.

Q: Where can Angus breeders find out more information about AGI, it's genetic evaluation, and research?

A: Like a lot of things nowadays, it's the website *www.angus.org*. AGI plans to keep people abreast of what's going on there. If there's information that you'd like to see, please drop us a line or get in touch with us, and we'll get it up on the website.

The Beef Improvement Federation (BIF) has an annual research symposium. This year it will be in Georgia in June. That's a great way for breeders to get updated on research and developments in cattle breeding.