

The Future of Animal Genomics

Please introduce yourself and your company.

I'm Chuck Sattler, Vice-President of Genetic Programs at Select Sires. I oversee our dairy breeding and dairy sire development programs at Select Sires, Inc. Select Sires is a farmer-owned cooperative that markets cattle semen and breeding services around the world. With our recent merger with Accelerated Genetics, we are now the largest Artificial Insemination company in the world. Our primary product is dairy bull semen and our success in the dairy genetics market has a lot to do with USDA's contributions in genetic and genomic evaluations that have enabled U.S. breeders to develop world-leading dairy genetics.

What is it that you wish you could do, but just cannot do today due to cost or lack of technology?

Obtain a genomic evaluation on a fresh embryo. We need embryo biopsy techniques that minimize damage to the embryo. We need DNA amplification methods that produce accurate genotype results when using high density SNP chips. And, we need quick turnaround genomic evaluation results so that we can eliminate lost pregnancies caused by embryo freezing.

Make pregnancies from pre-pubertal males.

What is/are the biggest current and 10-year challenge(s) to your industry that changing traits in your animals might be able to address?

Feed efficiency/Sustainability – USDA has made a big investment in feed efficiency and have made real advancements. But, we are a step or two away from feasible approaches that will produce genetic improvement. This is because collecting individual animal feed intake data on cattle is too expensive to gather enough data to make an impact. We need to take the feed efficiency research a step further. A set of indicator traits that are or can be routinely gathered in commercial settings that provide an accurate indication of feed efficiency need to be developed. These could include body weights, activity, rumination, eating time, readings from milk samples, etc. There are a lot emerging tools to automatically capture animal data and it seems like this is more likely to produce meaningful gains in feed efficiency as opposed to thinking we will someday gather millions of feed intake records on individual cows.

More adaptable, heat-tolerant dairy cattle – More dairy production is going to be needed in tropical regions. Tropically-adapted cattle that are efficient milk producers are needed.

More information about the mechanisms through which specific genes influence phenotypes. Gene editing offers great potential in both identifying these mechanisms and then producing animals with preferred phenotypes. We need more detailed information about specific gene function in cattle for gene editing application in breeding programs.

Are there opportunities between different segments of the industry? For example, something that does not fall within the wheelhouse of the breed association/company or the meat industry (expand to any topic one can think of), but would be very beneficial for both industries?

Big data – Much of the genetic success of the dairy industry is due to building big databases of meaningful production data. We were big data before big data was cool! While there have been lots of innovation in better ways to gather data on cattle and from farms, we've changed very little in how we assemble this data for use in genetic improvement programs. We still, almost entirely, rely on monthly DHI testing to provide the data for genetic evaluations. Just like in crop farming, there are all kinds of innovations that producers are using to automate and help them manage daily operations. A lot of data exists in feeding programs, calf rearing programs, milking systems and in milk samples but very little of this data is integrated so that data from one enterprise can be used for the benefit of the other enterprise. I see two primary opportunities: 1) Develop systems to harvest on-farm generated data cost effectively for use in genetic evaluations, and 2) Develop systems to integrate data from different farm operations into whole-enterprise-management information that helps the farm owner make better decisions.

Bridging the gap between dairy production and dairy processing. Milk is used to manufacture lots of different products. Can we identify and select for cattle that produce milk that is more suitable for the product it is manufactured into? The dairy industry is evolving to more vertical integration like has previously happened in the swine and poultry industries. There must be variations in milk proteins and fats that make it more useful in the manufacturing of certain products.

Other insights?

We need a public that is more accepting of technology. The current mindset, that food is better when produced with minimal use of technology, is preventing implementation of a lot of innovations. Efforts are needed at all levels and by all segments including the federal government and public universities.