



allows us to build low-density, low-cost products for routine commercial genotyping, and high-density products for research applications. The processes are compatible with the high-volume throughput in our lab.

The iSelect BeadChip enables us to serve our mission of data reliability and accuracy with fast turnaround time. The quality of the product means that we can rely on Illumina to perform the QC on each iSelect BeadChip. After the BeadChip comes to us, we have a high degree of confidence that it will deliver time and time again. There's essentially no variability in performance.

**“The great thing about Illumina technology is its reliability, accuracy, and robustness.”**

**Q: Is the bulk of your genetic testing for bovine breeding associations?**

**SB:** We service virtually every major breed association in North America and around the world, including the Holstein, Jersey, and American Angus associations. We think about the breed associations as a B2B (business-to-business) customer segment. Members send samples to their breeding associations, and the associations gather them up and send them to us for genotyping.

We also have a significant B2C (business-to-consumer) customer segment where we have a direct business transaction and information delivery to individual cattle producers. These range from ranchers that send us single samples for a low-density genotyping or parentage testing, up to the largest commercial ranching operations in North America. We offer services to virtually all of the major ranching operations in North America and many around the world, including Australia, New Zealand, and extensively throughout Europe. We even have business operations in Brazil and China. It's a diverse mix of customers, particularly on the bovine side.

In addition, we provide genetic testing services for various other species including dogs, fish, pigs, poultry, and horses. We also offer services for testing specialty crops, as well as trees that are used for pulp and paper production, such as eucalyptus and pine.

**Q: How do they use the genetic information?**

**SB:** Most of what we do is tied to genotyping of animals for the selection of superior breeding stock. It ranges from simple parentage testing to the development of a genomic-enhanced breeding program, where we use Illumina technology primarily. In the case of the cattle industry, there is a measure of genetic merit that's referred to as the expected progeny difference (EPD). This is a measure of the impact that a sire or dam will

have on their offspring. It's used frequently for the selection of superior breeding stock. It greatly enhances the rate of genetic progress by removing animals from the breeding population that aren't contributing the desired mix of alleles. More breed associations are embracing the GeneSeek Genomic Profilers (GGP) built on the iSelect platform to develop and deploy tools to achieve genomically enhanced EPDs for individual traits.

**Q: How are cattle traditionally evaluated?**

**SB:** The conventional way to measure the genetic merit of progeny is to raise a cow, impregnate her, and have her raise progeny. It takes several years to evaluate the progeny and decide whether she's any good. With genomics, the producer can take a tail hair or other tissue sample when she's a day old and get exactly the same information.

If I have a young bull and I want to evaluate his genetic merit, traditionally I put him out with a group of heifers, he impregnates them, and they calve. Their progeny grow up, are weaned, and put into the feedlot, where they are evaluated as they're prepared for market. By the time I get the data on the first progeny that bull has sired another set of calves and he's out in the pasture working on his third set. That's a risk management situation. I want to know before I put him out the first time whether he's any good. I don't want to wait until he's 3 or 4 years old and sired three set of calves, before I realize I've made a mistake.

**“The iSelect BeadChip has now enhanced our product offering, enabling us to expand from catalog to custom products.”**

**Q: What are some emerging genotyping applications?**

**SB:** The part that is emerging is the concept of marker-assisted management. We've seen increasing interest and investment into selecting the animal based on its genomic profile, and altering its management as a consequence.

For example, consider a steer that's going into the feedlot rather than for future breeding. What I do with him in the feedlot and how I manage him could be very different if he has the genetic potential to produce highly marbled, high-quality beef for a steakhouse, as opposed to hamburger for fast food. With marker-assisted management, we would know this essentially from birth. Soon, a steer will arrive at the feedlot, walk off the truck, and pass a reader that scans the electronic ID in their ear. Their record will pop up on the screen and the appropriate gate will swing open for the high-quality (Prime or Choice) or mid-quality (Select) beef pen based on their genomic profile.



