



Genomics for the Commercial Cattleman – It's Easier Than It Looks

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(Four-minute read)

Geneticists have a way of making things complicated, using phrases like “single nucleotide polymorphism,” “estimated progeny difference,” and the scariest of all — “genomics.” Since its introduction into the seedstock industry, genomics has been a concept as abstract as the “cloud.” It’s something that must be believed, not seen. It can’t be physically touched or placed into a pretty package. Increasing weaning weights in calves by using bulls with high growth potential is very visible but takes time to appreciate. Regardless, no matter how complex the wording or idealistic a concept, I think it is easy to understand that genomics is here to stay.

The new technology takes time to implement in the beef business, first by industry innovators and early adopters. Then, based on proof of concept, it is picked up by the early majority (Figure 1). This is where the use of genomics has reached in the seedstock industry. Some producers have seen great benefit from testing their male and female bulls. But, just as desirable genetics trickle down from seedstock to commercial industry, the same thing is happening with the use of genomics — and we are just getting started.

So how can it be done? Similar to the article in the January issue of SimTalk (on page 20), I believe there are three levels of investment in genomics in the commercial industry. While the first two are only lightly discussed here, for more information or even a light refresher, I highly recommend reviewing “Genetic Knowledge in Commercial Herds.”

The first option, if you do nothing else, is to purchase bulls with genomically enhanced EPDs (GE-EPDs) from trusted seedstock providers — they have already removed a majority of the risk from your purchase. How frustrating is it to buy a bull only to have his numbers shift after progeny or relative’s records appear in the evaluation? This concept is referred to as possible change. Purchasing bulls with GE-EPDs decreases the movement you could see in their numbers as more information enters the database. On average, you will do a better job of choosing the bulls to bring into your herd, and their daughters will better match your objectives. This is a great starting point for the use of genomics, especially for someone trying to get their feet wet. However, the introduction of new commercial possibilities poses the question — can you do more? The answer is yes.



If you are an all-in, data-driven producer, you may be surprised to know that through the American Simmental Association’s Total Herd Enrollment (THE) program, commercial producers have access to a structured genetic evaluation. Those who record phenotypes and pedigrees now have the same access to EPDs and indexes purebred breeders do. Should you choose to invest in genomic testing, this information can also be included. This second option provides the most accurate prediction about a cow herd’s genetic merit and the best return on the investment taken to record such information. If you are a producer dedicated to data collection, this would be your best path forward.

Now, if you are a producer already buying great bulls, but do not believe a structured genetic evaluation is a right fit, then using a commercial DNA test should be your next step. Recording phenotypes and pedigrees can be time and labor-intensive. Another way to get “data” on an animal is through DNA. The concept is simple: take a sample at birth or preconditioning to help determine which calves inherited the “good” genes from their sires with GE-EPDs.

Believe it or not, this kind of genomic information has been available to commercial cattlemen for over ten years. Still, adoption has been slow and is now starting to gain momentum. In August of 2018, NEOGEN Genomics launched Igenity® Beef. It came as an upgrade to Igenity Gold, now reporting an estimate of genetic merit for 16 maternal, growth, and carcass traits along with three indexes. Igenity Beef is based on the idea that although breeds of cattle are undoubtedly different in some ways, at a molecular level, there are pieces of the DNA that have a similar impact on many traits of interest. This concept also drives the genetic evaluation for breeds partnering with International Genetic Solutions (IGS); the only difference being that formal evaluation also includes phenotype and pedigree information. That is why Igenity is the best commercial DNA profile available for crossbred beef cattle. The concepts are so similar that in August of 2019 Maahdi Saatchi, Ph.D. and Dorian Garrick, Ph.D. published “MSRP: A Multi-Breed Selected Reduced Panel for Efficient Genomic Selection in Beef Cattle,” an Iowa State University Animal Industry Report which outlines the inclusion of the same genomic information used for the IGS evaluation into the Igenity product line.

The report compares a crossbred product like Igenity Beef to a breed-specific genomic prediction using 50,000 pieces of DNA (or SNPs) on 15,547 animals. As you can see in Table 1, across the ten traits listed, Igenity ranges from 80% to 92% as accurate as a breed-specific prediction on the same animals.

Table 1: The efficiency of Igenity (MSRP) vs. 50K in 6 U.S. cattle breed association populations.

Trait	Black Angus	Hereford	Gelbvieh	Limousin	Red Angus	Simmental
Birth weight	93	84	81	76	100	93



Calving ease direct	85	90	85	93	96	91
Carcass weight	91	-	90	92	87	87
Fat thickness	81	83	70	-	57	105
Heifer pregnancy rate	-	-	-	-	108	-
Marbling	95	73	87	71	95	99
Rib eye area	85	83	51	79	99	92
Stayability	-	-	-	-	94	88
Weaning weight	91	84	87	77	84	91
Yearling weight	97	84	91	80	84	83
Average	90	83	80	81	90	92

Adapted from Saatchi and Garrick (2019)

But enough about data. As with anything, time allows for improvements in product offerings and research into how well the product works. NEOGEN is continually focused on providing the best tools to commercial cattlemen, a goal that is mirrored in the vision of IGS. This ideal is what brought our groups together to form a partnership, and as a benefit of that relationship, Igenity Beef has been upgraded. Igenity Beef is now powered by the world's largest multi-breed genetic evaluation to provide "real-time" estimates of genetic merit. Leveraging the millions of phenotypes and hundreds of thousands of genotypes included in the IGS database, Igenity Beef is a cattleman's go-to commercial DNA test.

Whether you choose options 2 or 3 — it is easy to say using this technology; commercial cattlemen now have unprecedented insight into how well cattle will perform. With this information, cattlemen can:

1. Rank and select replacement heifers that meet their operation's goals
2. Produce feeder cattle to fit their market
3. Obtain knowledge on the genetic merit of commercial bulls
4. Identify trait improvement needs for next year's bull selection

Taking the next step towards incorporating genomics isn't difficult. It just takes patience, commitment, and time to reap the benefits of genetic change fully.