IGS Releases Multi-breed Genetic Evaluation powered by BOLT

Written by IGS

International Genetic Solutions (IGS) is an unprecedented collaboration between progressive breed associations fervently committed to enhancing commercial profitability. The collaboration has yielded the world's largest genetic evaluation of beef cattle with over 17 million animals and 120,000+ genotypes.

In keeping with our commitment to the cattle industry, IGS is pleased to announce the IGS Multi-breed Genetic Evaluation powered by BOLT. The new genetic evaluation provides more predictive EPDs, better use of genomics, more accurate accuracy reported with EPDs, all with weekly evaluations. The announcement ushers in a new era in genetic evaluation — an era made possible by a genetic evaluation system dubbed BOLT (Biometric Open Language Tools, owned by Theta Solutions, LLC).

The concept for BOLT started in 2014 as a research endeavor between the American Simmental Association and Drs. Bruce Golden and Dorian Garrick. BOLT is, quite simply, the most revolutionary and powerful genetic evaluation system in existence. Its power allows IGS to leverage genetic evaluation methodology that was once thought to be untenable on large databases — methodology that significantly improves genetic prediction.

In December 2016, IGS published a multi-breed stayability, the industry's first EPD using BOLT and the first single-step methodology applied to a large beef cattle database. Since that time, the IGS genetic evaluation team has worked toward fully implementing BOLT with an automated system that enables weekly evaluations for an entire suite of EPDs. As of May 5th, 2018, ASA is the first of the IGS partners to publish a full suite of EPDs generated by the IGS Multi-breed Genetic Evaluation powered by BOLT. Each IGS partner has complete autonomy to determine the release date that best fits their organization. As such, the release of EPDs by the other IGS partners is likely to be staggered over the next several weeks. As always, we look forward to your questions and comments about what you see.

Here are the notable changes in the evaluation:

Movement of EPDs and reranking. EPDs and indexes will change. These changes will be more dramatic for younger, lower accuracy cattle. The IGS team has tested the changes and proven the new EPDs result in superior predictions of genetic merit.

Shrinking of EPD range. You will notice a reduction in the range of EPDs for most traits. The IGS evaluation team tested the statistical veracity of the reduction and it has proven to be in line with expectations based on the genetic variation in the population.

Improved use of genomics. With the switch to the BOLT software, IGS will use single-step genomic evaluation on all EPDs. Single-step uses DNA markers, pedigree information, and phenotypic data simultaneously in the prediction of EPDs. Previously, molecular breeding values (MBVs) were calculated from the genomic information and those MBVs were blended in a separate procedure into the EPD predictions. The single-step method squeezes more information from the DNA markers than the previous approach allowed. Additionally, with single-step, the genomic information will not only enhance each EPD for the genotyped animals but also will be used in the EPD estimates of relatives.

The table below shows how many progeny records it takes for an animal without genomics to have the same BIF accuracy as the young animal with genomics (but no progeny). In other words, **EPD on a genotyped 1-month-old calf will be as accurate as an animal with birth weights on 21 calves, weaning weights on 22 calves, etc.** The carcass traits represent actual carcass records, not ultrasound records.   You may notice the maternal calving ease gets the least boost from genomics. This is due in part to such few females being genotyped.

TRAIT	PROGENY	TRAIT	PROGENY
CE	15	STAY	25
MCE	3	CW	6
BW	21	MRB	8
WW	22	REA	5
YW	24	FAT	6
MLK	18	DOC	19

It is important to note, continued collection of phenotypic records remains a vital part of genetic predictions. DNA testing will never replace the need to record and submit phenotypes.

It is well established that DNA markers vary greatly in their effect on traits — ranging from large to virtually no impact. To leverage this biological fact in a statistically advantageous manner, the BOLT single-step method only uses markers that have a meaningful impact on the traits of interest, while ignoring those that have little to no effect. Research has shown that by using this approach, BOLT reduces statistical "noise" and thereby increases the accuracy of the EPD prediction compared to other single-step methods.

More accurate accuracy. In the previous IGS evaluation platform and all others in existence other than BOLT, the calculation of the accuracy associated with each EPD is achieved through "approximation" methods. It has long been known these methods are a less than optimal approach to the calculation of accuracy — tending to overestimate accuracy. By employing unique computing strategies that leverage both software and hardware efficiencies, BOLT performs what was previously unthinkable — utilizing a sampling methodology to calculate what is essentially true accuracy. Unlike approximated accuracies, BOLT-derived accuracies will result in predicted movements associated with possible change holding

true over time. This is not the case with the previous IGS software or any other system currently in existence.

While the IGS evaluation team and partners are excited to release this new chapter in genetic evaluation, the new genetic evaluation system will only realize its true potential if the selection is made using its EPD and index values. Hands down, there is no better (more accurate) way to select for quantitative traits than an EPD. Economic indexes predict net profit by weighing the EPD for economically relevant traits coupled with economic estimates. To compete with other protein sources, it is imperative that the beef industry adopts the best science and technology to make better breeding selection decisions.

Please note, each IGS breed association has the latitude to publish the BOLT generated EPDs when the timing is right for their association.

For more information about the IGS Multi-breed Genetic Evaluation powered by BOLT, follow the links below or go to www.internationalgeneticsolutions.com

What to expect with the new IGS Multi-breed Genetic Evaluation powered by BOLT

Frequently Asked Questions

Validation of the new EPDs

Value of DNA tests

The IGS Multi-breed Stayability