What to Expect with ASA's New Genetic Evaluation System BOLT

By IGS Genetic Evaluation Team

Change can be a scary concept to some yet sought after by others. Many ASA members and International Genetic Solution (IGS) partners wonder about the changes on the horizon once BOLT is fully implemented. That change may be nerve racking but in reality, things should change. Why invest in new and improved methods if you get the same answers? Here are key changes to expect with the new genetic evaluation:

1. **Movement of EPDs and reranking.** EPDs will change especially in younger, lower accuracy cattle. Members should expect movement in lower accuracy cattle, as seen in the existing evaluations, because they may have new progeny data reported. Some cattle will move in a favorable direction while others will do the opposite. Keep in mind even if the EPDs get worse, the prediction of them is more accurate. With enough calves and phenotypes, the current evaluation would eventually arrive at a similar EPD as BOLT, it just would take longer or more information in the current system. With BOLT and the new genetic evaluation methodologies, we will have more accurate EPDs earlier in an animal's life.

2. **More accurate accuracy.** This idea takes a little time to sink in. The accuracy reported for each EPD will be a directly calculated and thus closer to the "real" accuracy. The methods to solve accuracy directly are extremely difficult and take a lot of computer power. In the current evaluation, it is not possible to solve for accuracy directly so an approximation method is used to estimate accuracy for each EPD. There are inherent flaws with approximating the accuracy which until BOLT were just part of the evaluation. Now with BOLT, the accuracy reported with the EPD will be more reliable.

3. **Reported accuracies will tend to be lower.** Again, this is a little confusing at first and sounds like the opposite of what was just explained. The EPDs will be more accurate. The accuracy reported will be more accurate. Both statements are still true. However, one of the inherent flaws in the approximation methods used to find accuracy in the current evaluation, and in all evaluations not produced through BOLT, is they tend to bias the accuracies upward, espe-cially for younger animals. This was known for a long time, but there was no way to calculate the accuracies directly. With BOLT, having accuracy directly solved results in a more reliable accuracy but that accuracy will often be numerically lower than the current evaluation would predict. However, the new reported accuracies with BOLT should better represent the possible changes for the EPDs.

4. **DNA testing will have a larger impact.** With the switch to BOLT, IGS will use Single Step genomic evaluation on all EPDs (currently using Single Step for Stayability EPDs). Single Step uses the DNA markers, pedigree information, and phenotypic data simultaneously in the prediction of the EPDs. Previously molecular breeding values (MBVs) were calculated from the genomic information and those MBVs were blended separately into the EPD prediction. The Single Step method squeezes more information from the DNA markers than the previous approach allowed. Also, there are biases inherent in the blending process that aren't a problem with the Single Step approach. Additionally, with Single Step, the genomic information will not only enhanced EPDs for the genotyped animal but also will be used in the EPD estimates of relatives.

5. **More frequent genetic evaluation runs.** With the horse power behind BOLT, IGS can run genetic evaluations much more frequently than the current system allows. This has many benefits. It allows members to get more immediate feedback after submitting their records. If members miss a deadline, the next deadline for data won't be far away. It allows for more accurate EPDs throughout the year and faster incorporation of the genomics. The down side is the EPDs put in print will quickly be outdated.

Genetic evaluation is not stagnant. There will always be improvements as new research in animal breeding, genomics, and statistics advance. BOLT is revolutionary in the innate flexibility, the computational power, and the statistical methods made possible using this software. Embrace the change to a new and improved genetic evaluation, it's coming!

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