# BOLT - The iPhone of Genetic Evaluations

by Larry Keenan, Director of Breed Improvement

**Take a stroll down memory lane and recall the days prior to the cellphone. While peace and tranquility may be your first thoughts, you also remember your ability to communicate with customers, business partners, family, etc. was significantly less. As a society we quickly recognized the value of immediate communication and efficient access to data took precedence over the serenity of a cellphone-less world.**

Following the release of the handheld cellphone, only minor technological advancements were made until the release of the Apple iPhone. The iPhone was a game-changer, as it was the first communications device that combined the cellphone, portable media player (iPod) and internet access into a single handheld device that used a touchscreen interface. The release of the iPhone spawned a communications revolution, which has largely shaped the highly efficient communication world that we live in today.

A similar revolution is brewing in the genetic evaluation world. Don't panic. Just as my old Motorola Razr could consistently complete a high-quality phone call, the EPDs that describe Red Angus cattle today are reliable, but improvements can be made to the software used to calculate them. Numerous genetic evaluation advancements have been made in the last decade, with the most prevalent being multi-breed EPDs and genomic technology. However, our ability to maximize the information gained from these advancements has been hamstrung by the 20-plus-year-old software currently used to calculate our EPDs.

Enter the next generation of genetic evaluation software – Biometric Open Language Toolkit (BOLT). Developed by Theta Solutions' Bruce Golden and Dorian Garrick (www.thetasolution-



sllc.com), BOLT holds promise to not only resolve the limitations known to exists in today's genetic evaluation software, but will also provide the flexibility needed to deliver tomorrow's advancements.

## Direct Incorporation of Genomic Data
While the delivery of genomic technology has greatly increased the amount of data available for predicting an animal's genetic merit, our ability to fully apply that data into the EPD calculations has been limited.

Currently, incorporation of the genomic data is achieved through a post-National Cattle Evaluation 'blending' method that adjusts the traditional EPDs of the tested animal based on the genomic information. The most significant limitation of 'blending' is the fact that the genomic data only impacts the EPDs of the tested animal. BOLT resolves this shortcoming. Once BOLT is implemented, the genomic data will be directly incorporated into the EPD calculation of the tested animal as well as all animals in their pedigree (sire, dam, progeny, grand progeny, etc.). This advancement will provide producers with the necessary means to maximize the return on their DNA test investment.

## Precise Calculation of Accuracy
A recognized imperfection of all current genetic evaluations is the inability to directly calculate accuracy values on a large database. Less computational-intensive approximation approaches have been used to indirectly estimate accuracy. A scientifically known drawback of the approximation method is its tendency to overestimate accuracy. BOLT's powerful combination of streamlined statistical modeling and integration of modern computing power will allow for the direct estimation of accuracy values, therefore resolving the known issues of the approximation methods.