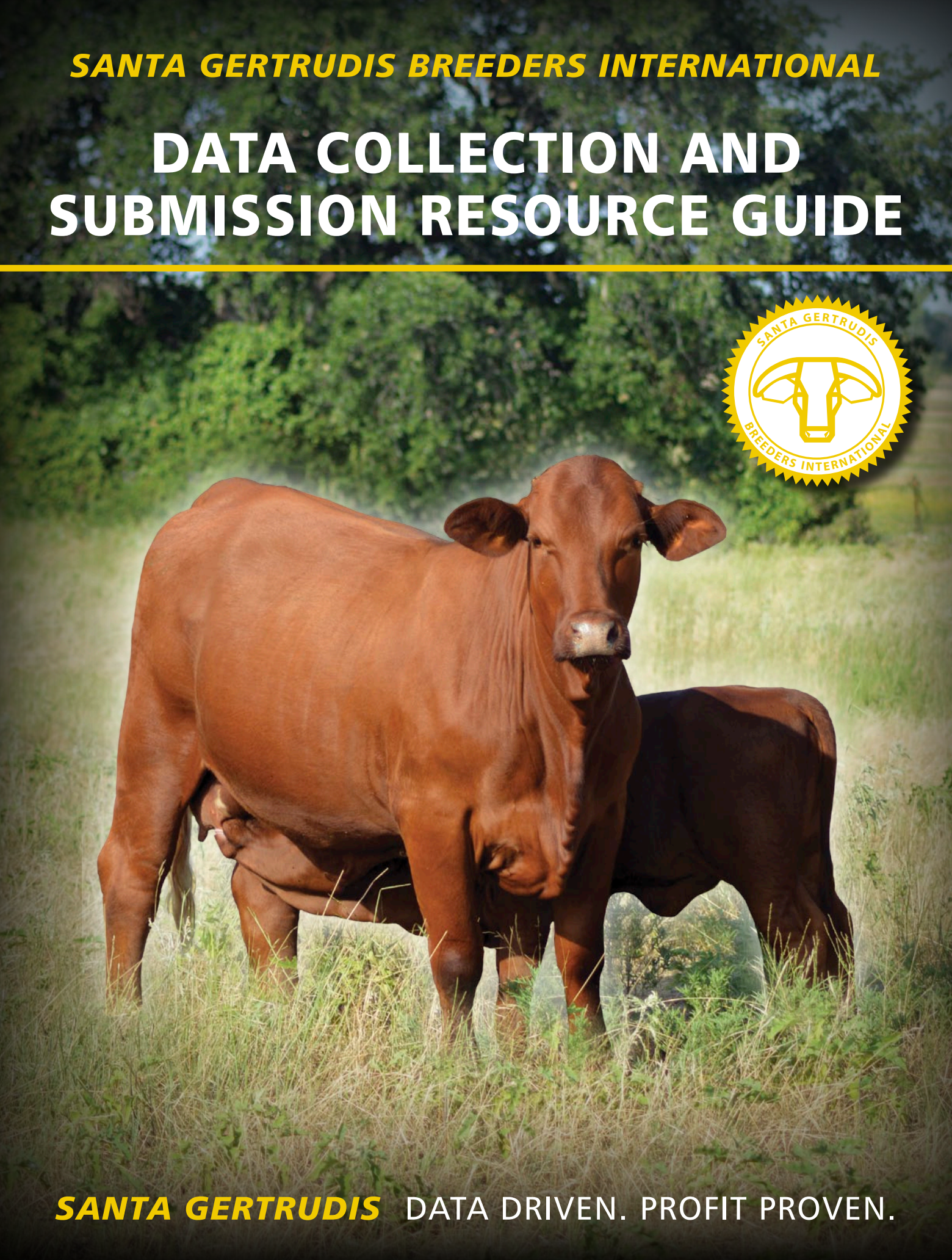
SANTA GERTRUDIS BREEDERS INTERNATIONAL

DATA COLLECTION AND SUBMISSION RESOURCE GUIDE



SANTA GERTRUDIS DATA DRIVEN. PROFIT PROVEN.

Dear SGBI member,

In the past, beef improvement (animal selection and breeding decisions) was largely dependent upon visual appraisal. While visual appraisal remains an integral component and extremely valuable tool in the beef cattle selection process, the use of the breed's genetic evaluation is the most powerful tool available to Santa Gertrudis Breeders International (SGBI) members for the measurement of economically relevant traits. The capability to utilize the association's genetic tools enables SGBI members to identify breeding stock with superior genetic merit. The ability to increase the proportion of genes having the desired effect on traits of economic importance is essential to long-term profitability in today's competitive seedstock industry.

Expected progeny differences (EPDs) serve as the starting point for the breed's genetic evaluation. EPDs are the prediction of how each animal's future progeny are expected to perform relative to the progeny of other animals listed in the SGBI database. EPDs are expressed in units of measure (plus or minus) for each trait being evaluated and are calculated using complex statistical equations and models. These statistical models use all known information on a particular animal to calculate its EPD.

This information includes performance data on the animal itself, information from its ancestors (sire and dam, grandsire, great grandsire, maternal grandsire, etc.), collateral relatives (brothers and sisters) and progeny (including progeny that are parents themselves). All performance data that relate to the animal of interest are used to calculate its EPD. Prior to inclusion in EPD databases, adjustments are made for the animal's age and sex and age of its dam. These adjustments allow performance records to be fairly compared in the analysis.

Additionally, the genetic merit of mates is accounted for in evaluating progeny information. Therefore, progeny records are not influenced by superior or inferior mates. The statistical analysis used for EPD calculation also accounts for the effects of environment (nutrition, climate, geographical location, etc.) that exist between herds. Finally, the genetic relationships that exist between various traits are also considered in the calculations.

The Santa Gertrudis Breeders International genetic evaluation is one of the most comprehensive among the *Bos indicus*-influenced breeds. The evaluation system, developed for the association by Livestock Genetic Services, has been reviewed by the nation's leading animal geneticists and utilizes more than 9,000 genotypes validated on 10K, 20K, 50K and 150K SNP chips. Thirty years of ranch phenotypes and scan records serve as the foundation for SGBI's genetic evaluation.

In 2013, Santa Gertrudis Breeders International released the first genomic-enhanced expected progeny differences (DNA verified) for *Bos indicus*-influenced cattle and was the first beef breed association to utilize the "single-step" method for the incorporation of DNA into the EPD calculation. The inclusion of DNA into the breed's EPD calculations (GE-EPDs) results in information that is more accurate and predictable than a pedigree and performance prediction alone. SGBI's reliable genetic evaluation ensures that cattlemen can make sound selection decisions, identifying those animals that will perform profitably in the most challenging environmental conditions.

This resource guide is designed to help SGBI members better understand the breed's tools and provide strategies for formulating sound practices to implement an effective and profitable use of the association's genetic evaluation. Utilizing all the tools in the association's toolbox will result in SGBI members meeting their breeding objectives and production goals. Thank you to members of the SGBI Performance Committee for providing the guidance and leadership to develop this member resource tool. ■

JOHN FORD
Association Consultant
Santa Gertrudis Breeders International

BRAD WRIGHT
SGBI Records and Data Advisor
Ranch Hand Analytics

GETTING STARTED

CONTEMPORARY GROUPS serve as the cornerstone of the breed's genetic evaluation. A contemporary group is a set of animals that have had an equal opportunity to perform: same sex, managed alike and exposed to the same environmental conditions and feed resources. Contemporary groups are used to remove biases from genetic evaluations due to environmental and management practices. Contemporary groups ensure the breed is making genetic progress by keeping records based on factual data, without the influence of personal biases. The responsibility of proper contemporary grouping lies with the individual breeder.

Remember that contemporary groups are a means of comparing breeding values of different animals, so your structure starts at breeding. Utilizing artificial insemination to incorporate proven sires into your contemporary groups will strengthen the accuracy of your data. Contemporary groups can get smaller but can never grow, meaning that cattle that were born together can be separated into smaller groups at weaning, but calves weaned together cannot be combined if they were in a different birth group. These splits are often expected as cows are split into different breeding groups and sent to different locations. Be mindful of rainfall, grass quality, fertilizer use, stocking rate and creep feed when considering which calves were truly managed in a like environment.

The maximum age range in any contemporary group is 60 days. It is better to have smaller, more accurate contemporary groups than it is to have a large group that is confounded by environmental differences. However, management for larger contemporary groups of like-managed cattle will result in more useful and accurate data. Contemporary groups' identification is breeder-determined and groups must be designated when applying for registration.

BIRTH WEIGHT (BW) EPDS are the most accurate indicators of genetic differences for birth weight. Research has documented that most calving difficulty is caused by heavy calves at birth. Therefore, considerable emphasis should be placed on Birth Weight EPDs when selecting bulls for use on heifers.

Birth weights should be taken using a scale within 24 hours of birth. Birth weights are submitted at the time calves are reported to SGBI for registration or as performance-only animals. Tapes and other methods are not recommended. It is better to leave this data blank than to guess.

WEANING WEIGHT (WW) EPDS predict the average difference in the weaning weight of an animal's progeny compared to another animal's progeny. This weaning weight difference is predicted for a standard weaning age of 205 days.

Weaning weights can be adjusted to 205 days of age and used in genetic evaluation if the calves are at least 120 days of age and not older than 300 days. This allows for weaning large groups of calves at one time, even if there is a wide range in age. Remember that only the calves born within 60 days of each other can be in the same contemporary group, but this range allows for multiple groups to be weaned at the same time. It is important to get a weight as soon as possible after weaning. Even if calves need to be hauled to a set of scales, weighing on the same day is preferred to accurately measure individual weaning weights. This could be another source of a contemporary group split. If, for example, half the calves are weighed on site at weaning, then for some reason the rest of the calves must be hauled to a different set of scales, this would be reason to separate contemporary groups.

The large weaning window also allows for best management practice without losing valuable data points. If, during drought years, the best management practice is to wean calves early, as long as the youngest calf is 120 days of age, all calves can be adjusted to 205-day weights. Weaning weights should be one of the easiest data points to measure with the largest contemporary groups since all calves, even culls, must be weaned. Weighing all calves at weaning will result in the most value to the genetic evaluation. Weaning weight can also be submitted at registration.

YEARLING WEIGHT (YW) EPDS predict the average difference in weight of a bull's progeny at a year of age (365 days). Yearling Weight EPDs are useful indicators of growth rate of slaughter progeny in the feedyard.

The age range for acceptable yearling weights is 301-470 days of age. However, it can be advantageous to get ultrasound carcass information at the same time, and those windows are 310 to 450 days of age. Keeping this narrower range as a rule of thumb can allow for more efficiency in data collection because the ultrasound weight will also serve as the yearling weight. Typically, animals that are managed to yearling, replacement heifers and bull development, are managed as like groups, so contemporary group designation is fairly easy at this point. Remember, though, that combining contemporary groups is not allowed. This means that for most breeders, the yearling contemporary groups will be the same as the weaning groups less any culls prior to weaning. It is still vital to sound genetic evaluation

that all weights taken in the same group are submitted. Data culling prior to submission does not paint a clear picture of the actual performance and can skew resulting EPDs. Yearling weight can be submitted any time after collection or be included with ultrasound data.

MATERNAL (MAT) EPDS reflect the milking ability of an animal's daughters. This difference in milking ability is expressed as additional pounds of calf weaned by a bull's daughters.

Maternal EPDs are calculated based on the contemporary group data of weaning records of calves out of an animal's daughters. Therefore, the accuracy of Maternal EPDs always lags behind growth and carcass numbers, since it is a generation behind. Most EPDs will have an optimum level for each herd, and that number is rarely the largest or smallest, but somewhere in between. Selection for high maternal animals can result in cows that milk too much to breed back in a timely manner if the environment cannot support high milk production. It is important for breeders to establish optimum levels of all traits for their environment and production system, and breed toward that goal.

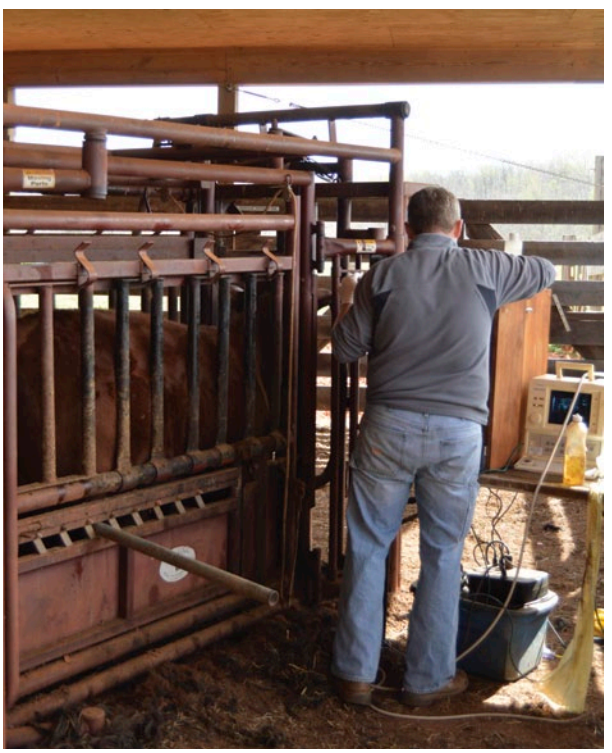
TOTAL MATERNAL (TMAT) EPDS predict the total difference in weight of a bull's daughters' calves at weaning. A portion of this difference in weight comes from the milking ability of the bull's daughters (Milk EPD), and a portion comes from the genes for growth that are passed from the bull to his daughters and then on to their calves.

SCROTAL CIRCUMFERENCE EPDS are expressed in centimeters and predict difference in scrotal size that will be passed on to progeny. Bulls with larger Scrotal Circumference EPDs would be expected to sire daughters that reach puberty at an earlier age, and therefore have earlier calving dates.

Scrotal circumference is to be collected at the same time as yearling data, so the same age parameters exist. A scrotal tape needs to be used at the widest part of the scrotum, reading the measurement with the tape pulled snug, but not tight. The actual reading from the tape should be reported. All scrotal circumferences will be adjusted to a 365-day measurement, just like the yearling weight. It is important to report actual data and allow the breed standard formulas to adjust for age. Scrotal circumference can be submitted with yearling weight and can also be included with ultrasound information.

HEIFER PREGNANCY EPDS measure the probability that a heifer will get pregnant as a yearling.

The primary drivers behind the accuracy of this EPD will be reporting of accurate palpation data and proper yearling contemporary group structure. The assumption here is that heifers in the same yearling contemporary group will be given the same opportunities to become pregnant. Again, all data is needed to develop this tool, so if all open heifers are culled and not reported as being palpated open, data is skewed and useless in genetic evaluation, since all heifers reported will show as pregnant. Since EPDs measure differences, contemporary group data that shows no differences cannot be used in the evaluation. Also, because heifers are only measured against their own contemporaries, management to calve at 24 or 30 months will not affect the accuracy of the EPD calculation as long as all heifers in the group are given the same opportunity at the same time. Heifer Pregnancy EPDs are reported in units of percentage; a higher EPD sire would be expected to have daughters with a greater probability, or chance, of becoming pregnant than a sire with a lower EPD. Data can be submitted following palpation.



BREED BACK EPDS measure the probability a 2-year-old will be pregnant given she was listed as pregnant as a yearling.

This is the hardest time in a cow's life to rebreed. Even small improvements in this area can greatly contribute to an operation's bottom line in both immediate pregnancy rate and cow longevity since it has been proven that cows that breed back quickly will stay in the herd longer. The base contemporary group for this is an extension of the heifer pregnancy contemporary group. This group will be the females that were in the same yearling contemporary group and palpated pregnant as a heifer. Breed Back EPDs are reported in units of percentage; a higher EPD sire would be expected to have daughters with a greater probability, or chance, of becoming pregnant than a sire with a lower EPD. Data can be submitted following palpation.

CARCASS WEIGHT EPDS predict differences in progeny carcass weight. Carcass weight is an indicator of the total amount of retail product in a carcass.

This EPD originates from actual harvest data and genetic correlations to other growth traits. Carcass weight will be most closely correlated with yearling weight since that is the live weight point in the database that is closest to harvest age. Retaining ownership and submitting harvest data are the best ways to make the most improvement in Carcass Weight EPD accuracies. Harvest data should also be managed for contemporary groups similar to that discussed for yearling data. All harvest data should be submitted to SGBI on a spreadsheet in a comma-separated .csv or an Excel (.xlsx) format.

MARBLING EPDS reflect genetic differences in marbling potential passed from a sire to his offspring. These values are expressed as a numeric marbling score. A 1.0-unit change in marbling score is equal to a full quality grade change (4.5 = Select vs. 5.5 = Choice).

The marbling EPD is a combination of both carcass data at harvest and ultrasound-measured intramuscular fat (IMF). The goal of this EPD is to predict

the marbling ability of an animal's progeny when it is hung on the rail. This means that harvest data is weighted more heavily in the model, so submission of more harvest data is the fastest way to increase an animal's carcass EPD accuracy.

Obviously, breeding animals aren't harvested during their useful lifetime, so ultrasound measurements can be used to add data points for carcass traits without harvest data. The contemporary grouping for these traits is the same as discussed for yearling weight, with an acceptable age range for data collection between 310 and 450 days of age.

Ultrasound IMF can be heavily influenced by environmental fluctuations. Consequently, this data is useful in genetic evaluation when compared within a contemporary group, but virtually useless as a single data point. Actual IMF score cannot be used for genetic selection with any reliability. The Marbling EPD is the only available tool to select for increased marbling.

RIBEYE AREA EPD is an objective assessment of muscling, and an indicator of total muscle in the carcass or live animal. Bulls with larger ribeye area EPDs will sire calves with more muscle and a higher percentage of carcass retail product.

Just like marbling, the Ribeye Area EPD utilizes both carcass and ultrasound data. The acceptable age range for harvest data is from 300 to 900 days of age. Typically, it should not be an issue to harvest cattle within this range. For ultrasound, the age range is the same as IMF. Like marbling, utilization of the Ribeye Area EPD in selecting for increased muscling is far more effective than use of actual ultrasound information.

Submission of harvest data to SGBI can be a simple spreadsheet. Carcass data on registered animals is most useful due to known pedigree, but even commercial data can be utilized with high effectiveness as long as one parent (typically the sire) is known when data is submitted and proper contemporary group structure has been designed.

FAT THICKNESS EPDS predict differences in carcass fat thickness between the 12th and 13th rib. Fat thickness is the primary indicator of saleable product in the carcass and is also the primary factor affecting U.S. Department of Agriculture (USDA) Yield Grades (YG). As fat thickness increases, the percentage of carcass retail product declines.

Fat thickness is also in the suite of carcass EPDs that is heavily weighted toward harvest data, but also utilizes ultrasound data. Like Maternal EPDs, optimum levels are important with this trait, particularly if an operation is retaining replacement females. The EPD was developed as a function of Yield Grade where less fat is a good thing to increase carcass yield. However, if you think of fat thickness as a function of "do-ability" in running cows, less fat is not necessarily a positive trait. In operations retaining females, an optimum should be set to have easy-fleshing females but hold a USDA Yield Grade of finished cattle at YG 3 or lower.

SGBI is one of four breed associations that offer a **TENDERNESS EPD** that predicts the pounds of shear force (mechanical estimate of tenderness) needed to cut a steak.

Tenderness data can only be evaluated by running a Warner-Bratzler shear force test on a steak after harvest. Tenderness EPD accuracy will always be less than other traits because phenotype is hard to measure and sacrificing a steak for shear-force testing is expensive. ■

UNDERSTANDING ACCURACY

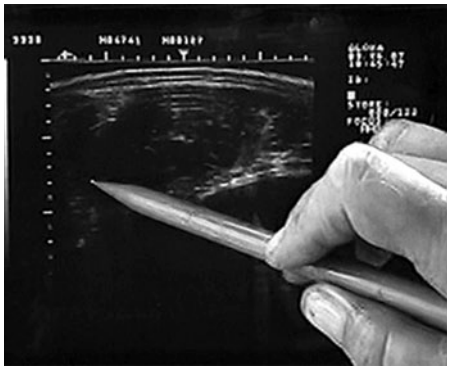
ACCURACY VALUES are published for all EPD values reported on an animal. Accuracy can be defined as the relationship between the estimated EPD of the animal and the "true" EPD of the animal. This relationship is expressed numerically from zero to one. As the accuracy value approaches 1.0, the reported EPD is more likely to represent the animal's true genetic merit. Conversely, low accuracy values (closer to zero) indicate that the reported EPD is less reliable. Accuracy is primarily a function of the amount of information available to calculate an EPD for any given trait.

The basis for all EPDs is the average of the parents. As individual data, and ultimately progeny performance data, is collected, the EPD starts to move and become more accurate. If an animal is registered with no individual performance data, the accuracy will be listed as PE, which stands for "pedigree estimate." And it is just that, an estimate of breeding value based only on pedigree. This type of EPD is the lowest accuracy and has the highest probability to be an inaccurate reflection of true breeding value. When no individual data is available, the fastest way to improve the accuracy of non-parent animals is to use genomic testing to more accurately reflect the relationship of that animal to known animals in the database. ■

STRENGTHENING DATASETS

ULTRASOUND TECHNOLOGY offers seedstock producers an opportunity to evaluate carcass traits in live animals without harvesting them. Carcass traits are considered moderately to highly heritable and the utilization of this technology provides cattlemen with one more evaluation tool for animal selection. Data collected from ultrasound scanning allows a seedstock operator to identify strengths and weaknesses in their cattle, develop breeding strategies to advance herd genetics, improve carcass potential and maximize profit.

A growing number of commercial cattlemen base their bull-buying decisions on a potential sire's ability to produce a high-quality carcass. Therefore, ultrasound scanning yearling bulls has become a common practice within the seedstock sector of the beef industry. However, seedstock producers should not overlook the value of scanning heifers. Having access to carcass data on both herd sires and replacement females provides the information needed to develop an elite herd capable of producing the high-quality beef today's consumers demand.



Ultrasound measurement must be collected and analyzed by certified technicians. In order for data to be used in a breed's genetic evaluation, breed associations have established windows for age at scanning that must be followed. Ultrasound measures fat thickness (in millimeters) between the 12th and 13th rib. Rib fat or backfat is used in USDA Yield Grade calculations. Rump fat thickness is also reported and, together with the rib fat measurement, they are used to determine overall external body fat. Ribeye area (measured in square centimeters) is taken from the same image as rib fat. Retail product yield increases and numerical Yield Grade decreases as ribeye area increases.

Intramuscular fat (IMF) generates the most breeder/producer interest. IMF, or marbling, is the percentage of fat in the ribeye muscle and is the primary factor in determining USDA Quality Grade. It is important to note that ultrasound is environmentally driven and IMF data is adjusted before being dropped into the association's database. SGBI's Marbling EPD is calculated utilizing harvest data and ultrasound information.

Several breeders have started utilizing ultrasound technology in yearling bulls, but there is still room for improvement. There is also a huge opportunity to collect more data on yearling heifers. With efficient management, ultrasound and yearling data collection can be timed with pre-breeding vaccinations. This can provide additional valuable genetic information that will be retained in the herd without adding a run through the chute. Ultrasound data must be submitted to SGBI from an approved lab or a Ultrasound Guidelines Council (UGC) chute-side certified technician. Data must be submitted in a spreadsheet, comma-separated (.csv) or an Excel (.xlsx) format.

GENOTYPING or DNA collection adds to the reliability of EPDs. EPDs that traditionally contained pedigree, performance and progeny information can also include results from genomic or DNA tests to calculate genomic-enhanced (GE) EPDs. These results are incorporated into EPDs to enhance accuracy and predictability, especially EPDs of younger, non-parent animals, and characterize genetics for difficult-to-measure traits. GE-EPDs on unproven animals have the same accuracy as if they each had an average of 15 progeny records, dependent on the trait of interest. SGBI offers members two genotyping tools – the GGP 50K is the standard to be used for animal selection and breeding management, and to validate performance during marketing. The GGP HD 150 can be utilized for AI sires, donor dams and high-impact bloodlines.

Tests are available from SGBI, and offer members four sampling options: hair, blood, semen or tissue. SGBI and its lab partner, GeneSeek, prefer tissue samples. Following testing, genetic information is incorporated into the animal's EPDs. In addition, Livestock Genetic Services issues a certificate of genetic testing. Direct genetic values (DGVs) (genomic results) that are generated from genotyping are included on the DNA certificate.

SGBI also offers a parentage tool. Parentage testing compares DNA markers for bulls or cows with calves to verify parentage. Test are available from SGBI, and the four sampling options listed above are also offered for parent verification. Today, the industry is turning to a new tool called the Allflex Tissue Sampling Unit (TSU), which makes DNA collection fast, clean and easy. TSUs are the recommended method of sampling. Contact your Allflex dealer for information on a TSU unit.

The **SGBI STEER FEEDOUT** is the best available tool for strengthening the breed's carcass dataset. The steer feedout is an information feedback system that enables producers to learn more about their calf crop and the factors that influence value beyond the weaned-calf phase of beef production. It is not a contest to compare operations and it is not a retained ownership promotion program. It is an opportunity for producers to determine how their calf crop fits the needs of the beef industry and provides the information needed to determine if changes in genetics and/or management factors are warranted in order to be competitive in beef production. Harvest information should be provided to SGBI in a comma-separated (.csv) or Excel (.xlsx) spreadsheet format. When submitting harvest data, send as much detail as possible. The specific data points of hot carcass weight, back fat, ribeye area, %KPH and marbling score are much more useful than Quality Grade and Yield Grade.

RESIDUAL FEED INTAKE (RFI) is the difference between an animal's measured feed intake and its expected feed requirements for growth and maintenance. "Efficient" cattle are those that eat less feed than expected based on their body weight and performance and are termed as having a negative, or low, RFI. "Inefficient" cattle are those that eat more feed than expected based on their body weight and performance. These are termed positive, or high, RFI. Typically, RFI is measured in young cattle (7-10 months of age) in feedlot pens fitted with feeding stations (GrowSafe System) designed to automatically monitor individual animal feed intake over a 70-day test, following a three-week adjustment to their test diet.

Cattle are weighed before feeding on two consecutive days at the start and end of the test period, and at approximately 14-28-day intervals. Because RFI is independent of mature size and body composition, animals on test are also measured for ultrasound backfat thickness (mm), ribeye area (cm^2) and marbling score at the beginning (optional) and end of the test period. Currently, SGBI does not offer an RFI EPD; however, members are encouraged to submit RFI test results in order to build the association's dataset. RFI data must be submitted to the SGBI office from a GrowSafe facility on a spreadsheet in a comma-separated (.csv) or an Excel (.xlsx) format.

HIP HEIGHT AND FRAME SCORE are objective, numerical descriptions of cattle skeletal size, which reflect the

growth pattern and potential mature size of an animal. Frame score values typically range from two to nine and are calculated from hip height and age. Frame scores may be submitted for inclusion on an animal's posted performance data set and is supplementary information to weight and other performance data. Frame scores can be used to project mature size, provide an indication of composition, and characterize the performance potential and nutritional requirements of an animal.

Optimum frame score and desired body type will be different among production situations that differ in feed resources, breeding systems and market endpoints. Frame score is considered to be moderately to highly heritable. Hip height can be measured at any time from 5 to 21 months and submitted on the trait page. ■

DATA SUBMISSION

Data can be submitted online or hard copies can be provided to the SGBI office for input. Harvest data, ultrasound results and RFI data must be submitted to SGBI for input. To submit all other datasets online, SGBI members must be registered with the association's data management service provider Livestock Genetic Services (LGS). To add traits through the LGS system, click on the "Add New Trait Record" icon; this will allow you to manually add each animal's traits to the specific tables.

The system is designed to automatically correlate adjusted values; you will not need to do this manually. ■

FOR OUR COMMERCIAL CUSTOMERS

The **SGBI $GROWTH INDEX** puts together weaning and yearling weight. Since weaning weight is contained in yearling weight, post-weaning gain (PWG) is used in the index to prevent double counting weaning weight. As an example of index, if an animal has a +30 Growth Index, its offspring, on average, will be worth $30 more as a yearling than the breed average, based strictly on weight. Please note, the $Growth Index places zero economic value on maternal traits. Utilizing the index as a replacement female selection tool might result in larger mature cow weight.

The SGBI **CARCASS RANK INDEX** factors in marbling score, hot carcass weight, ribeye area, backfat and tenderness, and is weighted by the economics of carcass values. It places strong emphasis on both growth and carcass traits. It is expressed as a numeric ranking within the breed from one to 10, with 10 being the highest. For example, an animal with a score of nine would be in the 80th percentile or would be better than 80 percent of the population in carcass composition. A ranking of six would place the animal in the 50th percentile. Seedstock producers focused on improved carcass quality are encouraged to utilize SGBI's genomic-enhanced Marbling EPD in the decision-making process. Breeding cattle with higher marbling EPDs should produce progeny with a higher degree of IMF and therefore better Quality Grades at harvest.

The **SANTA GERTRUDIS IGENITY®** profile helps commercial producers utilizing Santa Gertrudis genetics to select replacement females that will be good mother cows, produce calves that perform well in their environment and have enhanced carcass quality traits. The Igenity genetic panel is marketed through Santa Gertrudis Breeders International. ■

SANTA GERTRUDIS BREEDERS INTERNATIONAL

(361) 592-9357 • *sgbi@santagertrudis.com* **SANTAGERTRUDIS.COM**

Tissue Sampling Unit Tech Sheet

Allflex Tissue Sampling Units (TSU) are a rapidly growing sample type for DNA testing in livestock. This technology, while highly advanced, makes it easy to take DNA samples during routine cattle-handling processes while providing high-quality samples for genomic testing. Neogen® has worked closely with Allflex to enhance the convenience and reliability of DNA testing in the field.

Why TSUs?

- Faster, easier, cleaner
- Less hassle, more weather proof
- Sample at any age, even a day-old calf
- Neogen can use same TSU for BVD PI screening and genotyping
- Archived by breed associations
- Uniquely barcoded, preserves high-quality DNA

One Simple Step Opens a Whole World of Insightful Predictions

Cattle Producer Advantages with TSUs:

Fast – Loading the applicator, taking the sample and recording the animal ID can take as little as 10 seconds per head.

Easy – With one squeeze, a DNA ear notch sample is taken, sealed and preserved in a uniquely bar-coded vial.

Clean – Unlike blood or hair, TSUs have little chance for cross contamination. The vial protects the sample from weather and grime.

Flexible – Take DNA while handling young calves or during animal-health protocols.

More Benefits with TSUs:

More data from one sample

- Tissue in the vial can be used for multiple tests.
- Screen samples for BVD PI and run genomic tests.
- Store at the lab or breed association for future testing.

Integration with animal ID

- Match with visual tags and/or EID tags using the same identifier.
- Integrate with other record keeping or data collection.
- RFID readers and downloadable CSV files are available from Allflex.
- As export markets look to U.S. beef producers, ID needs change. Your ID and TSU system can meet your needs both in marketing and DNA testing.

Visual tag and EID match TSU barcode and visual number on the vial.

NEOGEN®