



RANGE BEEF COW SYMPOSIUM XX — SELECTION DECISIONS

Ultrasound's Evolution

University of Wyoming Extension beef specialist Steve Paisley shared some of the opportunities offered by ultrasound technology to the beef industry during his presentation at the Range Beef Cow Symposium (RBCS) XX in Fort Collins, Colo.

"Ultrasound offers us a way to evaluate the eating quality of the beef we produce by looking at carcass traits," he shared.

Giving a brief history of ultrasound, Paisley explained that research has shown that with this technology producers can estimate cattle's actual measurements for backfat, ribeye area and marbling pretty accurately and that heritability for these carcass traits is fairly high.

"So, there is opportunity to make genetic improvement using ultrasound data," Paisley said.

He also noted the ultrasound data being used by breed associations is interpreted by an independent third party to ensure accurate, consistent data. Further ensuring accuracy, ultrasound technicians must be certified every two years.

"Ultrasound has been around for



Steve Paisley

quite a while, but the industry has struggled with its implementation as a management tool," Paisley noted. That is beginning to change, and more feeders and cattle producers are recognizing the value that ultrasound data can offer.

For example, many breed associations are now building large databases of ultrasound data and using that information within carcass expected progeny difference (EPD) calculations or

for separate ultrasound EPDs. Paisley said the industry now has an ultrasound database with 10 times the information compared to actual measurements.

The development of chuteside software that allows for real-time interpretation of ultrasound measurements is also advancing the use of this technology for management decisions, Paisley said. For instance, at the feedlot, chuteside ultrasound data allows for immediate sorting of cattle into more uniform lots.

This is especially beneficial when marketing cattle on a grid, Paisley said. "The penalties for out cattle are higher than the premiums, so ultrasound can be an important tool to minimize those discounts."

At the ranch, chuteside ultrasound software is being used in some instances to gather information on calves at weaning. This can be beneficial if calves are marketed via retained ownership or simply to gather carcass data for future herd improvement.

Because of the heritability of carcass traits, Paisley said he is seeing

more ranchers collect ultrasound data on replacement females as well.

In closing, Paisley pointed out that across the industry cattle producers are still struggling with the ideal quality and yield grade distribution. More Choice and Prime cattle are needed, while Yield Grade (YG) 4s and 5s need to be eliminated.

Paisley reiterated that ultrasound can be a valuable tool to improve the carcass quality of the cattle we are trying to produce. But, he added, it is a technology that needs to be used realistically.

"Ultrasound is a technology that needs to be used in the right context to make management decisions," Paisley said. "When ultrasound data is collected chuteside, it is a point-in-time measurement; carcass traits are still impacted by management and environment."

Ultrasound may not be an investment for every operation. "As we look at new technology, number 1, we want it to benefit our operation and our bottom line," Paisley noted.

— by *Kindra Gordon*

Gene Testing: What Does It Mean for Producers?

Application of genome technology in livestock production, while no longer in its infancy, has reached adolescence. Use of marker-assisted selection (MAS) for economically important traits is progressing, said Bob Weaber, University of Missouri animal scientist.

Weaber shared his insights during Wednesday afternoon's RBCS discussion of cattle selection and genetics.

"Put simply, a DNA marker represents a way to track a piece of genetic material associated with a particular trait," Weaber said. "DNA markers can be used to track the inheritance of simple traits controlled by a single gene or complex traits controlled by many genes. Examples of simple traits include coat color, horned or polled, and some genetic diseases or defects. Complex traits include traits like weaning weight, tenderness and marbling, which are controlled by many genes. DNA markers simply

identify a sequence of DNA just as ear tags identify individual calves."

Marker-assisted selection can be used to increase the frequency of desirable forms of a gene within a population by selection of parent stock that carry the gene. The potential benefits are greatest for those traits that have low heritability, are difficult or expensive to measure, cannot be measured until later in life (carcass or maternal traits), are not routinely measured (tenderness), and are genetically correlated with another trait you do not want to change. An example of the latter would include selection for intramuscular fat (marbling) without affecting external fat.

Weaber said several limitations challenge implementation of DNA marker technology by seedstock producers or commercial ranchers. One involves the frequency of a favorable gene variation. If it occurs with a frequency of 90% in a population, for example, the gene variation is almost fixed in the



Bob Weaber

population, and it probably wouldn't be worthwhile to test all of the animals to find those that do not carry it. Alternatively, if the gene is at very low frequency, it may require selection over many generations to increase it to a beneficial level.

"If the population has [a gene variation] that is not very frequent but accounts for 80% of the genetic

variation in a particular trait, it might be worth going after," Weaber explained. "It's important to know the frequency and the magnitude of the effect to know if you're going to get enough bang for your buck."

It's also important to know if the trait is co-dominant or recessive. If it is recessive, both sire and dam must be carriers for the calf to have a high probability of inheriting the trait. Selection for recessive traits is difficult and time-consuming.

Weaber stressed that marker-assisted selection is not a substitute for selection based on expected progeny difference (EPD) values. Both marbling and tenderness, for example, are complex traits controlled by many genes, but only a few genes have useful markers associated with them. More response to selection will be obtained if both marker-assisted selection and EPD values are used, with the latter being the primary driver of selection decisions.

— by *Troy Smith*

EPDs: Strike a Balance

To be successful, you have to match your cattle to your ranch environment, said Willie Altenburg, owner of Altenburg Super Baldy Ranch. Using proper genetics can help you achieve that goal.

When it comes to genetic evaluation, Altenburg said he is a strong proponent of EPDs. He noted that he and many others in the audience are hard-core EPD “number junkies,” who like to crunch the numbers, talk about the cattle and can’t wait for the next sire summary to come out. While maybe not junkies, many other producers use the EPD numbers as a tool to breed cattle.

No matter what group you fit into, Altenburg said, “EPDs are the most important breeding tools implemented in the past century.” Throughout his presentation, he provided examples of how he uses EPDs in his ranching operation.

One of the benefits of using EPDs is being able to evaluate performance data. For starters, EPDs can help you predict calving ease and birth weights. Altenburg called the calving ease EPD a better predictor of the trait than birth weight because there is more to calving



Willie Altenburg

ease, such as calf shape, and birth weight is already incorporated into the calving ease EPD. This becomes important when evaluating calving ease of sires to mate to first-calf heifers.

When it comes to growth traits, weaning and yearling weight EPDs are highly correlated. Altenburg said he tries to find the bulls that have offspring that calve easy and grow fast.

Maternal traits are another important area to look at with EPDs. He

concentrates mostly on maternal calving ease and maternal milk, especially a sire’s ability to affect the calving ease of his daughters. “I don’t think we pay enough attention to this one,” he noted.

Carcass traits are another area of concentration for Altenburg. He said he considers emphasizing EPDs for ribeye, marbling and backfat to be important. “I have found backfat to be the best indicator of cow condition,” he said. This helps him select sires that are at or slightly above breed average fat. Indexing plays a role with carcass traits as well.

A couple of other EPD features that come in handy, Altenburg said, are accuracy and percentile ranking. Using bulls with high-accuracy EPDs increases the likelihood that his progeny will on average perform as predicted. Like high school test score rankings, percentiles indicate where an individual’s EPD ranks in the breed for that particular trait.

In addition to using EPDs to select for more or less of a particular trait, Altenburg suggested cattlemen establish thresholds of acceptability for use in culling decisions.

On a final note, Altenburg said he couldn’t talk about EPDs without discussing the importance of also assessing animal structure. Physical traits are hard to evaluate with EPDs and are usually best evaluated by the eye of the producer, he said. Before purchasing a bull, he said he looks

through the sale book to evaluate the performance, markings, EPDs and other data before arriving at the sale. Once there, he visually assesses the bull’s muscle, structure and temperament, along with scouting the dam and other family members.

“I don’t buy a bull without seeing his dam,” he said. “EPDs are essential; physical traits are equally important. It’s all about finding a balance.”

— by Jane Messenger

“EPDs are the most important breeding tools implemented in the past century.”

—Willie Altenburg

Value of Heterosis in Cow Herds

“Why crossbreed?” asked Matt Spangler, beef specialist for the University of Nebraska. “The answer is breed complementarity, capturing dominances and epistasis, and heterosis,” Spangler said. “First must come the realization that no one breed excels in all areas that lead to profitability.”

Spangler acknowledged to the Wednesday afternoon audience at the 2007 RBCS that he may offend everyone in the room at some point during his presentation.

“[In] every breed,

no matter how good it is or how much we love it, there is some place that can be improved,” Spangler said.

To select a crossbreeding program you must first know your marketing goals, Spangler advised. Knowledge of the production environment in which cattle are expected to perform, and the resources they will have available to them, is also very important.

He explained two types of systems — terminal and rotational. A terminal program takes straightbred cows from Breed “A” and crosses them with a straightbred bull from Breed “B” to get the A×B calves. A rotational system requires two sires, two pastures and approximately 50 cows (assuming

one bull breeds approximately 25 cows). Females will be bred to Breed “A” and the replacement females will be bred to Breed “B,” with those replacements going back to Breed “A” and so on in a continued rotation.

Both terminal and rotational can be done with a two-breed or three-breed system. According to Spangler, a three-breed rotation can become “a bear” to manage.

“The goal of a crossbreeding system should be the optimization of labor (inputs) and heterosis gained (outputs),” Spangler said. “Minimizing inputs or maximizing outputs alone will not lead to a profitable or sustainable system.”



Matt Spangler

Heterosis is a hybrid vigor, Spangler said, the superiority of crossbred animals as compared to the average of its straightbred parents. The more divergent the parental lines are, the more heterosis will occur. Spangler explained there are three types of heterosis: individual, expressed in the crossbred calf; maternal, expressed in the cow; and paternal, expressed in the sire.

According to Spangler, the heterosis

advantage would result in a better calving rate, survival to weaning, increased weaning and yearling weights and improved average daily gain (ADG) for crossbred calves. For crossbred cows and sires it would improve their longevity in the herd, fertility, number of calves, and cumulative weaning weights.

Crossbreeding can take advantage of dominances, whereas EPDs only take advantage of additive effects, Spangler noted. Stringent selection within parental lines is critical. Breed complementarity, he said, is why we crossbreed; heterosis is the reward. Producers should choose a system that makes them money and that they can maintain, he added.

In closing, Spangler said, “If you are raising purebred animals right now, seedstock, and you think that these crossbred sires are going to endanger your bull market, where do you think the animals come from that formed that composite? Purebreds, don’t they? One doesn’t endanger the other, they need each other.”

— by Mathew Elliott