



Predicting Profit

Identifying Economically Relevant Traits with a Measurable Indicator

It's no secret that cattle ranching can be a hard, high-risk business. The rancher is at the mercy of everything from weather to market forces, but a team of researchers at Colorado State University is dedicated to taking some of the risk out of ranching by identifying economically relevant genetic traits in cattle and simulating the results of

management decisions for individual ranchers. Mark Enns, assistant professor, and Dorian Garrick, professor of animal sciences, and their research team have developed a decision support system (DSS) to help ranchers choose cattle with genetic traits that will make ranches money over the short and long term.

The DSS is the latest in a line of groundbreaking tools that have been developed by the Agricultural Experiment Station at Colorado State University for evaluating Expected Progeny Differences (EPDs) in cattle. EPDs reflect the overall genetic merit or effects for traits in an animal's offspring. Seedstock breeders select individual animals for breeding based on what they think that animal will contribute to its offspring. Historically, EPDs often were identified on an ad hoc basis without concern for whether the identified traits directly impacted profit, but recently Enns, Garrick, and their colleagues have concentrated on identifying what they call "economically relevant traits" – traits that directly affect profitability by being associated with a specific cost of production or an income stream. Each trait is associated with a measurable indicator or indicators. For instance, one economically relevant trait EPD is the probability of calving ease. The indicators for this trait are calving ease score, birth weight, and gestation score.

In the past, information on EPDs was primarily delivered to seedstock producers, but the DSS that Enns and Garrick have developed allows information for making management decisions to go straight to commercial producers. The DSS, in the form of a Web site, is being tested in prototype by producers now.

To use the DSS, ranchers must input their herd's information regarding production, management, genetics, and cost/income information. Production information includes details on the number of cows raised, weaning percentage, and calving problems. Management questions deal with whether the ranch breeds their own replacement females or whether they are bought, the cow per bull ratio, and how old cows are before they are removed from the herd. The genetics of the herd are determined by the breed or breeds used, the type of bull that is purchased, and the average EPD for the cows in the herd or the EPDs on the bulls they have purchased in the near past. Cost and income reflect how much a cow costs if it is added to the herd and the price the producer gets for calves. Feed requirements associated with maintaining the beef cow, which account for upwards of 70 percent of the costs of production, also are figured in by the DSS. The program allows the producer to select between choosing to operate at the optimal level of resources they currently have or to buy or lease more land or feed for their cows in the event the cow requires more feed due to genetic changes over time.

Using the information that the producer provides, the DSS simulates a base economic profile of the herd. Then the entire database of the breed association of their choice is

Use of a
decision support
system helps
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pulled up so that producers can see what bulls and semen are available for purchase and at what cost. They then can use the DSS to simulate how the genetics of a herd are likely to change and the associated economic value of any change. By running different simulations, producers can choose which EPDs to emphasize in their herds or which bulls best meet their production system's needs. "This can be extremely useful, as some breeds have more than 20 EPDs to evaluate," Enns says. In the future, Enns anticipates that the DSS might be useful as a guide for producers who want to create specific markets for their beef.

What is next for EPD research? In addition to beef cattle, EPDs also are being used in the dairy and hog industry. Private corporations overseas are calculating their

own EPDs to use in managing deer herds, and Colorado State University is interested in researching equine EPDs.

For now, Enns is elated that the cattle industry as a whole is experiencing a boom. Despite the recent Bovine Spongiform Encephalopathy scare and the closing of markets in Japan and elsewhere, near-record high prices are being paid for calves, and farm incomes are hitting new highs. Even Colorado is bouncing back from the drought, which caused many producers to sell off their cattle. Enns who grew up on a farm in Oklahoma that raised cattle, wheat, and alfalfa, is excited about being in the forefront of research that could be so useful in maintaining the profitability of the United States cattle industry.



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Big Business

Facts about the Colorado beef industry:

- It is the largest component of Colorado agriculture.
- Colorado is home to approximately 3.3 million beef animals, valued at around \$2.3 billion.
- Large Colorado feedlots, with greater than 1,000 animal capacity, market approximately 2.6 million cattle annually.
- In any month, approximately 150,000 to 300,000 animals are marketed.
- Colorado is ranked tenth in the nation in overall cattle numbers.
- The cattle industry plays a major part in the economic health of almost one-third of Colorado counties.