Selection for Feed Efficiency

► "We need to be able to select for a trait that impacts every producer's biggest expense," Greg Jorgensen, Ideal, S.D., says.

South Dakota producers are sorting bulls on feed efficiency, utilizing ratios until EPDs are available.

Story & photos by ***Troy Smith***

Jorgensen Land & Cattle sends a lot of Angus bulls to the country for use by commercial cow-calf outfits. Greg Jorgensen, who spearheads his family's Ideal, S.D.-based seedstock enterprises, says bull buyers are becoming increasingly discriminating. They want to know what they are buying.

"It's pretty hard to sell a bull without information," Jorgensen states. "People expect it. Most of them want all they can get — pedigree and performance EPD (expected progeny difference) information to help them make decisions."

However, Jorgensen is convinced that cow-calf producers still lack an important tool for genetic selection. There are EPDs for many economically important traits, but not for feed efficiency (FE). Not yet.

Efficiency importance

"What could be more economically important?" Jorgensen asks. "We need to be able to select for a trait that impacts every producer's biggest expense."

It's been estimated that costs associated with producing and/or purchasing feed represent more than 60% of an average beef producer's total costs. So, the efficiency with which animals convert feed to production, or reproduction, is mighty important. Jorgensen believes feed efficiency will become even more critical to producer profitability in the future.

He holds up the pork and poultry industries, witnessed through his family's own experience in the pork business, as examples of how emphasis on improved feed efficiency has enabled producers to lower production costs. While running a 1,200-sow farrow-to-finish operation, the Jorgensen family saw how a seemingly small reduction in the amount of feed required to produce a pound of weight gain could save a pile of money.

"We saw how $50,000 (in annual feed costs) could be saved by improving the feed efficiency of our hogs by just one-tenth of a pound," Jorgensen says.

It's hard to argue against the potential economic effects of improved feed efficiency in beef cattle. The value of saved feed, Jorgensen notes, can be realized by every cow-calf producer. The same cannot always be said for value added through improvement of some other traits.

For example, calf sellers may not be adequately rewarded for their successful improvement of carcass merit through genetic selection. But, calves that better convert feed to pounds of gain should reward producers, regardless of when the calves are marketed, as will brood cows that hit production targets but have low maintenance requirements.

Genetic selection

Jorgensen is already applying genetic selection for improved feed efficiency. The process started about six years ago with a feed test involving 22 bulls fed individually so actual postweaning feed consumption and performance could be measured. But, hand-feeding bulls to collect individual feed intake data is expensive and impractical for evaluating large numbers of animals. So, Jorgensen compared his feed test results with those produced by a computer program for predicting individual feed efficiency of animals fed in groups. The model was developed at Cornell University, Ithaca, N.Y.

Using raw data supplied by Jorgensen, Cornell researchers plugged the information into a formula. "Their results matched ours for identifying the top five bulls and the bottom five bulls for feed conversion," Jorgensen says. "For bulls falling somewhere in the middle, Cornell's ranking was a little different than ours, but those bulls all

performed closely anyway. It told me that their method for identifying the most efficient and least efficient animals was pretty accurate. We've been using it since then."

Predicting profit

According to Cornell nutritionist Danny Fox, the Cornell Value Discovery System (CVDS) predicts each animal's share of the feed consumed by a pen of animals, applying measurements that are practical to gather. The model computes dry matter (DM) required for growth based on initial body weight, days on feed, carcass measurements [weight, backfat, ribeye area (REA) and intramuscular fat (IMF)] and ration composition.

"In effect, we are determining how much an animal ate, based on its observed performance," Fox says.

Tested against experimental data collected on individually fed steers, CVDS has accounted for 74% of the variation in feed consumed and 84% of the variation in feed conversion. In commercial feedlot tests, the sum of predicted feed required for the observed growth of individual animals was within 1% of the actual amount of feed consumed by all of the cattle.

Several commercial feedlots are now using the model to allocate feed costs for pens containing cattle of mixed ownership. Instead of keeping each owner's cattle penned separately, feedlot managers can sort cattle by "days to finish" and more effectively manage groups for their appropriate market targets. Even though a pen may contain cattle belonging to several different owners, CVDS-predicted feed requirements for individual animals allow allocation of feed charges to their respective owners.

Fox says another goal was to use CVDS to identify differences in feed efficiency in bull tests. Applied to the New York State Bull Test, the program's accuracy for predicting feed intake of individual bulls was comparable to feedlot tests involving steers and heifers. Throughout a five-year period, Jorgensen Land & Cattle has used CVDS to predict feed efficiency for more than 850 bulls, representing more than 50 sires. The sum of predicted feed required did not vary more than 5% from the actual amount of total ration fed. Dave Bittner, a partner in the Profit Maker Bulls alliance from Paxton, Neb., also has used CVDS to predict feed efficiency of bulls, with similar results.

It's not perfect, Fox states, noting that CVDS predictions have missed on occasion, failing to identify certain tested bulls that should have ranked among the most or least efficient animals. It hasn't happened often, which suggests that the risk of being wrong is not very high. Fox believes CVDS can be used as a decision-support tool for identifying differences in feed efficiency among individual bulls. Does that mean CVDS-predicted DM requirements can be used as an indicator trait to select breeding animals for feed efficiency?

"We don't know yet," Fox admits. "We're optimistic that it can be used to help develop an EPD or some kind of selection tool for feed efficiency. The research is ongoing."

Heritability issues

Work by Cornell animal breeding graduate student David Kirschten casts a favorable light on feed efficiency heritability. His preliminary analysis suggests that feed required, as predicted by the CVDS model, is at least moderately heritable — about 0.36. The model's calculations of feed required also account for differences in mature size of cattle and composition of weight gain. Therefore, it is expected that mature size and carcass composition would not be changed as a result of selecting for CVDS-predicted feed efficiency. That's been a problem in the past, when selection for growth rate and accompanying increased feed efficiency also yielded larger mature cow size and leaner carcasses.

It is not known yet how selection for feed efficiency might affect other traits.

"We are working with breeders to evaluate feed efficiency of group-fed animals and determine if there are undesirable correlations with other traits," Fox notes. "We would expect selection for feed efficiency to be part of a multiple-trait selection process."

Jorgensen suspects feed efficiency may be negatively correlated with milk production. He thinks some producers could easily afford to give up a little milk for increased feed efficiency. However, Jorgensen fears some breeders will go to extremes, trying to outdo

CONTINUED ON PAGE 170

Value of Records

The Jorgensen family has been a fixture in south-central South Dakota since its Danish forbearers homesteaded on the rolling prairie near the tiny community of Ideal. The name "Ideal" is common to the many Angus pedigrees traceable to the Jorgensen breeding program. It's a program that helped pioneer the production of performance-tested beef cattle and integrated resource management.

Initiated by Martin Jorgensen, the use of artificial insemination (AI) since 1964 and the bold turnover of generations have enhanced more than 40 years of line-breeding to produce cattle that fit the environment and the market. Avoiding phenotypic trends, the Jorgensens embraced expected progeny differences (EPDs) early on as an important aid in selection for economically important traits.

Featured in the *Angus Journal* nearly 25 years ago, Martin talked about the importance of recordkeeping to the family's diversified livestock and crop production enterprises.

"Information is the most valuable tool we have, and the most valuable information we have comes from our own records," he said. "You can't evaluate what you're doing and make changes unless you know what your costs are. You can't know that unless you keep records. So, we track costs and return crop by crop, field by field and pasture by pasture. It all boils down to being better business people."

Today, Jorgensen Land & Cattle, involving some 16,000 acres, is very much a family operation. Martin and Mary Jorgensen's son, Greg, manages cattle operations, including 1,000 cows (both registered and commercial) and a feedlot. Their other son, Bryan, heads up production of crops, including corn, wheat, oats and alfalfa. Also involved is Greg's son, Cody. Along with involvement in cattle management, Cody has primary responsibility for the newest Jorgensen enterprise — a pheasant-hunting business that hosts sportsmen from across the country.

one another in regard to feed efficiency EPDs.

What the future holds

But let's not get ahead of the science. We do not yet have feed efficiency EPDs. Maybe we won't. Some geneticists, like Colorado State University's Dorian Garrick, have their doubts.

"There will be selection aids, but probably not an EPD for feed efficiency," Garrick offers. "Indexes developed for several breed associations by Mike MacNeil of USDA (the U.S. Department of Agriculture) and decision-support software developed by the National Beef Cattle Evaluation Consortium (NBCEC) reward animals for the value of the productivity and penalize animals for the costs of their feed and other inputs. Selection on these existing tools will improve economic efficiency more effectively than does selection on a ratio such as a feed efficiency EPD."

Garrick says geneticists in the United States, Canada and Australia have been working on a variety of concepts to account for feed requirements. For example, Colorado State has developed a maintenance energy EPD used by the Red Angus Association of America to account for the additional feed required by larger cows, or cows with potential for higher milk production.

However, there currently is no national system for collecting and measuring individual measures of feed intake. It is likely, Garrick says, that individual feed intake measurements will be used to identify animals that ate more or less than they were expected to consume, based on their production. This value is known as residual feed intake (RFI) and may become a component of the decision-support tool that aids selection for more feed-efficient cattle. Garrick says this cannot happen until the infrastructure is in place to collect routine feed intake measures on registered cattle in the same way that growth, reproduction and ultrasound data are collected.

Making do

Meanwhile, Jorgensen is applying feed conversion ratios based on CVDS-predicted feed requirements to his own genetic selection process. Geneticists contend that ratios do not make the most effective tool for genetic selection. That's true, and Jorgensen won't argue the point, but neither is he content to sit and wait for something better.

"Before there were EPDs, we used ratios because that was the best tool we had. EPDs are better. But, until we have something like that, I'm using the only tool available to rank cattle for feed efficiency," Jorgensen explains.

"It won't hurt anything unless we put too much emphasis on feed efficiency and neglect other traits. But, we've never used single-trait selection, and we're not using it now," he continues. "We're adding more information to the selection process. It's a start in the right direction, and we think it's making a difference."

The CDVS is available to seedstock producers interested in ranking cattle for feed efficiency. Software may be downloaded from *www.cncps.cornell.edu/cvds.*