Index 101

Fundamentals of index-based selection explained.

by Shauna Hermel, editor

Expected progeny differences (EPDs) are great tools for making genetic progress; but trying to analyze 20 of them when selecting bulls at a sale is too cumbersome, said Matt Spangler, University of Nebraska beef genetics specialist. Combining them into a single index value that gets at the genetic merit for net profit can alleviate that complexity.

Spangler shared his comments, stressing the importance of using indexes correctly, during the Index 101 session at the 2018 Angus Convention in Columbus, Ohio. The session was part of the Nov. 4 Angus University educational program sponsored by Merck Animal Health.

"For commercial bull buyers," said Spangler, "the conversation needs to begin with really what are your breeding and marketing goals."

Do you retain replacement heifers? Do you sell calves at weaning? Do you retain ownership through the feedlot?

By understanding what traits drive profit on your ranch, you can select the best EPDs and economic indexes for your situation and environmental constraints, focusing on the traits economically relevant to you.

ERTs vs. indicators

Economically relevant traits (ERTs) are those that directly affect a revenue stream or a cost. Indicator traits, on the other hand, are genetically correlated to an ERT, but aren't directly tied to a revenue or cost stream, Spangler explained. Birth weight and ribeye area, for instance, would be indicator traits of the economically relevant calving ease and yield grade, respectively.

Using ERTs is preferred, he noted, but indicator traits may be useful when they can be measured earlier in life or at less cost. They are also useful when the ERT is sex-limited, but the indicator trait can be measured in both sexes.

Whether a trait is considered economically relevant or an indicator may depend on your segment of the industry, Spangler said. Consider yearling weight and carcass weight. Carcass weight is an economically relevant trait to someone selling on the rail, while yearling weight would fall into the indicator trait category. However, for someone selling yearlings, yearling weight might be economically relevant.

Practicing multi-trait selection

"Commercial cow-calf producers are faced with selection for multiple traits simultaneously, because it's not just one trait that impacts overall profit," Spangler observed. As they sort bulls in a sale group, they'll use one of three tactics.

Tandem selection — Looking for bulls that could improve both calving ease direct (CED) and yearling weight (YW), a producer may choose to select for CED until they get it where they want it, then start selecting for yearling weight. The downfall of this process is allowing advances in one trait to erode while selecting for the other, Spangler said. "It's grossly inefficient."

Independent culling levels — Producers can also employ independent threshold levels for four or five traits in which they are interested, buying only bulls that meet or exceed all threshold levels.

"In my experience, people lie and cheat on their own thresholds," Spangler said, explaining that if they really like a bull that didn't meet all their thresholds, they'll often change the thresholds. On the other hand, if adhered to, the strategy also may miss the bull with the most genetic value for a herd because he failed to meet one threshold value.

Matt Spangler says selection indices are meant to drive net profit to the commercial industry.

"That's the benefit of selection indices," Spangler said, noting the third means of sorting bulls on multiple traits.

Selection indices are tools to enable informed multi-trait selection, Spangler explained. They are based on breeding objectives, economic parameters, relationships among traits and herd averages, which give a baseline for how economically valuable change is to a particular herd.

Spangler emphasized that current selection indexes have been created to help the commercial cattle industry.

"If you are a seedstock producer, these tools are meant to drive change in net profit for your customers," he emphasized. "They are not tools for a breed improvement directive; they are meant to drive net profit to the commercial industry."

How do you apply an index?

Spangler provided the example of two bulls, Bull A and Bull B, with general all-purpose indexes of 100 and 76, respectively. If you intend to use the bull for four years, exposing him to 30 cows each year, he would get 120 exposures in your herd. The selection index would indicate Bull A could provide $2,880 more net profit to your herd than Bull B [120 exposures × (100-76)].

For this to be true, Spangler warned, the index used must fit your breeding objectives. If you retain your own replacement heifers, for example, beef value ($B) would not provide an accurate reflection of net value to your herd because it ignores that breeding objective.

While other species have created efficiencies in delineating maternal lines and terminal lines, Spangler said he doesn't see that happening in the beef industry.

"As a consequence, the majority of commercial beef producers find themselves in a situation where their profit is generalized over multiple breeding objectives," he said, referring to producing both maternal and terminal products. "Given that's the way the beef industry is structured, there is logic in producing an economic index that actually fits the objective of the majority of commercial cattle producers."