Pacer Awards

MOST INNOVATIVE RIDE

More Bang for the Buck

A NEW TEST SCREENS BULLS FOR A PROTEIN THAT ENABLES THEM TO SETTLE MORE COWS EARLIER.

Have you ever had bulls that pass a Breeding Soundness Evaluation with flying colors fail to breed as many cows as other bulls that passed the same test?

Serving capacity and libido aside, the answer to that question vexed Roy Ax from the University of Arizona for years. Finding the reason why some otherwise reproductively fit bulls were less fertile than others led Ax to discover that there is a particular protein contained on the sperm of some bulls which allows them to settle more cows earlier in the breeding season than bulls whose sperm is devoid of this protein. The protein in question, chemically identified in 1998, has been termed Fertility Associated Antigen (FAA).

"Selecting bulls with FAA present in sperm membranes compared to bulls without FAA results in about five more calves per 25 cows exposed to a bull," says Ax. "If selection of bulls with FAA resulted in only one more calf weaned per herd, the national economic impact to producers could be $19.2 million."

In an ongoing multi-year study across 304 FAA-positive bulls bred to 8,281 cows, compare to 217 FAA-negative bulls bred to 5,167 cows, FAA-positive bulls have settled approximately 17% more cows within the first 60 days of the breeding season than FAA-negative bulls.

The economics of such an advantage are obviously many and far-reaching.

For one, more calves in the first 60 days mean more pounds to sell at weaning time. More calves in the first 60 days also means there's a need for calving help for a shorter period of time and that the cows have more time to recover for re-breeding.

As far as Bob Prosser is concerned, though, the greatest advantage of FAA-positive bulls in the commercial pasture may simply come in the fact that fewer bulls can be used, meaning there are fewer to purchase and maintain year to year.

Prosser and his family own and operate the Bar T Bar Ranch headquartered near Winslow, Arizona. This is sprawling, rough country. The operation includes both seedstock and commercial cow/calf enterprises. In both, Prosser has never been a believer in pampering cattle. Instead he has focused intently on genetics-including meticulous management of heterosis-to build cattle that will work for him and his family rather than the other way around.

About a decade ago Prosser began working with Ax and Tim and Barbara Jackson of Repro Tec, Inc. (more later) as a research herd for FAA. He was impressed enough with the differences he was seeing between FAA-positive and FAA-negative bulls that he began running some of his own experiments. As an example, he split his heifers into two breeding groups. He ran a FAA-positive bull to 15 heifers in one group like usual. In the other he ran a FAA-positive bull to 20 heifers.

"We didn't see any difference in breed-up. We got the same conception rates (92-95% in the first 45 days), and did it with a third fewer bulls and no additional feed resources," explains Prosser.

Given the high heritability of FAA, over time Prosser's attention on it means he continues to produce fewer and fewer FAA-negative bulls as well.

"I think the big savings is that you can cut down your herd bull battery, get as much breed-up (conception) with fewer bulls and be in a position to buy better bulls," says Prosser. "You can replace lower fertility bulls with fewer FAA-positive bulls and still not impact breed-up negatively."

How FAA Works

In a nutshell, Ax explains that sperm is sperm until it comes into contact with seminal fluids. For sperm to penetrate the protective coating of an egg to allow for fertilization, the sperm must be *activated* via a process that is called capacitation. Capacitation process occurs when the acrosome - a region located on the head of the sperm - swells and bursts, releasing enzymes that allow the sperm to penetrate the egg (acrosomal reaction). This process takes place within the reproductive tract of the cow within 6-8 hours of the semen being deposited there.

None of this was known when Ax and fellow researcher, Hal Hawkins, were trying to figure out, more than a dozen years ago, why it was that in experiments involving in-vitro fertilization all of the variation in results was coming from the sire side. In other words, here was semen from bulls that were reproductively fit, bulls that had passed a Breeding Soundness Evaluation, bred to the same cows, yet some bulls proved more fertile than others.

Incidentally, given the fact that BSE (Bovine Spongiform Encephalopathy) is now a much-used acronym, even among consumer, perhaps the industry needs to move away from using the acronym to denote a Breeding Soundness Evaluation. How about Breeding Fitness Evaluation (BFE)? That's what we'll use from now on in this column, anyway.

What Ax and Hawkins discovered is that the presence of FAA increased acrosomal reaction. If FAA is present, capacitation of more sperm in the semen occurs, meaning that more sperm have the opportunity to fertilize the egg. In round numbers, Ax explains acrosomal reaction in FAA-positive bulls runs 60-65% compared to 15-20% in FAA-negative bulls. Furthermore, in the ongoing study cited earlier, of the 914 bulls tested last year, 26.5% were FAA-negative.

Testing for FAA

Once the researchers uncovered FAA and its role in capacitation and acrosomal reaction, they figured out how to test for it. The problem was that testing was fairly labor-intensive and time-intensive, requiring that semen samples be sent to the University of Arizona for an involved process of electrophoreses. This is where the Jackson's and their Repro Tec, Inc. come in. They and Ax recognized that if they could create an affordable, accurate, fast and easy chute-side test for FAA, then lots of cattle producers would have the opportunity to select for bulls that were inherently more fertile than others because of the FAA.

Plenty of years and frustration later, they finally have it. Repro Test for Bulls works a whole lot like a home pregnancy test. In this case, a drop of semen is put into a plastic cassette. Within 10-20 minutes, if a line appears in the window of the cassette, the bull is FAA-positive.

The tests cost $30-$45 depending on the volume purchased. Although the price is nothing to sneeze at, it is miniscule compared to the potential economic returns of getting more cows bred earlier in the season. Even so, at least early on, it may not be reasonable for commercial producers to

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expect their seedstock suppliers to foot the bill for testing all the bulls they offer for sale. If that's the case, it does seem reasonable that sellers and buyers might share the cost in some way. For instance, perhaps a buyer would stand the cost of testing bulls he has decided on; pay for it of the bulls wind up being positive, while the seller would pay the cost if the bull winds up FAA-negative.

However it ends up, all those mentioned here emphasize that screening for FAA is one more tool available to use in selection. Rather than basing bull use decisions on whether or not a bull is FAA-positive, they suggest using it as an added selection filter. After all, a negative test for FAA doesn't mean a bull is infertile, it just means the bull will settle fewer cows in the first 60 days of the breeding season than one that test positive.

Rather than supplanting a BFE, the notion is that FAA testing should be new component within a standard BFE.

Carry all of this a step further, it may be that FAA-positive bulls will also make a greater genetic contribution to a herd over time. Prosser points out that the heifers born earlier in the calving season have more opportunity to cycle sooner than those born later. Consequently, it makes sense the heifers born earlier have an advantage when it comes to being retained as replacements. As for breeding-age cows, this same reality means that fewer cows bred to FAA-positive bulls may fall out of the herd for slipping later into the calving season.

Bottom line, while the test is no silver bullet, its value-benefits relative to cost-mean it's new technology that should be seriously considered by producers.

(For more information about ReproTest for Bulls, contact Repro Tec at 800-533-8115)