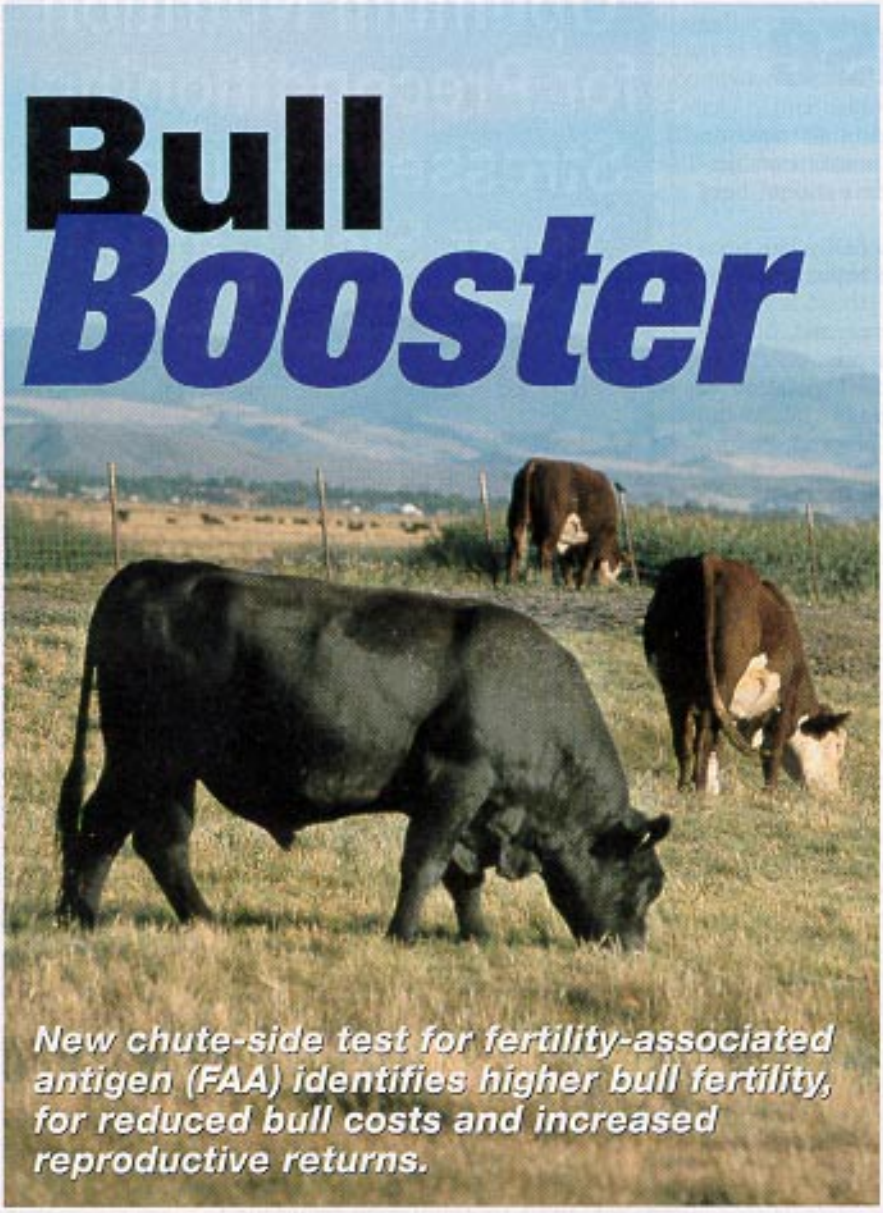
Bull Booster



New chute-side test for fertility-associated antigen (FAA) identifies higher bull fertility, for reduced bull costs and increased reproductive returns.

By Wes Ishmael
Contributing Editor

Even in rough country with otherwise reproductively fit bulls, research proves the absence or presence of a heparin-binding protein, dubbed fertility-associated antigen (FAA), can make a world of difference in terms of how many cows a bull settles within the first 60 days of the breeding season.

"Sperm is sperm until it comes into contact with seminal fluids," explains Roy Ax, a University of Arizona (UA) animal scientist and researcher. But that notion was far from apparent more than a dozen years ago.

That's when Ax and his colleague Hal Hawkins sought to explain why, all else being equal, during in-vitro fertilization the variation in fertility kept coming from the sire side. It seemed there had to be something different in the sperm among bulls to explain the variation, but science at that time failed to explain it.

Now we know that sperm can't penetrate an egg's protective coating to allow fertilization until the sperm is activated through a process termed capacitation. Capacitation occurs when the acrosome – a region located on the head of the sperm – swells and bursts to release enzymes that allow the sperm to penetrate the egg (an acrosome reaction). This process occurs in the reproductive tract of the cow over the course of six to eight hours after the semen is deposited there.

Roy Ax

Ax discovered that the presence of FAA enables increased acrosomal reaction. Thus, if FAA is present, capacitation of more sperm in the semen occurs, which means more sperm have the opportunity to fertilize the egg.

For the record, Ax explains they find acrosomal reaction levels of 60-65% in bulls positive for FAA, compared to 15-20% in bulls that test negative for the FAA protein. So, the thinking went, figure out how to identify bulls positive for FAA and you could select for higher inherent fertility in bulls.

Such Bulls Settle More Cows Earlier

Ax and fellow researchers developed a test to accurately identify bulls positive and negative for FAA. They then began to compare the fertility of bulls positive for FAA to those negative for the protein. Fertility in the ongoing multi-year study is defined by the number of cows palpated bred within the first 60 days.

Thus far in the study, a total of 304 bulls positive for FAA have been bred to 8,281 cows, while a total of 217 FAA-negative bulls have been bred to 5,167 cows. The positive bulls have settled 16.1% more cows within the first 60 days than FAA-negative bulls (78.6% for FAA-positive and 62.5% for FAA-negative). The study includes bulls from a cross section of breeds.

"Selecting bulls with FAA present in sperm membranes, compared to bulls without, 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 additional calf weaned per herd, the national economic impact to producers would be $19.2 million."

And, that may be peanuts compared to the other advantages that higher fertility bulls can yield.

"I think the big savings is that you can cut down your herd bull battery, get as much breed-up (the conception) with fewer bulls, and be in a position to buy better bulls," says Bob Prosser. He and his family own and manage the Bar T Bar Ranch near Winslow, AZ.

As a research herd, Prosser began using the UA-developed test, which ultimately was licensed by Repro-Tec, Inc. at Tucson, almost a decade ago. Given the accuracy of the test and the apparent high heritability of FAA uncovered in his and other research herds, Prosser continues to use only FAA-positive

Tim Jackson, (left) of Repro-Tec and Roy Ax of the University of Arizona, developed a chute-side test to determine if a bull is positive for fertility-associated antigen.

bulls. Over time, that means fewer bulls he produces are FAA negative. In his commercial pastures, that equates to using fewer bulls without hurting conception rates.

For instance, Prosser conducted his own experiment, using only FAA-positive bulls but at different bull-to-female ratios on his heifers. He placed one bull to 15 females on half his heifers, which is traditional, and one bull to 20 heifers on the rest.

"We didn't see any difference in breed-up. We got the same breed-up (92-95% in the first 45 days) and did it with a third fewer bulls and no additional feed resources," Prosser says. He points out producers in a position to rotate bulls between pastures could see even more dramatic savings.

Fewer bulls is just one plus. There should be more females worth retaining if part of the savings are used to buy higher quality bulls, and the value of those bulls to genetic improvement is magnified over time. That's on top of the long-term cost of progeny per bull that will continue to decline.

Plus, more calves coming from the first 60 days of breeding should serve up more saleable pounds at weaning. Not to mention, heifers that cycle earlier and more days for cows to recover for re-breeding.

Incidentally, in top high-to-bottom testing of more than 900 bulls in 16 herds last summer 25% tested negative for FAA.

A Convenient Test

For all the potential upside, the test's lack of convenience dogged researchers and potential users.

When Tim and Barbara Jackson of Repro-Tec, Inc. licensed the test from UA, they easily saw the potential value to the industry. But they and Ax knew a more convenient procedure was needed than collecting a bull, freezing and sending the sample to Repro-Tec, Inc. for a complex and time-consuming electrophoresis gel process.

Finally, after three years of research and development a chute-side test is ready to market. It's as simple as depositing a drop of semen into a small, disposable plastic cassette. Much like a home pregnancy test, if a line appears in the cassette's window, the bull is FAA positive. If there's no line, the bull is FAA negative. Depending on volume, the test will retail at $30 each.

Both Jackson and Ax are quick to point out that a negative result doesn't mean a bull isn't fertile. Instead, bulls positive for FAA produce more progeny than other reproductively fit bulls that test negative for the protein. Rather than a substitute for a traditional breeding soundness exam, they believe the FAA test should be used as another component.

Likewise, Prosser emphasizes FAA is only one selection filter. As always, other economically important traits should be considered and balanced.

All else being equal, though, Prosser believes over time the FAA test can help producers cull fewer females because more will get bred earlier.

"You can replace low-fertility bulls, replace them at a lower rate (with FAA-positive bulls) and still not impact breed-up negatively," he says. ♦