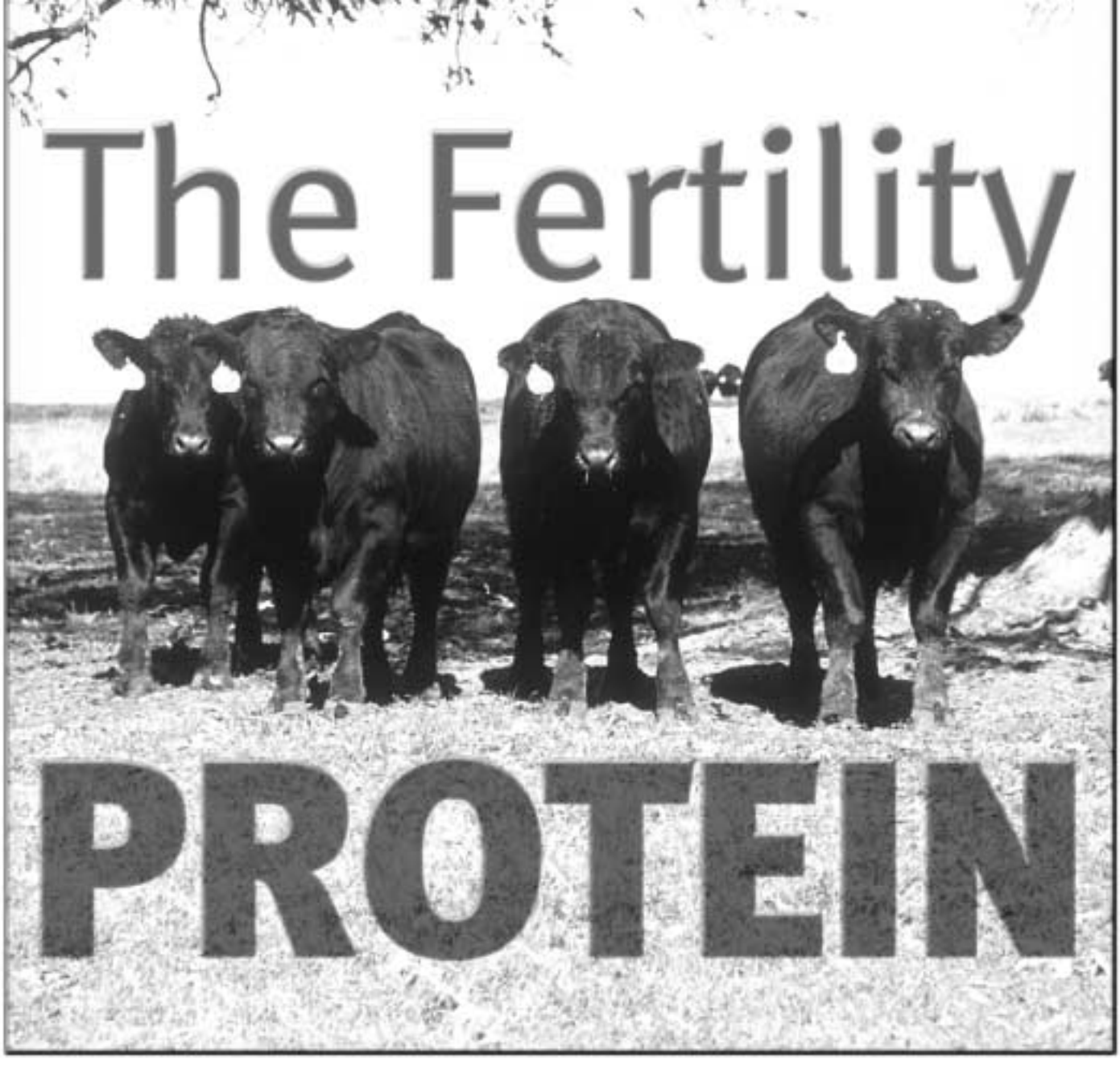
The Fertility PROTEIN



A protein, labeled fertility associated antigen, found in sperm may soon give producers a better way to predict bull fertility.

Story & photo by ***Becky Mills***

A protein found in bull semen may hold the key to predicting bull fertility in the future. Research shows that bulls having the normal form of the protein, labeled fertility associated antigen (FAA), have higher conception rates than bulls that have a mutant form of FAA. For simplicity, bulls with the normal form of the protein are referred to as FAA-positive, while bulls with the mutant form are called FAA-negative.

The discovery of FAA came in 1992. Roy Ax, University of Arizona professor of animal science, knew there had to be something lurking in or around sperm that doesn't show up on a standard semen test.

You could have two bulls with equivalent semen evaluations, and one would settle cows and the other wouldn't, Ax explains. In research conducted at King Ranch, Kingsville, Texas, he says they used hundreds of bulls with identical semen test results. "They would vary from a pregnancy rate of 90% to 95% down to 40%."

Ax went back to the laboratory to do some high-tech detective work using white mice to uncover the protein, and later its sidekick — another protein labeled TIMP-2. Coupled with the lab work was real-world research at King Ranch.

The results are hard to ignore. One King Ranch study continued for seven years. In it, only bulls that had passed a breeding soundness exam were turned out. A typical bull-to-cow ratio of 1:25 was used and the

►Above: Research shows that bulls having the normal form of the protein, labeled fertility associated antigen (FAA), have higher conception rates than bulls that have a mutant form of FAA.

breeding pastures had 300 to 400 cows per group.

At the end of the study, the FAA-positive bulls claimed a 19% higher pregnancy rate than the FAA-negative bulls — 85% compared to 66%.

And, it appears the effects of the FAA carry over to the next generation. Ax says King Ranch got 20% more calves in the first 20 days of their calving season when they kept daughters from the FAA-positive bulls for replacement heifers.

Attitude plays a role

Sure, Ax says, a bull's attitude plays a role. Some bulls obviously breed more cows. Then, there are those who just want to complicate matters. "Some bulls want to be king of the mountain but don't want to breed cows," he remarks. "They just don't want any of the other bulls to breed cows."

And, whether they are FAA-positive or FAA-negative, the bulls that rate higher on serving capacity tests settle more cows. In other words, those that breed more cows, settle more cows. In Ax's studies, FAA-positive bulls with high serving capacity scores settled 87% of the cows. FAA-negative bulls with high serving capacity scores settled 78% of the cows. The Arizona animal scientist says both of these groups tend to settle cows in the first 20 days of the breeding season.

On the other hand, FAA-positive, low serving capacity bulls settled 69% of the cows.

However, using artificial insemination (AI), which takes the bull's attitude out of it, the FAA-positive bulls still stood out. In work done with Texas A&M University on 1,150 heifers, 66% settled on the first service when bred with semen from FAA-positive bulls; 50% of the heifers settled when bred with semen from FAA-negative bulls.

The FAA-negative bulls do have FAA, but it is a mutant form. "These are not sterile bulls," Ax emphasizes. "Just not bulls with the whole package."

As for TIMP-2, it isn't easy to tell which of the beneficial effects come from that protein alone or in conjunction with FAA. "It is hard to find a bull that is FAA-positive but not TIMP-2-positive," Ax explains.

However, in one field study, he says they did find they had a 16% higher pregnancy rate when they used TIMP-2-positive bulls in natural service.

Testing your bulls

So, how do you find out if your bulls have the whole package? Write, call, or fax: ReproTec Inc., 4439 N. Highway Drive #2, Tucson, AZ 85707-1909; (520) 888-0294 (office); or (520) 888-0297 (fax).

ReproTec will send you a shipping container and vials. When you have the container and vials on hand, get a semen sample from your bulls, pack the vials in dry ice, and send them back to ReproTec. Ax says the shipping container and dry ice will hold the samples even in Arizona's 110-degree heat.

Next question, of course, is the cost. It starts at $40/bull, but there are discounts depending on the number of samples.

"That's a dollar a cow," Ax says. "Not a bad return on investment."

While you've got the bull in the chute, Ax advises giving him a thorough breeding soundness exam, too. "We consider a breeding soundness exam to be a basic insurance policy. The test we have for the FAA protein is like a rider on that insurance policy."

The basic semen sample will reveal abnormal sperm, dead sperm, or sperm with poor motility. Plus, Ax says, this is a good time to measure scrotal circumference.

"At King Ranch they practiced single-trait selection for scrotal circumference for 11 years," he says. On 14- to 18-month-old bulls, they culled for less than a 34-centimeter (cm) scrotal circumference. The average age of puberty in the heifers of these bulls dropped five months during those 11 years.

In the future

It is hoped that a chute-side test for FAA is in the works so the test can be performed during a breeding soundness exam.

Winslow, Ariz., rancher Bob Prosser, who tests between 20 and 40 of his Angus, Gelbvieh and composite bulls annually, is more than ready for the next step.

"The test will be a whole lot more useful when we can do it chute-side," he says. "It is a bit awkward now, and we have to wait two or three weeks for the results."

However, he says, "We were able to reduce the herd bull battery by 30% in virgin heifers with no difference in conception rates, which did result in significant savings." He adds, "Another way to look at it is you can buy better bulls for the same amount of money."

There is more good news in the works with FAA and TIMP-2. While Ax and his colleagues haven't yet been able to manufacture enough TIMP-2 to do any fieldwork, they have been adding FAA to semen before freezing it. So far, it looks like it does wonders for the semen when it thaws.

And, Ax is working on a test to determine the presence of FAA with a blood test that could be taken from a day-old calf, whether a heifer or a bull. AJ