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Whether you know it or not, you have already crossed over into a totally new era in bovine reproductive science. Two new blood tests — one already on the market that checks for pregnant cows 30 days after insemination and one scheduled for release in 2006 that checks for open cows 20 days after insemination — promise to increase impregnation opportunities and reduce age and weight variability.

Fred Slocum, owner of Sequoyah Land & Cattle, based in Quitman, Ark., has used BioPRYN™ for almost three years and is enthusiastic about how it has improved his herd reproductive program. BioPRYN is a mail-in test developed by BioTracking LLC of Moscow, Idaho, with a license of the technology from the University of Idaho (UI).

“Over [the] time we have used the test, we have culled on its results, and the accuracy has been excellent,” Slocum says. “We now test all of our animals instead of palpating. It is easier on the cows and easier on us.”

Slocum isn't the only one who doesn't rely on palpation to identify open cows. A national survey reveals that a majority of commercial cow-calf producers don't, and never have, palpated their cows. In spite of the fact that the costs of replacements for beef cows have never been higher and that relying on visually identifying pregnant cows is a risky science at best, most beef producers still trust their eyes and instincts to judge whether or not a cow is open and must be culled.

The U.S. Department of Agriculture (USDA) National Animal Health Monitoring System (NAHMS) collected data on 1,190 producers with five or more beef

cows from 23 of the leading cow-calf states. The study represented 85.0% of all U.S. beef cows on Jan. 1, 1997, and 66.3% of all U.S. operations with beef cows.

When asked about pregnancy palpation, only 34.5% of operations reported using this technology. Of those who did not use palpation, 33% gave time and labor as reasons for not using the technique.

“These are precisely the beef producers we want to reach,” says Garth Sasser, UI professor emeritus and developer of BioPRYN, an ELISA test that detects pregnancy in cows after 30 days. “All you do is draw blood, send in a sample into our lab in Moscow, Idaho, and you know the next day.”

To point out the fallibility of visually assessing whether a cow is pregnant or not, Sasser confesses that some of his best customers for the BioPRYN pregnancy tests have developed a lucrative cottage industry buying fall culls out of the sale barn and running blood pregnancy tests on them. Those that test positive are kept. Those that don't are resold.

“You'd be surprised how many pregnant cows they pick up that way,” Sasser says.

What makes the whole enterprise work is the low cost and fast turnaround of the test. At \$1.95 each, with a 36-hour turnaround, the cow speculator doesn't have to keep an open animal any longer than four days.

One rancher's view

As a seedstock operator, Slocum uses the pregnancy test in conjunction with his artificial insemination (AI) program. His cows calve in early fall, so Slocum's team begins synchronizing the cows around Thanksgiving.

“That gives them a good one to

Replacing Palpation

Early blood sample pregnancy tests offer new alternatives

two cycles after calving before they are bred back,” he says. “Once we do the synchronizing, we stick a straw in everything that shows heat.”

After 16 days, the cows are turned out with the cleanup bulls. Thirty days after pulling the bulls, Slocum runs his cows through the chute and takes a blood sample out of the tail. Within 48 hours, he has the results in his hands.

“We take blood from the mamas at the same time the calves are getting their second vaccination shot,” he says. “It all works well together.”

Slocum is pleased with his reproduction program, remarking that last year, out of a group of 135 cows, less than 6% were open. He feels that the pregnancy test contributed to that record, noting that drawing blood from a tail puts a lot less stress on a cow than palpation.

“If you don't know what you are doing, palpating an early pregnancy can interfere with it,” Slocum says. “So if the cow shows up open down the line, it costs you at least six or seven months. Then what do you do?”

Economic studies referenced in University of Arkansas' July 2005 *Beef Improvement Bulletin* indicate that for every open cow kept on the farm, the income from 2.4 cows is required to offset her direct expenses. This doesn't factor in the allocation of indirect costs to the cow herd.

Slocum estimates that expenses associated with carrying an animal through to the next breeding season now exceed \$400. But for him, convenience is also an important plus for the blood test.

“My guy can bleed a cow from the tail a lot faster than he can put a glove on and palpate,” he says. “There is no comparison when it comes to time and effort.”

Specific protein detected

Sasser says convenience was one of his main motivators for developing BioPRYN. “We felt we could come up with a test that was more user-friendly,” he says. “Now anyone

who can draw blood has access to a test that produces fast, accurate and inexpensive results.”

The laboratory work involves detecting in a blood sample what Sasser has named pregnancy specific protein B (PSPB). He adds that unlike previous pregnancy tests that evaluate blood or milk for progesterone, or other hormones or proteins that can also occur in normally cycling animals, PSPB is only produced in the placenta.

BioPRYN can detect the presence of PSPB as early as 30 days after conception, with an accuracy of 99% for those detected as open and 93%-95% for those detected as pregnant. Sasser attributes some of the false-positive results to early embryonic death after a sample is collected, rather than test inaccuracy.

Cow-side test on its way

Beef producers who want a blood test that offers immediate results, not unlike in-home pregnancy kits used by women around the world, might not have long to wait.

UI research scientist Troy Ott has the answer — a cow-side pregnancy test relying on a blood sample that detects open cows after 18 days.

Recent studies confirm the SurBred™ bovine early pregnancy test is based upon the correct protein marker for determining pregnancy status of a cow at 18 days post-AI.

Limited field trials are being conducted by AspenBio Inc. of Castle Rock, Colo., the company to whom the technology has been licensed. The trials will determine the accuracy of the latest generation of tests provided by Merlin Labs Inc., an organization specializing in lateral flow test development.

Ott notes that when the kit becomes available, it will allow beef producers to tell immediately whether a cow is pregnant or not. He adds that the 18-day time frame from conception to detection is better suited to a cow's reproductive cycle, and the shorter waiting period

translates into greater reproductive efficiency.

“The key to this technology is being able to determine which cows are not pregnant and being able to breed them on their next cycle,” Ott says.

The test kit, which will be sold under the trade name SurBred 15, will consist of a disposable plastic cassette with a blood well and test-result window. Three drops of blood or one drop of plasma is placed in the well. Two lines or bars in the test-result window indicate the cow is pregnant. One bar indicates she is open. AspenBio’s research shows the kit’s effectiveness at approximately 97% for diagnosing open cows and 99% for diagnosing bred cows.

The basis for the new detection method was developed after Ott and senior research assistant Stephanie Etter discovered, while studying gene expression in the uterus during early pregnancy, that a specific protein soon appeared in the bloodstream of pregnant sheep and cattle but was absent when the animal failed to conceive.

Scientists have long known that a group of interferon-stimulated genes are expressed in the uterus during early pregnancy, but it was widely accepted that this was a local effect in the uterus that did not manifest itself in the peripheral blood. The results of their discovery were first published in the *Journal of Endocrinology* in summer 2001.

Soon after the publication of the article, discussions were opened between AspenBio and UI’s Idaho Research Foundation (IRF). These culminated in the licensing of Ott’s invention. “From that point on, AspenBio and other collaborators have directed development and validation of the test,” Ott says.

Recently, patents for the technology have been awarded in Canada and are pending in the U.S. and worldwide.

Ott sees the economic benefits of the SurBred 15 kit to beef producers as fourfold.

“A very important role this test will play is to tighten up the calving interval to give you a more uniform product to market,” he says. “This has the potential to reduce the number of underweight stragglers come market time.”

He believes the test will also be very useful to beef operations that are marketing genetics. “Certainly the seedstock producers that are making their money off of high-quality genetics need a tool that will help them determine when an animal has failed to conceive so they can get them rebred more quickly,” Ott says.

Also, by cutting the number of days between the first and last breeding, Ott sees an opportunity to reduce labor costs. “Often, operations need to take on additional labor during calving,” he says. “With a shorter calving period, you will have less need for that labor.”

Finally, by identifying open animals sooner, a rancher has a better chance to separate potential culls from the rest of the herd. “Any technology that will allow you to identify open cows more quickly and get them off the feed bill is going to return money to the producer,” Ott says.

Originally expected to be on the market sooner, the test is still being refined at AspenBio. “Our accuracy levels aren’t where we need them to be,” says Richard Donnelly, AspenBio president and chief executive officer (CEO). Merial has agreed to market and distribute the \$5-\$7 test globally once it is ready. New estimates are for an early 2006 rollout.



Identifying open animals earlier allows a rancher to separate potential culls from the rest of the herd and manage them accordingly.