

Methods of Pregnancy Detection in Beef Cattle

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From 1993 to 2010, the cost of feed and pasture accounted for 75 percent of direct expenses for herds enrolled in the North Dakota Farm Business Management program. When pasture costs were removed, the remaining feed costs were a little more than 50 percent of fixed expenses. If nonpregnant cows are maintained through the winter, producers incur a significant feed cost with no calf in the spring to help offset the feed bill.

Pregnancy detection is a way to identify nonpregnant cows and, subsequently, decide how to best manage nonpregnant animals on your operation. However, less than 20 percent of beef producers in the U.S. perform a pregnancy check in their herds (data from NAHMS Beef 2007-2008 survey).

Reasons that producers provided for not pregnancy checking their herds included a lack of time and labor, the cost of performing the service and the fact that it was too difficult or complicated. As we progress into an era where available labor is decreasing, input costs are increasing and time is becoming an even more precious commodity, decisions on which areas to focus time, effort and financial resources certainly warrant careful consideration. If you decide to proceed with pregnancy checking your herd, the method of pregnancy checking you use in your operation also requires that same careful thought and consideration.

Pregnancy determination is made by three main methods: palpation per rectum, transrectal ultrasonography and blood analysis for pregnancy-specific proteins. Each method uses a unique way to determine if a female is pregnant, and each method has a place in the beef industry.



Palpation per Rectum

Palpation per rectum (palpation) is the most common method of pregnancy detection used on beef cattle operations. Using palpation is not a visual process; the veterinarian comes out, puts on a sleeve and goes in and out of the cows, and we may be left wondering what just happened. Depending on the age of the pregnancy, several different things could have happened during the process.

The placenta of a calf has two distinct layers: a fused chorion/allantois and the amnion. The technique used to detect most early pregnancies with palpation is to feel the “fetal membrane slip.” In a pregnant female, the layers of the placenta will be felt slipping between your fingers when the uterus is gently pinched. The fetal membrane slip can be felt in pregnant cows beginning from day 35 to 45 after breeding, depending on the person performing the technique.

As pregnancies progress, the developing fetus also can be felt. When learning how to age pregnancies with palpation per rectum, students are taught to associate pregnancies of a given age with animals they are familiar with: 2 months = mouse, 3 months = rat, 4 months = small cat, 5 month = large cat, 6 months = beagle.

In addition to the size of the fetus, the size of the placentomes can be felt to give an indication of fetal age beginning around 90 days after breeding. Placentomes are the points where the placenta attached to the uterus to share nutrients between the cow and calf. Half of this structure, the cotyledons, can be seen as the “buttons” on the afterbirth that passes shortly after calving. You should not see the other half, the caruncles, which would be visible as “buttons” on a prolapsed uterus!



Transrectal Ultrasonography

An ultrasound unit consists of two major parts - a console (screen) and a transducer (probe) - and is a visual instrument. While looking at a screen and seeing a developing fetus may seem like a simple process, many things are happening in rapid succession to get an image onto the screen. Electricity flows from the console to a row of crystals in the probe, which causes the crystals to change shape slightly, then emit ultrasonic sound waves. These sound waves are focused on the tissues that are beneath the probe. The image we see on the screen is the result of sound waves bouncing off the tissues and returning to the probe.

If the sound waves contact a solid tissue (bone), they return to the probe very rapidly and bright white is shown on the screen. If the sound waves contact some type of fluid (urine, blood vessels, follicles, fluid surrounding a fetus), they do not return to the probe and black is observed on the screen. Different tissues have different densities, and this fact allows us to identify different structures, muscles and parts of fetuses on the ultrasound screen. (No, it is not just a black and white TV with poor reception!)

Pregnancy checking with ultrasound allows the operator to see the calf, look for heartbeat or other fetal movements, and determine whether a fetus is alive. Skilled operators can identify pregnancies with ultrasound once the heartbeat starts (around 21 to 22 days after breeding), but the optimal age to do large groups of animals quickly and accurately is around day 26 in heifers and day 28 in cows.

As with palpation per rectum, speak with your veterinarian about the age of fetuses he or she is comfortable identifying. Research that evaluated the pregnancy loss in heifers revealed that pregnancy loss was approximately 1 percent higher in heifers pregnancy checked via palpation compared with heifers checked via ultrasound.

Ultrasound is the most accurate of the methods discussed for determining fetal age. Methods of age determination include measuring specific body parts (distance from top of the fetus's head to its rump, diameter of the skull or diameter of the chest), and each operator has a preferred method or methods of determining fetal age.

This is an important point to note when asking someone to determine the age of a fetus: The measurements and age relationship are most accurate early in pregnancy. The sooner cattle can be checked, the better the predictions of the anticipated calving date will be. Early pregnancy detection also could give you the opportunity to market culls ahead of the seasonal low prices seen in November.

Using ultrasound also may be beneficial for producers wishing to see if cows have twins or to determine the sex of the fetus. Fetal sexing techniques can be used with very high accuracies, depending, again, on the age of the fetus. The fetal age that combines accuracy with speed of the technique begins around day 60 to 65 of pregnancy and ends when the fetus gets too large or simply drops over the pelvic rim.

The exact age when a fetus will drop over the pelvic rim is highly variable among animals; frame size, fatness and other factors determine when (and if) this phenomenon will occur. Even if breeding seasons are confined to 60 days, scheduling a single ultrasound date that would allow an ultrasound operator to fetal sex an entire herd will be very difficult due to the variability in fetal age.

Techniques of palpation per rectum and ultrasound historically required the technician to enter through the rectum to gain access to the feel or "sight" of the reproductive tract in cattle. The elbows and shoulders of personnel who perform extensive pregnancy tests or those working with animals that are thrashing violently are prone to injury. To avoid the risk associated with repeatedly placing arms in cows, several types of rigid ultrasound probes and probe extenders were developed. The use of a probe attached to a rigid "wand" is an option for increased safety, but the operator does lose some of the mobility and sensitivity that is required to perform all diagnostic techniques accurately in all cattle.

Pregnancy-specific Proteins

The newest method of pregnancy detection is the evaluation of blood samples for pregnancy-specific proteins. Several commercial tests are available that quantify concentrations of pregnancy-associated glycoproteins (PAGs) in blood samples that producers send to processing labs. Tests can determine pregnancy status accurately around day 28 to 29 (depending on the company developing the test) of gestation as long as at least 90 days have passed since the cow calved. Companies marketing PAG pregnancy tests include BioPRYN- Biotracking LLC, Moscow, Idaho; PAG- IDEXX Labs, Westbrook, Maine; and DG29- Genex, CRI, Shawano, Wis.

Producers can learn to take blood samples from blood vessels in the neck or tails of cattle and then collect samples from their whole herd without a veterinarian. Sample results are returned within a few days after submission, and some laboratories can email results to producers even sooner.

Interpreting the results is pretty straightforward; options on the list include “pregnant,” “open” or “recheck.” If a “recheck” designation is found for a particular animal, then an additional sample should be collected and submitted at a later date to get a final determination.

For this method to be successful, you need to keep very precise records. Any blood samples that are mislabeled or cases of multiple animals with missing tags or similar animal ID numbers can lead to unintentional culling of pregnant animals.

Another major difference among blood PAG, ultrasound and palpation is the fact that with PAG tests, an immediate answer for pregnancy status is not available. This means that once sample results are returned, cattle will need to be gathered to sort nonpregnant cows from the remaining pregnant cows.

With many areas of the country experiencing a shortage of large-animal veterinarians, PAG tests are a viable alternative to palpation per rectum and transrectal ultrasonography. In addition, the use of blood tests eliminates variation in accuracy of pregnancy detection associated with the expertise of technicians performing ultrasound or palpation per rectum.



Pregnancy Check Timing

One last note regarding the timing of pregnancy checking: You need to pay particular attention to the limitations of each detection method. If bulls are continuously run with a cow herd or are being pulled from the pasture the same day as the pregnancy exam, you have no way to determine the true pregnancy status of all cows. Cows that become pregnant early in the breeding season will be identified easily in these instances, whereas cows that are called “open” may have been bred recently. These recently bred cows may be carrying an early pregnancy that is simply too young to feel via rectal palpation, to visualize with ultrasound or is not producing the pregnancy-specific proteins at levels detectable in the blood.

Identifying and removing open cows from the herd prior to winter feeding can result in significant cost savings, and identifying nonpregnant cows early in the year may offer marketing advantages. Reasons and expectations for pregnancy determination are different for each operation, and each method of pregnancy determination has its place. Consider each carefully.

Comparison of pregnancy detection methods

| Item | Method of Pregnancy Determination | | |
|-----------------------------------|-----------------------------------|------------|-------------|
| | Palpation | Ultrasound | Blood Tests |
| Minimum fetal age detected (days) | 35-45* | 25-30* | 28-32 |
| Accurate fetal aging | Yes | Yes | No |
| Identification of twins | No | Yes | No |
| Evaluate fetal viability | No** | Yes | No |
| Determine sex of fetus | No | Yes | No |
| Veterinarian required*** | Yes | Yes | No |
| Immediate answer | Yes | Yes | No |
| Experience impacts accuracy | Yes | Yes | No |
| Price | Low | Higher | Low |

* Speak with your veterinarian to find out what fetal age he or she is comfortable detecting

** If fetus is old enough, some movement can be felt using palpation per rectum

*** Regulations vary by state; North Dakota requires pregnancy diagnosis to be conducted by veterinarians if producers are paying for the service

For more information on this and other topics, see www.ag.ndsu.edu

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