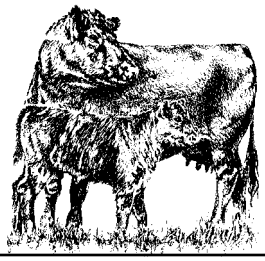

Western Beef Resource Committee *Fourth Edition*

Cattle Producer's Handbook

Reproduction Section 412

Pregnancy Testing

John B. Hall, Extension Beef Specialist, University of Idaho
Danielle Gunn, Agricultural Extension Educator, University of Idaho

Pregnancy testing in beef cattle is a useful management tool that producers can use to determine the pregnancy status of breeding females. Pregnancy determination will identify candidates for culling since those who fail to produce a calf are unable to offset the production costs of maintaining a non-productive cow.

Timely detection and marketing of non-pregnant or "open" cows has positive impacts on ranch profitability. As an example, income from selling open and other cull cows represents 15 to 20 percent of all cattle sales in most commercial cow-calf operations. Pregnancy testing is also an advantageous tool that producers can use to optimize heifer management, such as determining the success of artificial insemination (A.I.) programs shortly after breeding has concluded.

Pregnancy testing can be most profitable when used at two different times during the year. The first would be a minimum of 28 days (dependent upon method used) after the breeding season ends. The second would be when calves are weaned and before gestational feeding programs begin. Pregnancy testing at this time would assure that only cows that are carrying a calf would be fed until calving.

Pregnancy detection at these key times offers these advantages:

1. It gives early warning of breeding trouble, such as infertility in males, problem breeders in females, and can alert producers to the possibility of disease; particularly trichomoniasis, in the herd (see fact sheet 659).
2. It makes it possible to rebreed or sell non-pregnant females.
3. It allows for separation and grouping of females as pregnant and non-pregnant, which provides opportunity for proper management regarding nutrition, health, late calving cows, and culling.
4. It gives an operator the opportunity to use his/her facilities effectively year round, particularly at calving time.
5. It makes it possible to guarantee pregnancy status of females that are for sale.

Several different methods exist to determine pregnancy status. Pregnancy detection can and is most often conducted by trained veterinarians and technicians. In addition, many pregnancy detection methods are relatively easy to learn and can be utilized by producers. As new technologies emerge for pregnancy diagnosis in cattle, ranching input costs continue to rise, and, as the number of large animal veterinarians decreases, more producers are pregnancy checking their own cows.

In most states, however, pregnancy diagnosis for a fee or of cattle owned by others is restricted to licensed veterinarians or veterinary technicians. In some states, people can work in cooperation with a licensed veterinarian to conduct pregnancy detection for other people's cows. It is important to know the laws of your state regarding these practices.

Pregnancy detection methods, which are described in detail, include rectal palpation, ultrasound, and biochemical tests.

Rectal Palpation

Pregnancy is routinely detected in cows by inserting the hand into the rectum and palpating through the rectal and uterine walls for fetal membranes, the amniotic vesicle, and/or cotyledons within the uterus. Training for pregnancy detection by rectal palpation involves taking a course on pregnancy diagnosis or working with an experienced palpator. Palpation generally requires practicing on several hundred animals to become proficient in determining pregnancy status and in detecting other reproductive health conditions that might exist.

Revision of 412 originally authored by Norris J. Stenquist, Extension Animal Scientist, Utah State University; and R. G. Sasser, Professor of Animal Science, University of Idaho.

Table 1. Fetal size and characteristics used in determining pregnancy.

Days of gestation	Fetal size		
	Weight	Length (inches)	Identifying characteristics
30	1/100 oz	2/5	One uterine horn slightly enlarged and thin; embryonic vesicle size of large marble. Uterus in approximate position of non-pregnant uterus. Fetal membranes of 30- to 90-day pregnancy may be slipped between fingers.
45	1/8 to 1/4 oz	1 1/4	Uterine horn somewhat enlarged, thinner walled, and prominent. Embryonic vesicle size of hen's egg.
60	1/4 to 1/2 oz	5 to 6	Uterine horn 2 1/2 to 3 1/2 inches in diameter; fluid filled and pulled over pelvic brim into body cavity. Fetus is size of mouse.
90	3 to 6 oz	5 to 6	Both uterine horns swollen (4 to 5 inches in diameter) and pulled deeply into body cavity (difficult to palpate). Fetus is size of rat. Uterine artery 1/8 to 3/16 inch in diameter. Cotyledons 3/4 to 1 inch across.
120	1 to 2 lb	10 to 12	Similar to 90-day but fetus more easily palpated. Fetus is size of small cat with head the size of a lemon. Uterine artery 1/4 inch in diameter. Cotyledons more noticeable and 1 1/2 inch in length. Horns are 5 to 7 inches in diameter.
150	4 to 6 lb	12 to 16	Difficult to palpate fetus. Uterine horns are deep in body cavity with fetus size of large cat with horns 6 to 8 inches in diameter. Uterine artery 1/4 to 3/8 inch in diameter. Cotyledons 2 to 2 1/2 inches in diameter.
180	10 to 16 lb	20 to 24	Horns with fetus still out of reach. Fetus size of small dog. Uterine artery 3/8 to 1/2 inch in diameter. Cotyledons more enlarged. From sixth month until calving, movement of fetus may be induced by grasping the feet, legs, or nose.
210	20 to 30 lb	24 to 32	From 7 months until parturition, fetus may be felt. Uterine artery 1/2 inch in diameter.
240	40 to 60 lb	28 to 36	Age is largely determined by increase in fetal size. Uterine artery 1/2 to 5/8 inch in diameter.
270	60 to 100 lb	28 to 38	The uterine artery continues to increase in size. Uterine artery 1/2 to 3/4 inch in diameter.

Well-trained palpators can detect pregnancy 35 days after insemination, but accuracy is considerably improved by waiting until 40 to 50 days of gestation. Accuracy at 30 days post breeding is reduced, and a second examination is often required.

Accuracy in pregnancy testing depends upon the ability to recognize changes in the tone, size, and location of the uterine horns as well as changes in the uterine arteries. Fetal size and characteristics used in determining pregnancy are given in Table 1.

In addition to pregnancy detection, experienced, knowledgeable palpators can determine reproductive problems or conditions in open cows. Ovarian palpation can help determine cyclic status, presence of ovarian cysts, uterine infections, or uterine adhesions.

Ultrasound

Real-time ultrasound has become the method of choice for early pregnancy diagnosis by many veterinarians and some producers. An ultrasound transducer is inserted in the rectum of the cow and an image of the fetus and fetal membranes is obtained on the attached screen. Extension arm ultrasound probes are also now available. These probes eliminate the need to insert a hand or arm into the rectum. This type of probe allows the individual to determine pregnancy on more animals as the arm will not tire as with insertion type probes. One must utilize caution with these probes as sudden movements can cause rectal tears.

Compared to rectal palpation, pregnancy determination by ultrasound is relatively easy to learn. Most people can learn to accurately detect pregnancies at 45 days post conception in only a few training sessions. Experienced operators can detect pregnancies as early as 24 to 25 days post breeding with accuracies of up to 85 percent, and with high levels of accuracy (>96%) at 30 days of gestation.

In addition to pregnancy detection, ultrasound examination can determine the viability of the fetus, presence of multiple embryos, fetal age, and occasionally fetal defects. Also, experienced ultrasound technicians can determine sex of the fetus when ultrasound is performed on days 55 to 80 of gestation. Information on reproductive health or problems with open cows can also be assessed.

Only real-time ultrasound equipment specifically designed for veterinary applications should be purchased and utilized for your operation. These units

are portable, rugged, and often battery powered. Other units may require an electrical source. Ultrasound equipment ranges in cost from $7,000 to $12,000 for new units. Therefore, veterinarians tend to be the primary purchasers. However, several large ranches may consider purchasing units jointly, given that using ultrasound units on several thousand animals a year greatly reduces costs per cow. In many cases, the cost of the unit can be recovered in a few years vs. paying for professionals to conduct a field call and pregnancy checking several hundred head of cattle.

Biochemical Tests

In recent years a blood test using biochemical detection has become a practical alternative to ultrasound and palpation. The tests rely upon a change in the secretion pattern of a hormone or detection of a specific protein in the maternal system when an embryo is present in the uterus. Biochemical tests are useful to determine what animals conceived to A.I. in synchronization programs or to clean up bulls with a waiting period of 4 to 5 weeks. It is an easy, cost effective method to determine pregnancy status before producers make the decision to sell or keep bred or open females.

Biochemical tests are conducted by drawing blood from the coccygeal vein in the tail or the jugular vein in the neck. A minimum of 2 ml of blood must be obtained from each female. Needles must be changed for each cow. Vaccutainers used to collect the blood sample should be labeled according to the female's identification number and kept cool before and during shipment to a laboratory.

Pregnancy-associated Glycoproteins (PAGs)

The placenta of the developing calf produces proteins that are secreted and appear in the maternal circulation. These proteins can be detected at approximately 25 to 30 days after breeding and 73 days after calving, depending on the test used. Measuring these proteins is an accurate way to determine pregnancy in cows. These methods do not have the capability to determine sex or gestational age of the fetus.

Currently, three companies offer PAG tests in cattle. Each PAG tests for a different protein existing in the maternal system:

- BioPRYN—BioTracking, LLC; Moscow, ID (accurate 28 days after breeding and 73 days post calving)
- DG29—Genex, CRI; Shawano, WI (accurate 29 days after breeding and 90 days post calving)
- PAG—IDEXX labs; Westbrook, ME (accurate 28 days after breeding and 90 days post calving)

Accuracy varies slightly from test to test, but research indicates accuracy of 93 to 99 percent compared to palpation or ultrasound. If used early (<35 days) in pregnancy, these tests might give more "false" positives due to loss of embryos that were established, but died early in pregnancy. Another consideration is that most cows will have PAG in their blood for about 20 to 60 days after calving; therefore, blood samples only should be taken from cows that are at least 60 days postpartum. In practice, blood samples to detect pregnancy in beef cows are usually going to come from cows that are >80 days postpartum.

Progesterone Tests

The steroid hormone called progesterone is secreted into the blood or milk at different rates depending upon the day of the heat cycle. It is elevated during most of the cycle and low at time of heat. If a cow conceives, progesterone remains high until the end of pregnancy and is required at this level to maintain the pregnancy. If a cow is bred and does not conceive, it declines as usual at the end of the cycle when heat is again visible.

Blood or milk progesterone test kits can be purchased to analyze progesterone concentrations. To use these kits, a single blood or milk sample is collected at 21 to 24 days after breeding and analyzed. If progesterone is low, the cow is designated "not pregnant." If progesterone is high, she is designated "pregnant." The reasoning is that if the cow has not conceived, she will have lost her corpus luteum at testing time and progesterone production will be low. She should be, or had been in heat, if progesterone concentrations are low. Continued reasoning is that progesterone remains high if conception occurs.

Accuracy of determining a cow to be "not pregnant" (low progesterone) is almost 100 percent. Even if she were pregnant, she would abort with a low progesterone testing level. Accuracy of determining a cow "pregnant" (high progesterone) is less than 85 percent. In this case, progesterone may be high at the time of testing because certain cows have shorter or longer estrous cycles or an embryo is present, resulting in high progesterone. However, if the embryo dies at a later stage, the test may inaccurately designate the cow as pregnant. Therefore, embryo loss contributes to the inaccuracy of progesterone for identifying "pregnant" cows.

The lack of accuracy combined with the necessity to take the sample at a specific day post breeding makes progesterone tests problematic for pregnancy detection in commercial beef operations. Progesterone testing is limited in its use in the beef industry and may be more effective in dairy cattle if obtaining milk samples for testing.

Summary

Pregnancy testing is a beneficial management tool because it affords early pregnancy diagnosis with little hazard to the animal. Cows should be pregnancy tested as part of the weaning or early post weaning operation. This practice will assure that only cows carrying a calf will be kept through gestation and calving. Selling open cows will save feed valued at $100 to $300 per head, depending on the type of operation and preferred management practices.

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