



BEEF

Chapter 28

Pregnancy Determination and Using it to Better Manage Your Herd

George Perry, Russ Daly and
Robin Salverson

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Introduction

Each year following the breeding season all cows should be pregnancy tested to determine which cows conceived during the breeding season, and if conception occurred early or late in the breeding season. As feed costs increase the expense to maintain non-pregnant cows through the winter also increases, and these expenses must be paid for by the calves that are born and weaned the following year. For example, in a herd of 200 cows and winter costs of \$400 per cow; 12 non-pregnant cows kept through the winter would cost an additional \$4800. This would increase the cost for each of the 188 calves born by \$25.53.

There are definite advantages to grouping cows based on their expected calving date. The ability to focus time, labor and provide adequate shed space during inclement weather to the group of cows that should be calving. There is also health benefits that can be realized when calf ages do not vary greatly within calving groups. Calves born late are more likely to become exposed to the scour-causing organisms that have been building up from the beginning of the calving season.

Pregnancy Diagnosis

Pregnancy diagnosis has traditionally been performed by a local veterinarian using rectal palpation. However, many advances in pregnancy determination have occurred over the last few decades, and other methods to determine pregnancy include transrectal ultrasonography and blood sampling. Each technique has its benefits and its downsides, therefore each method should be evaluated based on your operation and your access to each technology.

Rectal palpation

Rectal palpation is the time honored method that has been used by veterinarians since the early 1900s (Roberts, 1986). A skilled veterinarian can determine a pregnancy between 30 and 35 days after conception (Ball, 1980), and can accurately estimate the age of the fetus (Kasimanickam et al., 2010). This method is performed

Key Points

- Keeping non-pregnant cows through the winter increases the cost associated with every calf produced.
- Many new methods for determining pregnancy status exist and include: rectal palpation, transrectal ultrasonography, blood sampling, and observation for return to estrus.
- Rectal palpation gives immediate results, but the accuracy is dependent on the skill of the veterinarian.
- Transrectal ultrasonography is similar to rectal palpation but allows for sex determination; however, the accuracy is dependent on the skill of the clinician.
- Chemical or blood tests require the sample be shipped to a laboratory to perform the ELISA.
- An animal that returns to estrus is not pregnant, however, the accuracy of detecting return to estrus is dependent on the amount of time spent observing for estrus.

by manually feeling through the rectal wall for the amniotic vesicle, the fetus, placentomes, or palpating for a membrane slip. This method of pregnancy determination gives immediate results, but the accuracy is dependent on the skill of the veterinarian. Furthermore, there can be incidences of embryonic loss due to rectal palpation, but these losses vary tremendously between technicians (Abbit et al., 1978).

Transrectal Ultrasonography

Transrectal ultrasonography is a newer technology that has become more routine as the portability and durability of the equipment has increased. Similar to rectal palpation, the clinician inserts the probe into the rectum and places it over the uterus. The probe will emit sound waves that bounce back differently depending on the density of the object (fluid will appear black and bone will appear white). A skilled clinician can detect a pregnancy as early as 27 days after conception (Beal et al., 1992; Fricke, 2002). As with rectal palpation, the results are known immediately when this method is performed. Furthermore, a clinician that is properly trained can quickly and easily determine the age, viability (presence of a heartbeat), and gender of the fetus (Lamb and Fricke, 2005). However, similar to rectal palpation the accuracy is dependent on the skill of the clinician.

Chemical Pregnancy Determination

Recognition of the fetus by the dam occurs around day 15 to 16 after insemination (Peters, 1996) through a chemical signal, but this chemical signal is not detectable in the circulating blood. However, when the embryo begins to attach to the uterus, there are binucleated cells in the placenta that migrate and fuse with the epithelial cells that line the uterus (Spencer et al., 2007). These binucleated cells synthesize proteins that are released into the maternal blood supply when these cells fuse with the uterus. One type of protein that is synthesized by these cells is pregnancy-associated glycoproteins (PAG). These PAG proteins can be detected in the circulation of the cow beginning approximately 25 days after conception (Green et al., 2005). A diagnostic technique called an Enzyme-Linked ImmunoSorbent Assay (ELISA) has been developed to detect PAGS in the maternal circulation

beginning around day 30 after conception. Currently there are three commercially available PAG tests for pregnancy determination in cattle. The first PAG test that was commercially available is through BioTracking, LLC (Moscow, ID) or through one of the commercial labs affiliated with BioTracking. The test is trade-named “BioPRYN”. Conception Animal Reproduction Technologies (Beaumont, Quebec, Canada) has partnered with AgSource Cooperative Services and Genex Cooperative (Cooperative Resources International, CRI, Shawano, WI) to market a test called “DG29”. The third commercially available test is being marketed by IDEXX laboratories (Westbrook, ME), and is being run by a number of affiliated laboratories across the country.

Where the previous two methods (rectal palpation and transrectal ultrasonography) required a skilled clinician, a chemical test only requires a blood sample be collected. However, sterile technique is required, both for the health of the animal and the integrity of the test results. Furthermore, unlike rectal palpation and transrectal ultrasonography where the test results are known immediately, these chemical tests require the sample be shipped to a laboratory to perform the ELISA. Therefore, results may not be known for a couple of days, and chemical test can only tell pregnant or not pregnant. Therefore, age of the fetus may not be known and the delay in the results may require gathering cattle a second time to sort pregnant from non-pregnant animals.

Estrus Detection

Observing for return to estrus is possibly the oldest method for determining pregnancy in an animal. Standing estrus results from a series of hormonal changes that occur at the end of each estrous cycle and results in a cow/heifer standing to be mounted by a bull or another cow/heifer. In a normal cycling animal, standing estrus will occur approximately every 21 days, but this can range from 17 to 26 days. Cows enter standing estrus gradually, and secondary signs that an animal is nearing standing estrus will progress until the animal stands to be mounted. Individually, none of these secondary signs allow for a confident determination of estrus (**Standing to be mounted by a bull or another cow/heifer is**

the only conclusive sign that a cow is in standing estrus and ready to be inseminated). The period of standing estrus (sexually receptive period) usually lasts about 15 hours but can range from less than 6 hours to close to 24 hours. Continuous observation of over 500 animals in 3 separate studies (Hurnik and King, 1987; Xu et al., 1998; G.A. Perry, unpublished data) indicated that 26.0% of cows initiated standing estrus from 6 a.m. through noon, 18.1% from noon through 6 p.m., 26.9% from 6 p.m. through midnight, and 29.0% from midnight through 6 a.m. Furthermore, observing 270 cows for standing estrus every 6 hours (6 a.m., noon, 6 p.m., and midnight) indicated that observing cows for standing estrus at mid-day increased estrous detection by 10%, and observing four times daily (every 6 hours) increased estrous detection by 19.9% over detecting standing estrus at 6 a.m. and 6 p.m. alone (Hall et al., 1959). This indicates that to detect the maximum number of cows possible in standing estrus, it is extremely important to observe cows as much as possible, and estrous detection should occur as early and as late as possible as well as during the middle of the day. Therefore, the accuracy of detecting return to estrus to determine pregnancy is very dependent on the amount of time spent observing for estrus. Several estrous-detection aids are commercially available to assist with the detection of standing estrus. However, **these are just aids, and the more time spent observing for standing estrus the better.** Results can be very good when using these devices in addition to visual estrous detection, but care must be taken to make sure they are properly attached to the hair of the animal. Care should also be taken when using these aids since they could be activated by low branches, brush, or fences.

Accuracy of pregnancy determination

No method of pregnancy determination is 100% accurate. With both rectal palpation and transrectal ultrasonography there is always the chance of human error in diagnosing pregnancy. The earlier a clinician diagnoses pregnancy, the greater the possibility to misdiagnose a pregnant animal. When determining the age of the fetus increased variations in fetal growth rates, presence of twin, etc. can make the uterus feel or look different than the actual age of the fetus. With the chemical test there is always variation in the amount of PAG produced and animals near

the threshold concentration for being diagnosed pregnant could be diagnosed as not pregnant. With visual observation for return to estrus, the amount of time spent detecting estrus is critical since estrus activity varies by animal and can last as little as a couple of hours. Furthermore, with any method of pregnancy determination, pregnancy loss can occur at any time, and an animal could be pregnant on the day of pregnancy determination and lose the pregnancy the next day.

Pregnancy determination and your herd management

Everyone is aware of the traditional reasons for determining which cows are pregnant at the end of the breeding season: timely culling of open cows, selling animals that conceived late in the breeding season decrease winter feed costs, etc. However, when we think about pregnancy determination as a reproductive technology and how it can impact overall herd management there are several reasons to not only determine which cows are pregnant but also when they conceived during the breeding season.

From a management standpoint, during the normal production year, cows should be given scour vaccine 30 days prior to calving. If we know when cows conceived and they are sorted accordingly into calving groups we can vaccinate the cows within 30 days of calving and receive the biggest benefit of the vaccine. At time of calving by knowing when cows conceived labor can be focused on the animals that should be calving.

When we consider combining pregnancy determination with other reproductive technologies, it allows us to determine how these technologies are performing. With artificial insemination (AI), it can be difficult to determine an AI pregnancy from a natural service pregnancy when pregnancy determination is done following the end of the breeding season. However, by waiting at least 10 days after the end of the AI program to turn bulls out with the cows a blood sample could be collected at day 30 to determine which animals conceived to AI. These results can be made available to veterinarian for confirmation at the final pregnancy diagnosis following the end of the breeding season. In addition, this would verify if any embryonic loss

occurred between the first pregnancy diagnosis and the final one.

Summary

There are now several options available for pregnancy determination in cattle. Rectal palpation is still widely used across the country, and can be very accurate for determining pregnancy status and age of the fetus, but the accuracy is dependent on the skill of the clinician. Transrectal ultrasonography has gained in popularity over the past several years as the durability and portability of the machines has increased, and as with rectal palpation can be very accurate in determining pregnancy status and age of the fetus as well as viability of the fetus (presence of a fetal heartbeat). Skill of the clinician is again a determining factor in the accuracy of this method of pregnancy determination. Chemical test allows for pregnancy diagnosis when a skill clinician is not available. A single blood sample can determine pregnancy status beginning approximately 30 days after conception; however, this technology currently requires a sample to be sent to a laboratory and therefore results are not known immediately. Whichever, method of pregnancy determination is used the knowledge gained by knowing which cows are pregnant at the end of the breeding season and if possible when they conceived during the breeding season allows for increased management of your herd through culling of non-pregnant animals, grouping by calving date, and increasing the efficiency of your operation.

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