

# BioPRYN<sup>®</sup><sub>wild</sub>, A Blood Test for Pregnancy;

## Pregnancy Detection in Deer and Elk

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The deer and elk breeder often would like to know if an animal is pregnant. Valuable animals become even more valuable with this information. Knowing pregnancy status can also provide a means for selection of alternate feeding, breeding and parturition management schemes for the herd. A female that has not delivered young the previous year or so may be permanently sterile.

Waiting to cull until the next calving season

wastes valuable resources. Extended birthing seasons are always a concern because females require special attention. If an animal is expected to give birth and hasn't, the question of whether she is just late or is not pregnant comes up. A pregnancy test at this time is helpful.



Photo courtesy of Hill Top Whitetails Deer Farm – Magnolia, OH

Pregnancy testing in the young female is important because pregnancy rates are lower. The skilled manager has an opportunity to increase profit by working with these animals. Young deer and elk in poor body condition will not reach puberty in time for the breeding season and will not become pregnant. Those with adequate growth can get pregnant; however, as a group it will be at a lower pregnancy rate than in older animals. Even so, puberty and conception are often late in the breeding season. Here is where pregnancy testing is desirable and it can be applied once they are 40 days after conception. During the parturition period, the manager can concentrate attention on those known to be pregnant and eliminate concern for others.

BioTracking LLC provides a service by testing blood for presence of the placental protein named pregnancy-specific protein B (PSPB). The trade name for the test is **bioPRYN<sub>wild</sub>**. Managers or veterinarians can send samples to the laboratory for testing. The assay takes three days to complete with set up on alternate weeks. The written report can be used as third-party testament that the animal is pregnant or not pregnant. This and certain other means for testing for pregnancy are discussed below.

### PREGNANCY DETECTION TECHNIQUES

There are several ways for testing for pregnancy. These include rectal palpation of the fetus or fetal membranes within the uterus, ultrasonography, measurement of blood progesterone, measurement of fecal steroid hormone metabolites, and measurement of blood PSPB.

## RECTAL PALPATION

This technique has been used by cattle managers for many years. It is used in deer and elk and consists of inserting the hand and arm into the rectum and feeling the uterus through the rectal wall. The technician feels for presence of the fetus or fetal membranes. In cattle this can be applied at 35 or later days in pregnancy. Deer and elk pregnancy can also be detected near this time in gestation. The technique is highly reliable at various stages of pregnancy. Error is greater at 35 days compared to 40 or 50 days after conception. The size of the rectal opening of the deer and size and of the hand and arm of the technician can limit testing and may result in undue stress for the animal.

## ULTRASONOGRAPHY

Success depends upon the skill of the operator, the type of instrument in use, and the animal to which it is applied. Real-time scanning of the uterus, in which an image is displayed on a video monitor, allows the operator to make a precise and accurate decision. In ruminants, including deer and elk, the conceptus is a filamentous structure during the first three to four weeks of age and contains little fluid. Until fluid accumulates, ultrasound cannot reliably detect the conceptus. A high degree of accuracy in cattle is not obtained until the third to fourth week of gestation. If an embryo/fetus is observed on the monitor, the animal is called pregnant with high accuracy. If an embryo/fetus is not observed, she is called not pregnant and accuracy is less because the probe may not have been positioned correctly for detection of the existing conceptus. Producers in New Zealand are actively using ultrasound for testing for pregnancy in red deer.

## BIOCHEMICAL MARKERS



Photo courtesy of Bonnie Brae Farms – Plymouth, NH

This type of detection falls into two categories. One is detection of pregnancy associated substances that change in the maternal system in response to a pregnancy. An example is progesterone from the ovary, which remains high during gestation.

The other category is detection of pregnancy-specific substances. These are produced by the fetus or placenta and appear in tissues or body fluids of the mother. Examples are human chorionic gonadotropin and pregnant mare serum gonadotropin. The placentae of deer and elk and other farm animals are not known to produce gonadotropins. However they produce PSPB, an inactive enzyme, which provides a test.

## TESTING FOR PREGNANCY BY ANALYSIS OF PROGESTERONE

This hormone is produced by the ovary during portions of the reproductive cycle. Since deer and elk are seasonal breeders and have cycles only during this season, the ovary will produce progesterone only during the breeding season. Production rises and declines with each reproductive cycle and thus progesterone can be high in non-pregnant animals. The season can run as late as March. During each cycle, it is low for a 3- to 5-day period during heat and high the rest of the 21-day cycle. If the animal conceives, ovarian progesterone production is no longer cyclic and remains

high until the end of pregnancy. The embryo/fetus stimulates the continued secretion. If pregnancy is not established or embryo death occurs, a new cycle will start if it is still during the breeding season.

During pregnancy, additional progesterone comes from the placenta. One can take advantage of the high progesterone during pregnancy. A blood progesterone test in the non-breeding season, say in April or later, and progesterone is high, then pregnancy is assumed. During the breeding season, if a deer or elk is not pregnant but the sample is taken during mid-cycle, progesterone will be high. One cannot declare her pregnant or non-pregnant because she was at mid-reproductive cycle, even though we did not know that. If it is possible to know the breeding cycle, such as following artificial insemination, and sampling during time of expected heat can be done. If progesterone is low then the animal is called not pregnant and this is a highly accurate decision.

Deer and elk are highly excitable animals, and handling them often to sample for progesterone testing is not practical. Bleeding for progesterone after animals have ceased having reproductive cycles in the spring can also result in false positive detection because of excess progesterone being produced by the adrenal. The adrenal gland secretes this hormone if the animal is placed under excess stress, and false positive assays could result.

### **BioPRYN<sub>wild</sub>**

#### **PREGNANCY TESTING WITH (PSPB)**

Use of this protein as a pregnancy test was first reported by us in 1986 (Sasser et al., Biol. Reprod. 35:936) and has been used to develop a blood pregnancy test for all ruminant animals including deer (Willard et al., J Anim. Sci. 77:32, 1999) and elk (Huang et al., J. Wildlife Mgmt. 64:429, 2000). The PSPB is a major product of the placenta, once attachment to the uterus has begun. The protein appears in blood of some cattle as early as 15 days after conception, but to be reliable as a pregnancy test on a herd basis, one must wait until 28 to 30 days into gestation. The PSPB remains in the blood throughout gestation. For that reason, one does not need to know date of breeding to detect pregnancy if it is assured cows are past 30 days into gestation.



Deer and elk can also be tested for pregnancy any time after 40 days of gestation. We have been testing deer and elk samples mailed to the laboratory from herds throughout North America. Breeders have been satisfied with the test. When breeders send samples too early in the breeding season, some are not 40 days into pregnancy and animals will be called not pregnant. Care must be taken to assure that 40 days have passed since conception. In artificial insemination situations, timing is known. If males are away from female for 40 days, this is a good time to test.

#### **ARTIFICIAL INSEMINATION (AI) OR BACKUP BULL CONCEPTION**

A schedule for testing for PSPB has been developed to indicate to which sire the fetus was conceived. Deer and elk breeders are actively using artificial insemination by breeding following synchronization of heat. These animals are all inseminated on the same day. Normally, 60 to 70

percent will conceive to a single breeding, and so backup bulls are placed with cows to increase herd conception rate during the breeding season. To allow for an indication of AI-sire conception, the breeder must keep the backup sire out of the herd until 14 to 16 days after AI. A blood sample is then taken 40 to 42 days after AI. Since PSPB can be detected first near 40 days after conception, the test will rarely detect backup bull conceptions because they would only be 26 days old or younger, while the AI conceptions are 40 days old. Parentage testing is needed to assure AI conception.

### ACCURACY OF THE BioPRYN<sub>wild</sub> TEST

A study was conducted in fallow deer (*Dama dama*) by Willard et al., (J. Anim. Sci 77:32, 1999) in which pregnancy testing by ultrasound and PSPB were compared. At 30 days after buck removal, the two tests agreed 96.6% of the time. At 90 days agreement was 100% in mature and 2-year old does. Both ultrasonography and the blood testing methods could have contributed to this slight error. An advantage of using bioPRYN<sub>wild</sub> over ultrasonography is that detection can be done based on a blood sample, whereas ultrasonography requires that an experienced technician be present on-site. A drawback of blood testing is a delay in obtaining results. However, the BioTracking lab conducts tests biweekly and results are available on the weekend of the test week.



To give a better idea of the accuracy of the test, results in cattle that had been bred from 0 to 60 days prior to slaughter were examined. Blood was collected at time of slaughter and the uteri were examined for presence of an embryo or fetus. If the conceptus was not discernable by observation, the reproductive tract was flushed and fluid was searched under a microscope. Of 187 cows determined not pregnant by uterine examination, the PSPB test was 94.7 percent correct in calling cows not pregnant. Of 242 detected pregnant by uterine examination, those less than 25 days into pregnancy were detected correctly at 15.7 percent.

However, if they were 25 days or more in pregnancy, the PSPB assay was 99 percent correct (Mauer et al., J. Anim. Sci. 61:390, Suppl. 1. 1985). Examination of the reproductive tract is the sure way to know if the animal was pregnant; however, such a study is not practical in highly valued deer and elk, which are rarely culled in large numbers. Accuracy in deer and elk is only confirmed by birth of a live offspring.

### CAUTIONS ABOUT PREGNANCY TESTING

It is often the opinion of breeders, researchers and practicing veterinarians that a very early test is desirable. However, embryonic death rate is high, and certain deer, elk or cattle which test positive for pregnancy early will be non-pregnant at a later time. If one evaluates cattle, there is up to 40% loss from breeding until 30 days of gestation. Also, there is a 5% loss from 30 to 60 days. Other ruminants, including deer and elk, have equal difficulty in maintaining a pregnancy. For the producer who pays for the animal, the importance of knowing status of pregnancy status, and the expense of the testing is important.